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REPORT

for

Redbank Mines

on the

Redbank Area

Copper Project

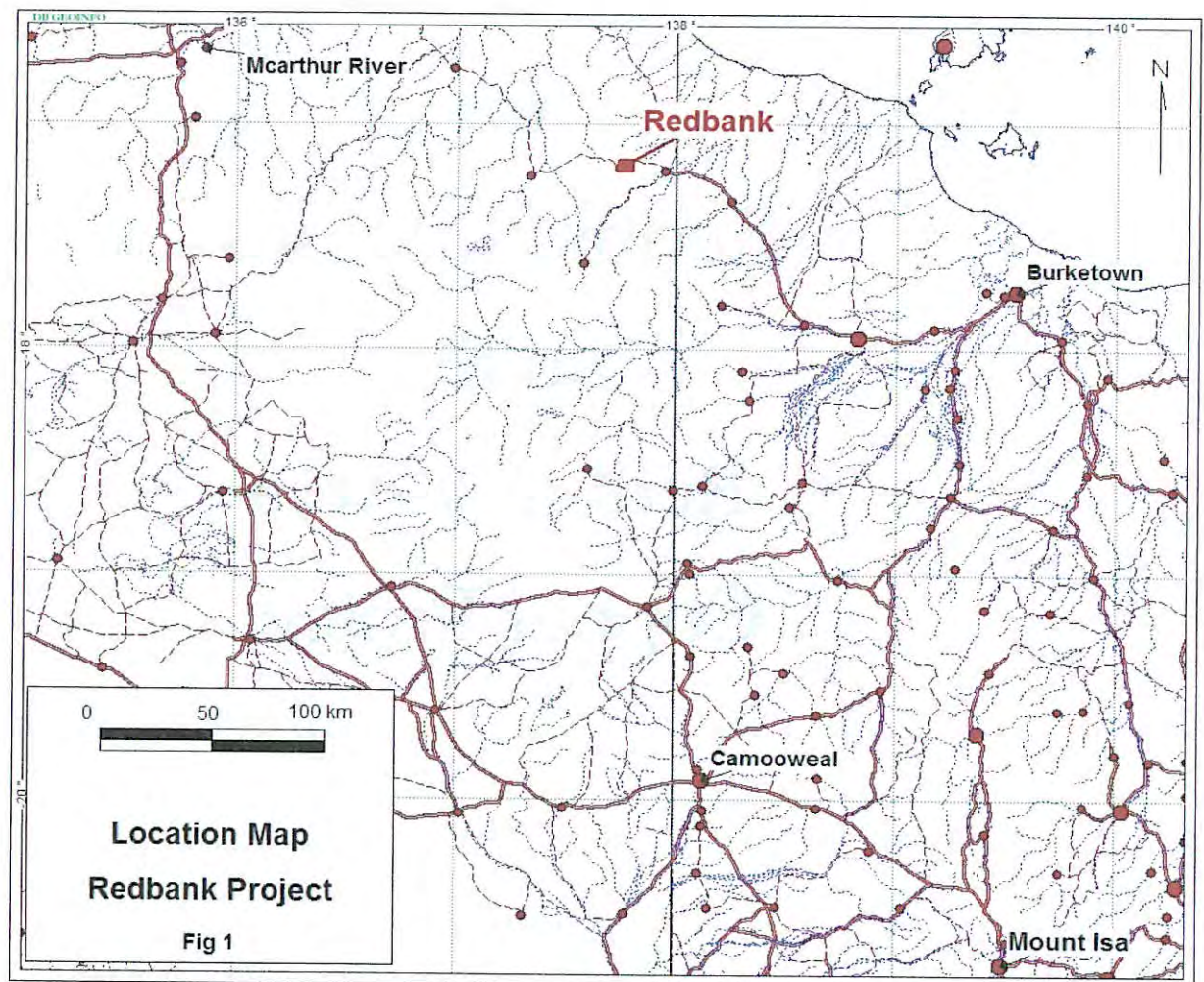
April 2009

By: Dr Joseph Drake-Brockman

Introduction

The Redbank Project Area was visited by Dr Joseph Drake-Brockman, between 25th March and 8th April 2009. The field work was vehicle supported - driving each day from Redbank Camp. Fig. 1 shows the regional location.

The aim of the visit was to check the previous mapping (AMDEX Mining Ltd, 1:10,000 1975 Fleming et al 1975) and examine outcrops at the main mineralized sites. The outcrop data along with a certain amount of photo interpretation was compiled into Map Info along with the relevant parts of the historical geology.



Project Geology

The project area is located near the eastern margin of the Proterozoic McArthur Basin immediately adjacent to the Northern Territory-Queensland border. It occurs within the upper part of the Tawallah

Group; a mixed volcanic-sediment package with some minor granite intrusion. The project occurs within a 100 km wide and 400 km long NW trending structural corridor that parallels the Calvert Fault.

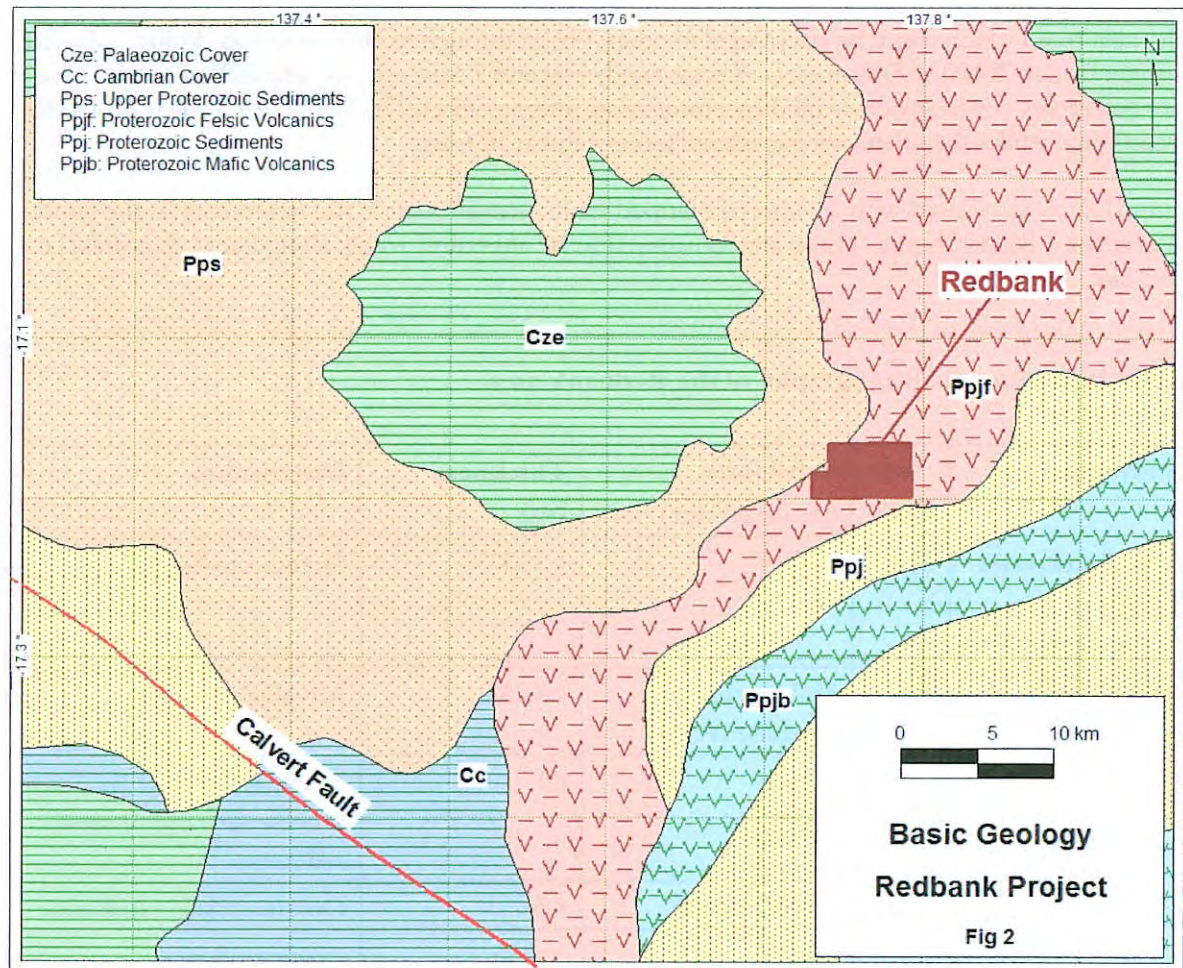


Fig. 2 shows the regional geology (above) while Table 1 records the stratigraphy (below).

The copper mineralization at Redbank is primarily hosted by structures within the Gold Creek Volcanics. These structures are generally described as breccia pipes or vein-like zones of alteration. The pipes are generally <75 m in diameter and have been traced to approximately 350 m in depth into the underlying Wollogorang Formation. Disseminated and veinlet chalcopyrite is the primary copper ore. Wall rock alteration includes bleaching, reddening, argillic and chlorite alteration. The breccia material includes primary insitu broken trachyte and hydrothermal copper and gangue minerals with secondary in-fill material of sedimentary origin that has collapsed into the pipe. The upper 35 m or so has been oxidized by surface weathering and is dominated by secondary copper minerals and superficial clay overprint. Uranium is associated at low grades with the mineralization.

Fig. 3 (below) shows the generalized project geology based on the 1:250,000 published geological map and also shows the location of the known prospects. The main features are the east west orientation of the copper showings and their occurrence in two (or three) E-W zones. The Redbank

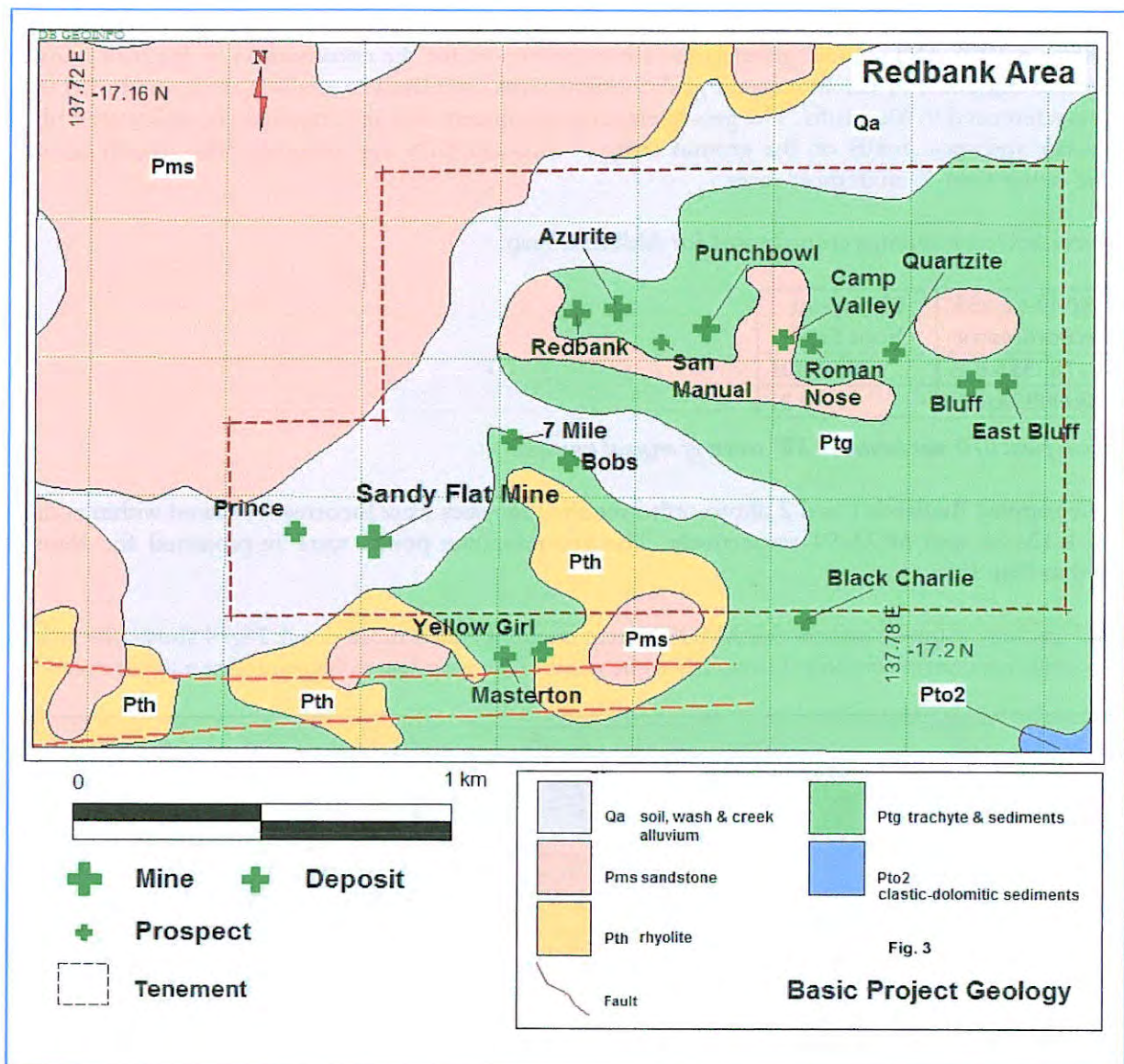
through to Bluff line of showings forms a quite distinct and fairly tight zone at about WNW-ESE. All of these showings (apart from East Bluff) have been shown to be associated with breccia bodies.

The next trend which might be considered to count Prince through to Bobs is not so distinct. Alternately it might be two WNW-ESE zones; i.e. Prince-Sandy Flat and 7 Mile – Bobs. The lack of outcrop due to the Quaternary cover obviously hinders a more exact interpretation. The Sandy Flat Mine is hosted by a breccia pipe while the others are considered more vein-like in form.

A third zone associated with a series of mapped faults occurs outside the tenements to the south Masterton – Black Charlie. These are considered to be alteration zones along linear fractures; i.e. vein-like.

Table 1: Proterozoic Stratigraphy of the Redbank area

Formation	GA Code	Sub-Units (Amdex Units)	Thickness (m)	Description
Echo Sandstone (Pms) (<i>ex Masterton Sst</i>)	Pps		>150	Quartz sandstone
Gold Creek Volcanics (Ptg)	Ppjf	Hobblechain Rhyolite (Pth)	10-25?	Rhyolite intrusive
		Upper (Ptg5)	60	Trachyte flows & mud-lava breccia with minor clastic sediments
		Middle (Ptg5)	<5	Quartzo-lithic sandstone
		Lower (Ptg3)	+/-50	Trachyte flows
		Base (Ptg2)	+/-50	Trachyte mud-lava breccia & tuff; clastic sediments
Wollogorang Formation (Pto2)	Ppj		>150	Mixed clastic-dolomite units
Settlement Creek Dolerite	Ppjb		200	Dolerite



Results

Details Previous Mapping

Previous mapping by AMDEX Mining was provided by Redbank Resources as a 1:10,000 sticky-taped mylar compilation of a photographically reduced larger scale set of geological maps. The map was based on a local foot grid. There were some minor but obvious jogs where the sheets had been joined (taped). The map was scanned at 200 dpi and written as a tif file (sheet1.tif) to CD.

Using a 1966 AMG value (given in the surveyors report for the construction of the foot grid) for the starting point of the foot based grid; 9 points were calculated to enable the scanned map to be geo-referenced in Map Info. The geo-referencing compared with the supplied geo-referenced photo mosaic and spot points on the ground using a handheld GPS was adequate. The overall accuracy was better than 10 m in most cases.

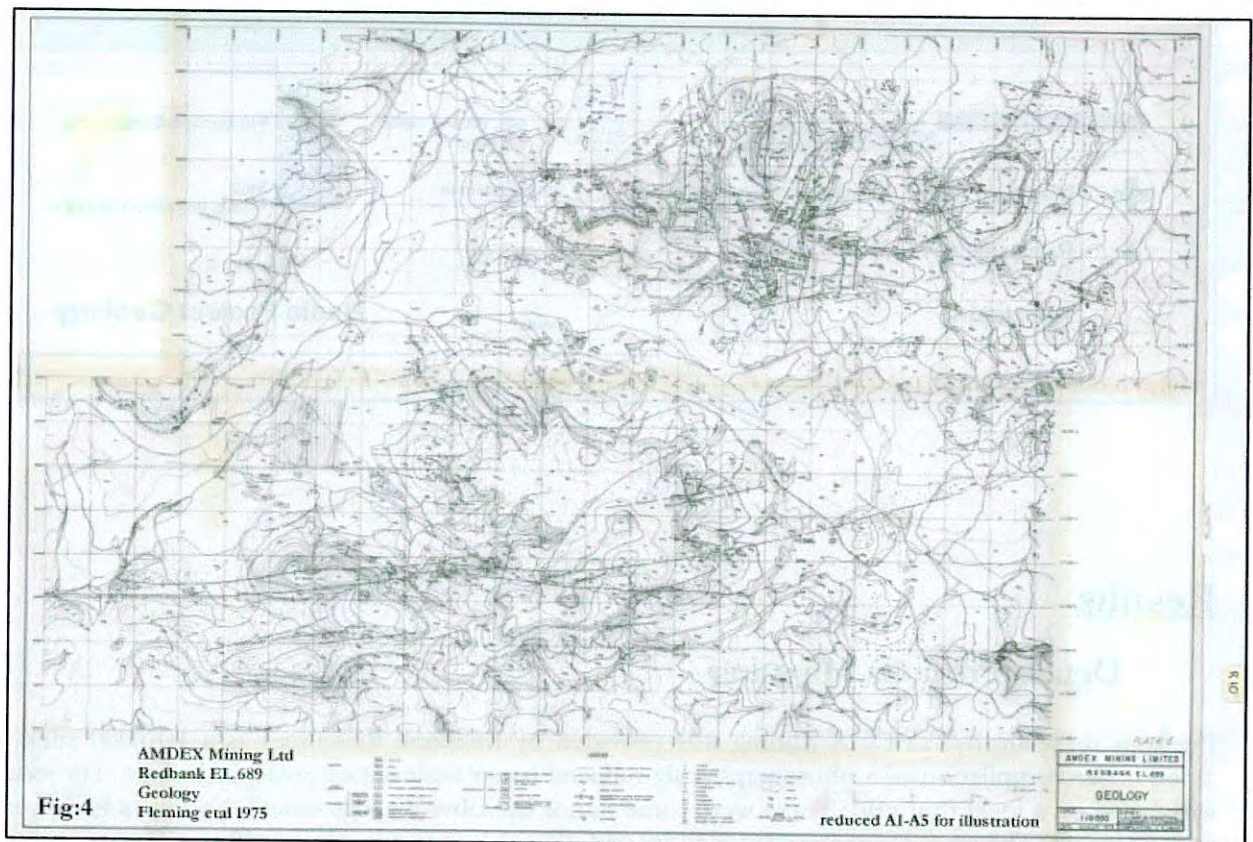
Table 2: Geo-reference co-ordinates for AMDEX map.

AGD-66 z53 co-ordinates	Newmont Foot Grid
783555.6 E	0 E
8090824.0 N	0 N

Note; point 0/0 was located at SW corner of original tenement.

The supplied Redbank 1 and 2 photo ortho-rectified mosaics were incorrectly located within zone 54 of UTM-84 and MGA-94 respectively. The geo-reference points were re-projected for zone 53 within Map Info.

The geology as presented on the AMDEX map contains much more detail. Fig. 4 shows the style of the map for illustration only. Obviously to be useable the map has to be printed at a larger scale.



Comments: Previous mapping

In general terms the AMDEX geology is quite accurate and of a high standard. In particular the trachyte sequence has been carefully mapped. The detail in the Redbank - Bluff zone is excellent. The main attention appears to have been directed at mapping the interflow sediments and of subdividing the trachytes; firstly into three stratigraphic units (Ptg2, 3 & 5) and then by use of stippling into massive, vesicular, breccia, mud-breccia and pink altered varieties. Ptg4 is an extensive brown quartzo-lithic sandstone that has been used as a marker horizon. See Table 1 (above) for details. The only quibbles with this work are that the colour variations apart from the 'pink alteration' have been neglected. There are numerous distinct layers or patches of brown tan coloured trachytes which contrast with the 'average' dark brown trachytes. This may be significant as the 'pink alteration' which is frequently associated with either copper mineralization or brecciation may grade into the tan coloration. This association is uncertain at this stage because there are tan layers that are apparently not located near mineralization.

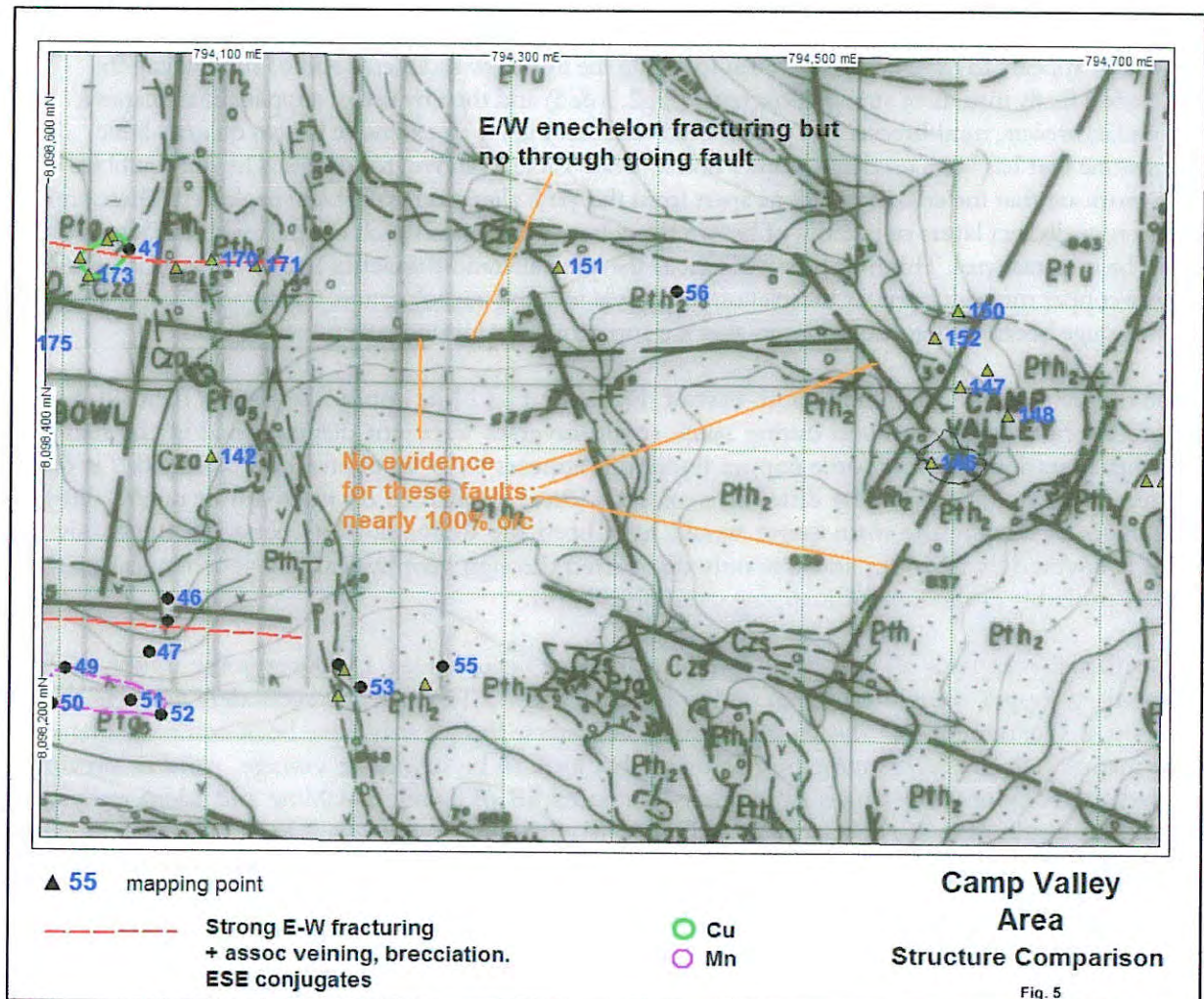
The mapping to the south and south-east of the Sandy Flat Mine appears to be less detailed. Several altered zones that were noted during some scout traverses were not distinguished in the mapping. As this alteration contains some copper traces this appears to be an oversight. Possibly this is due to different levels of mapping by different geologists (three are named on the map) or due to different emphasis as initially the main target would have been the Redbank-Bluff zone. As the Sandy Flat area is covered by alluvium and was only discovered through geophysical and geochemical methods it was probably at the time of mapping a peripheral area.

The map also records all the most significant copper occurrences. However some minor spots of secondary copper were located that had not been recorded. In particular secondary copper exposed in a pit at Quartzite is not shown on the map. Of course the pit may have been completed later but the mapping does record numerous costeans that look to be of similar vintage. And as previously noted altered zones with traces of copper were noted SE of Sandy Flat Mine and additionally other areas alongside the Masterton and Yellow Girl prospects were also located. There is some uncertainty when comparing copper stained outcrops with the map as the copper occurrences are only symbolized on the map hence may well be inaccurately located.

Another area of issue is that many of the faults shown on the map appear to be airphoto interpretation and not actually mapped faults. It is strongly doubted whether many of the N-S orientated faults exist. Some of the mapped faults cut through solid sandstone exposure without any sign of disruption. Fig. 5 shows this as an example. The E-W faults marked on the AMDEX map do align with zones of E-W fracturing but none of the fractures show any length (<5m) or much suggestion of any movement beyond the occasional pocket of brecciation. While the NWN fault south of point 151 is plotted as passing through solid sandstone outcrop with absolutely no signs of any fracturing or disruption. It has obviously been interpreted based on a low scarp alongside the shallow gully.

Since the map was compiled the stratigraphy of the area has been revised by the NTGS. The Masterton Formation has been re-named the Echo Sandstone. Conglomeratic and sandstone units ascribed to the Hobblechain Rhyolite are now placed at the base of the Echo Sandstone. Presumably the change was made because the rhyolite is now considered to be an intrusive. This cuts down the areal coverage of the Hobblechain Rhyolite; in particular the large amount of sandstone mapped in an around the Redbank-Bluff areas are now just extensions of the Echo Sandstone. Similarly a flaggy

silty sandstone mapped as the Pungalina Member of the Masterton Formation is now just lumped into the Echo Sandstone



The Pungalina Member is now part of the Warramana Formation a lateral equivalent of the Echo Sandstone. The Gold Creek Volcanics remains the same.

Sandstones marked K (Cretaceous) on the map are frequently though not always associated with the breccia pipes and often show slump brecciation with subsequent re-cementation. These sandstones are silicified clean washed quartz sandstones with small scale planar crossbeds that look very similar to the Echo Sandstone. Orridge and Mason 1975 give their age as mid Tertiary. Rotated blocks of re-cemented sandstone breccia were located within the pipe breccias at Redbank, Azurite and possibly also at San Manuel. It is possible that these sandstones are just part of the lower Echo Sandstone.

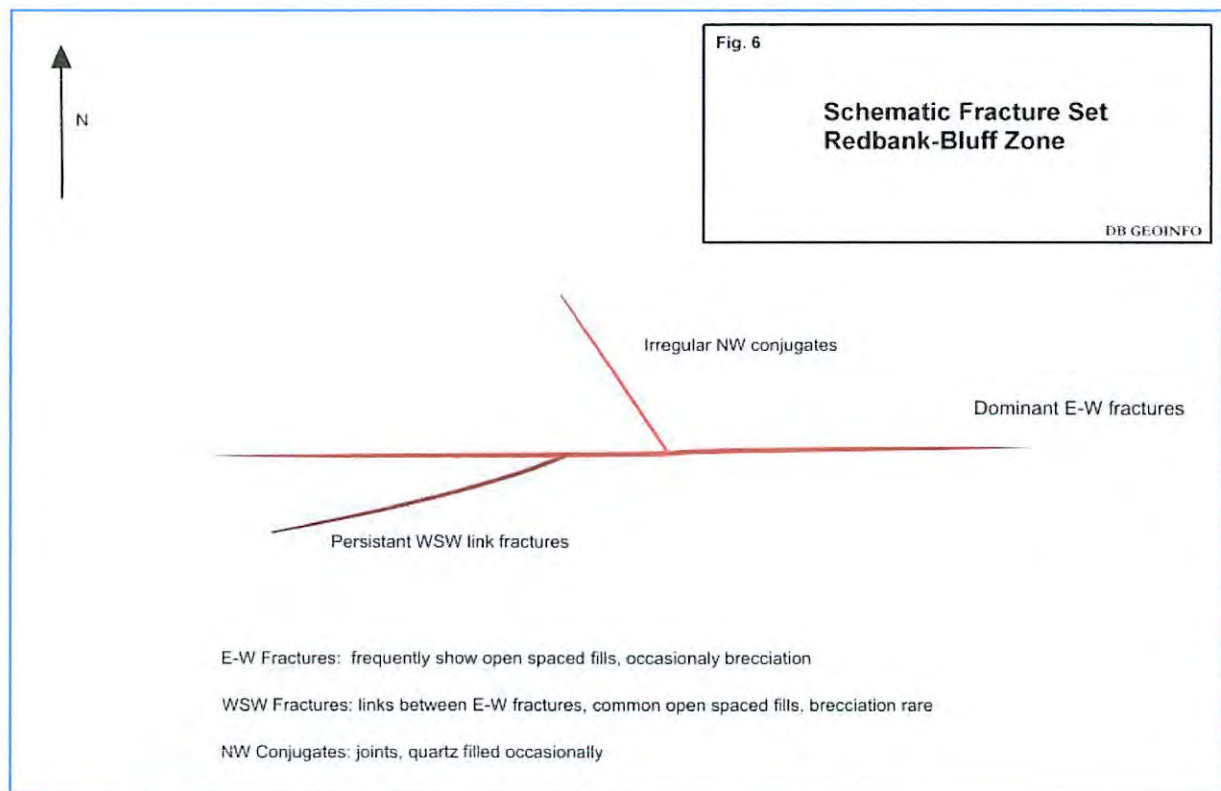
Field Work March-July 2009

Redbank-Bluff Zone

All of the known sites of mineralization were visited to gain an appreciation of the basic geological settings. The following conclusions were made.

Structure

The structural fabric within the zone is characterized by broad bands of predominantly E-W open fractures. These fractures are narrow (1-3 cm) open fracture sets at E-W (dominant), WSW & NW directions; filled variously with hematite, limonite, chlorite or quartz; of limited length (5-10 m) with limited signs of movement and only occasional mostly minor brecciation. Fig. 6 illustrates the fracture orientations schematically while Fig. 7 shows the same set in outcrop.



A very similar fracture set can be observed at the W end of the Redbank workings (Fig.13).

In section there is some indication of shallowly dipping tectonic breccia zones that link the vertical fractures. Fig. 8 shows this schematically while Fig. 9 shows it in outcrop.

Associated with this zone of E-W fracturing there is a zone of steepening of the dips – a monoclinial flexure. This was noted in particular between Punchbowl and Camp Valley and east of Quartzite. Fig. 10

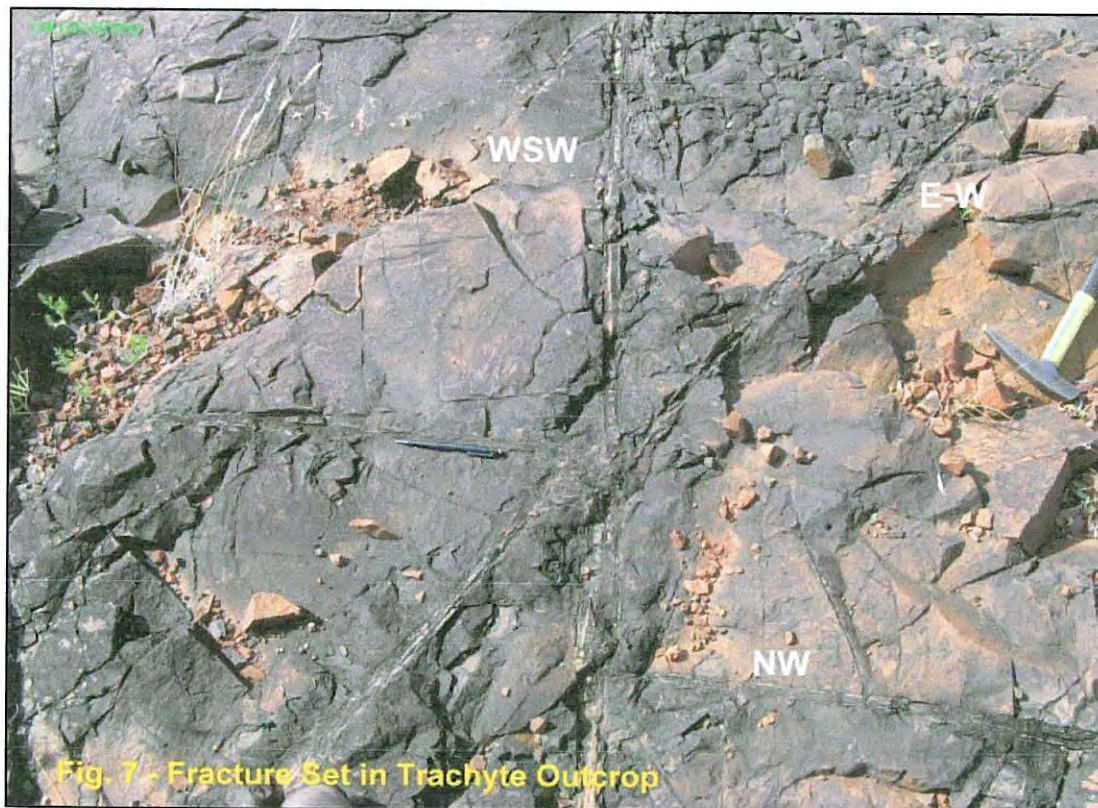
shows the main zones of fracturing and the flexure. North of East Bluff strong slickensides on near horizontal layer surfaces in the trachyte indicate some slippage along the layering in response to this flexure. Movement was bottom block north.

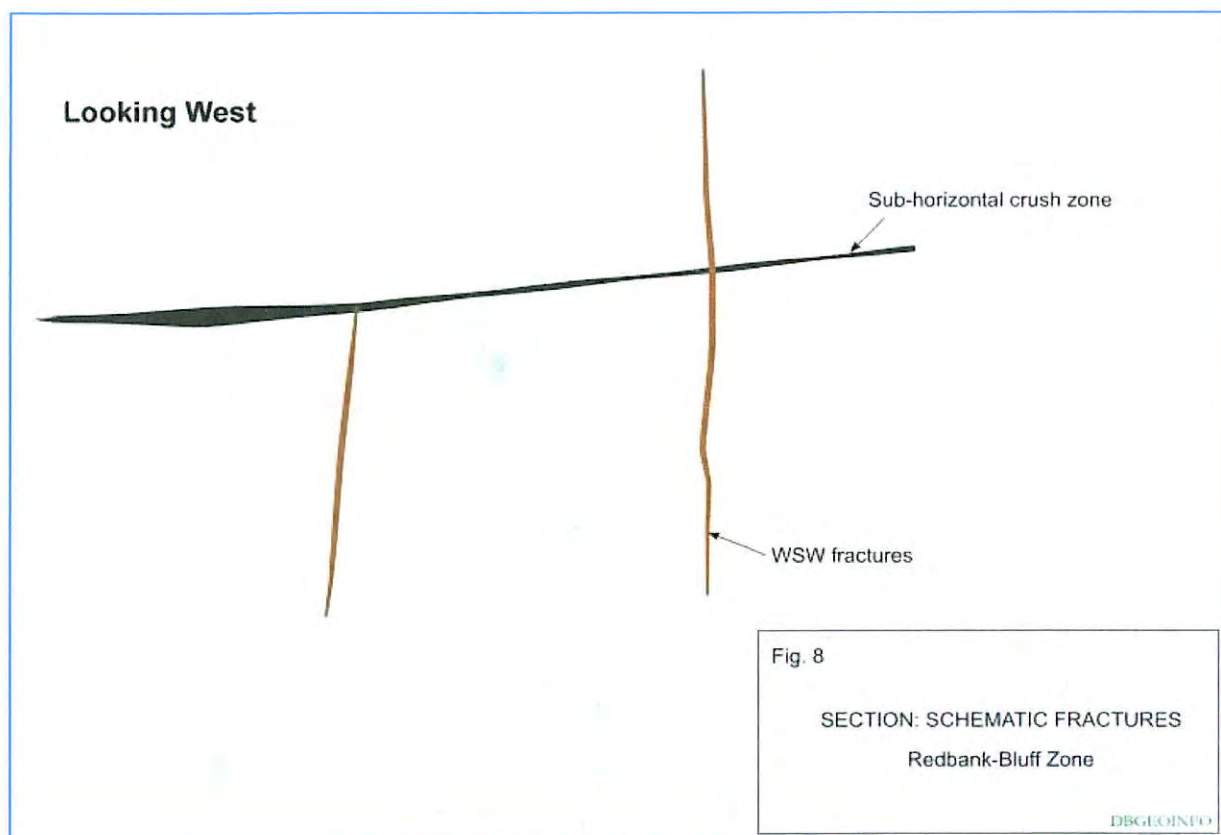
Such a zone of short open fractures may have occurred along the margins of a shallow graben structure in the underlying basement. This downward movement would result in a slump flexure in the overlying beds as support is removed and also initiate tensional fractures to accommodate the stretching required. The graben margin would of course be an obvious site for breccia pipe formation. Figure 11 (taken from Badgely 1965 of an experimental deformation of clay slabs) illustrates the suggested setting.

Rawlings (2005) suggest that the Redbank area (Mitchell mesopackage of the Redbank Package) has undergone the following tectonic processes:

- upwelling due to magmatism,
- downwarping due to underplating , volcano-sedimentary loading and thermally driven phase changes in the lithosphere,
- and strike-slip faulting.

This model of moderate up and down movements would seem to be able to accommodate sets of shallow grabens in response to the volcanic activity.





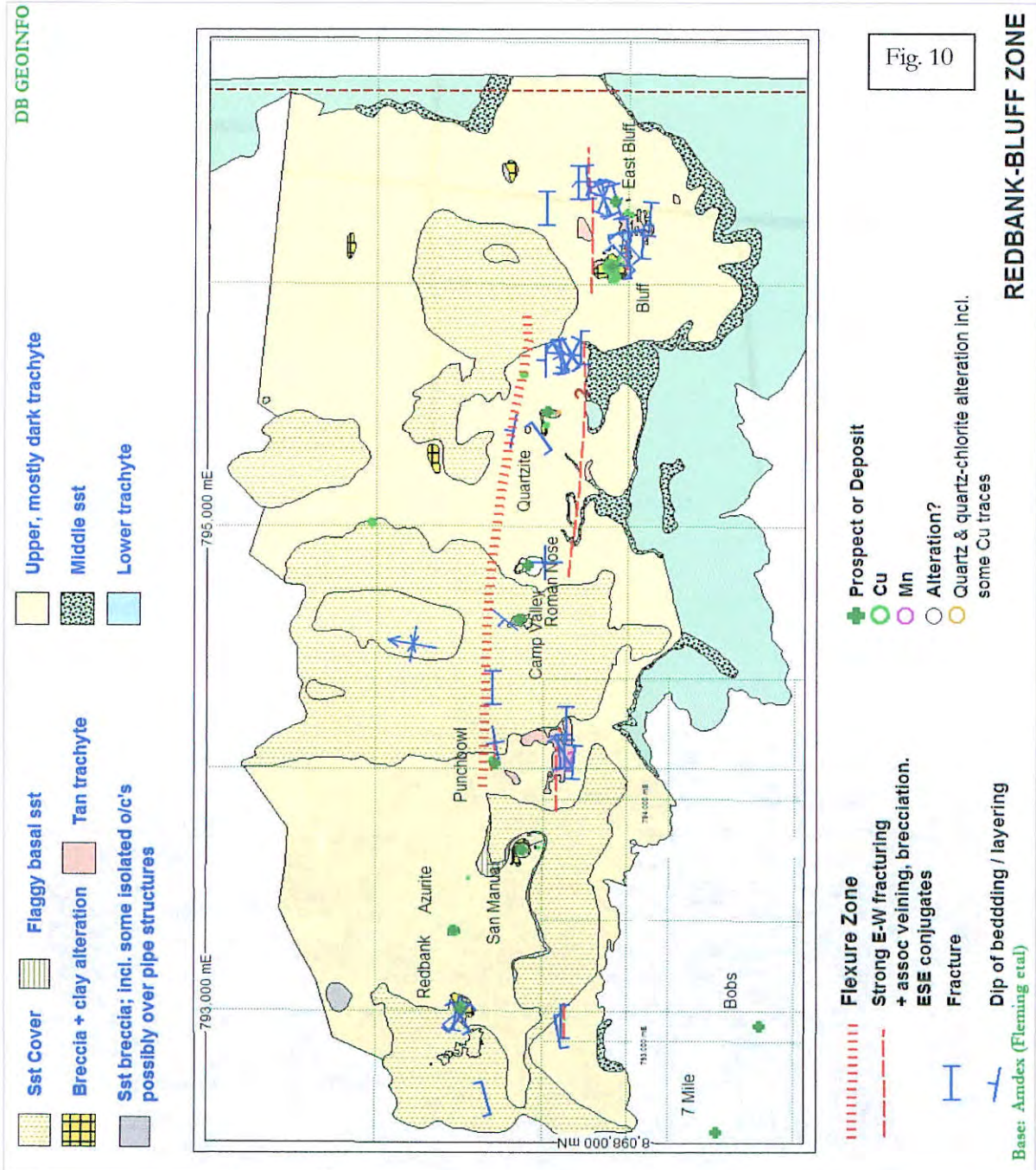
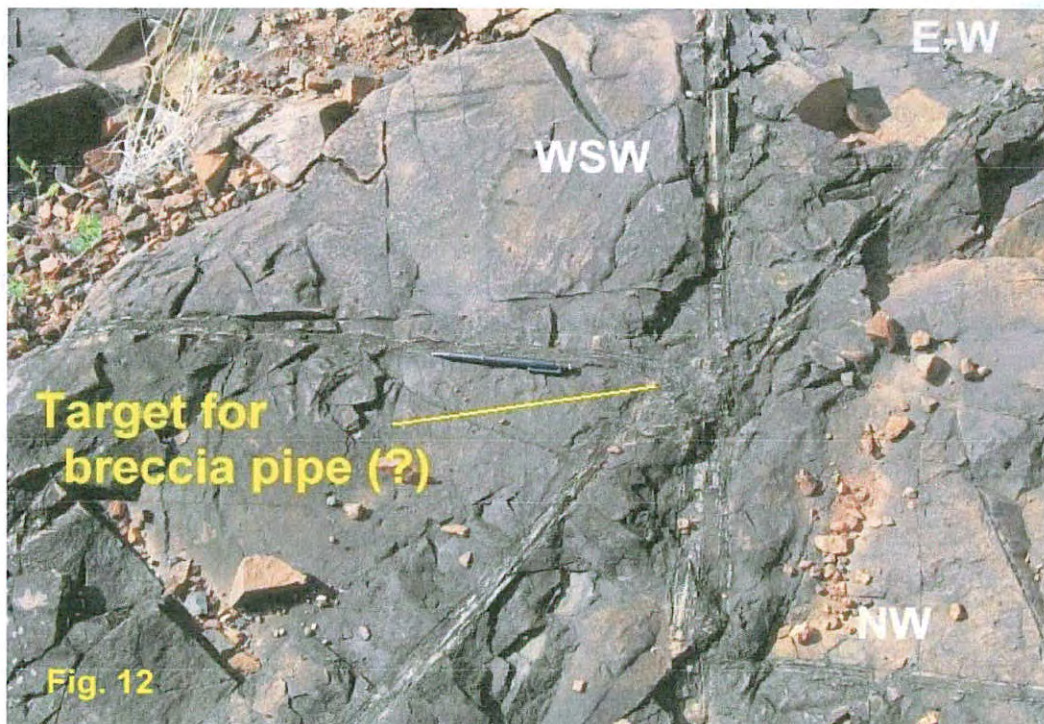
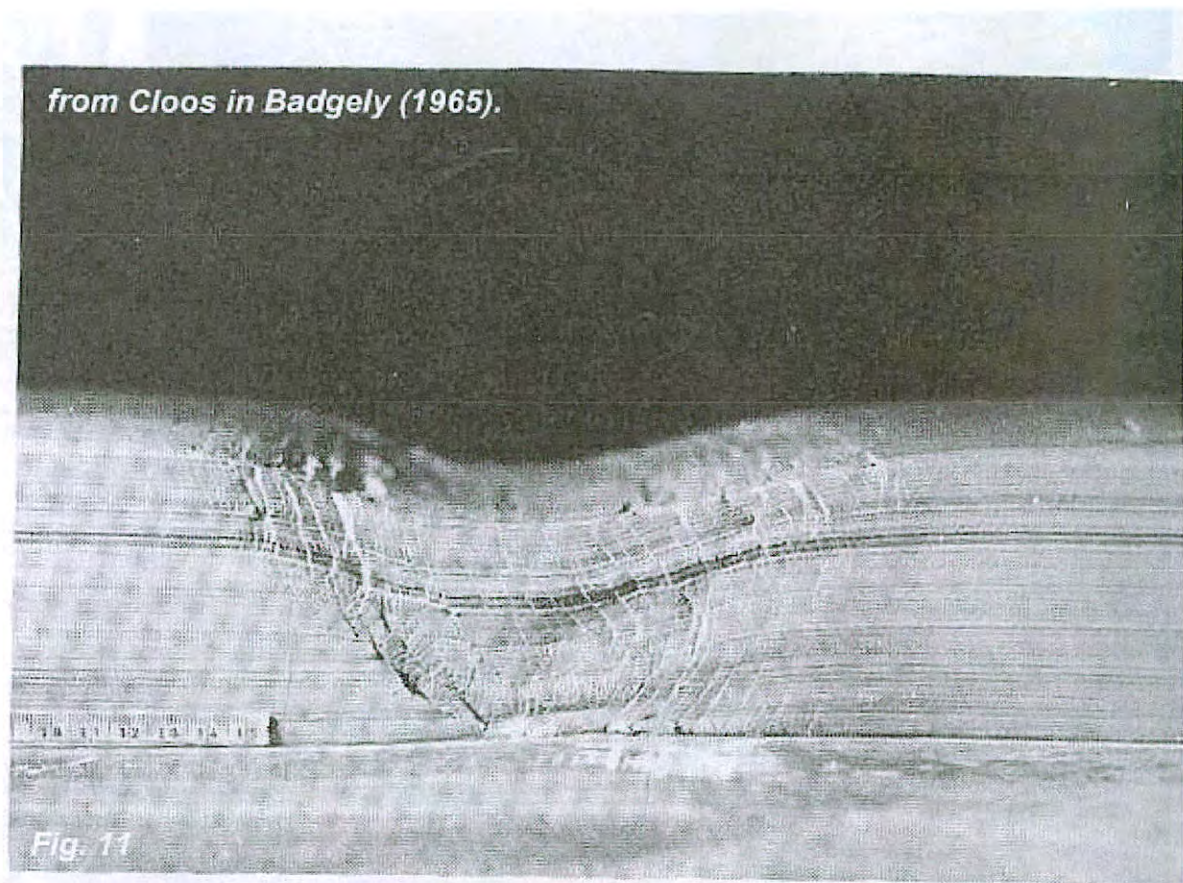
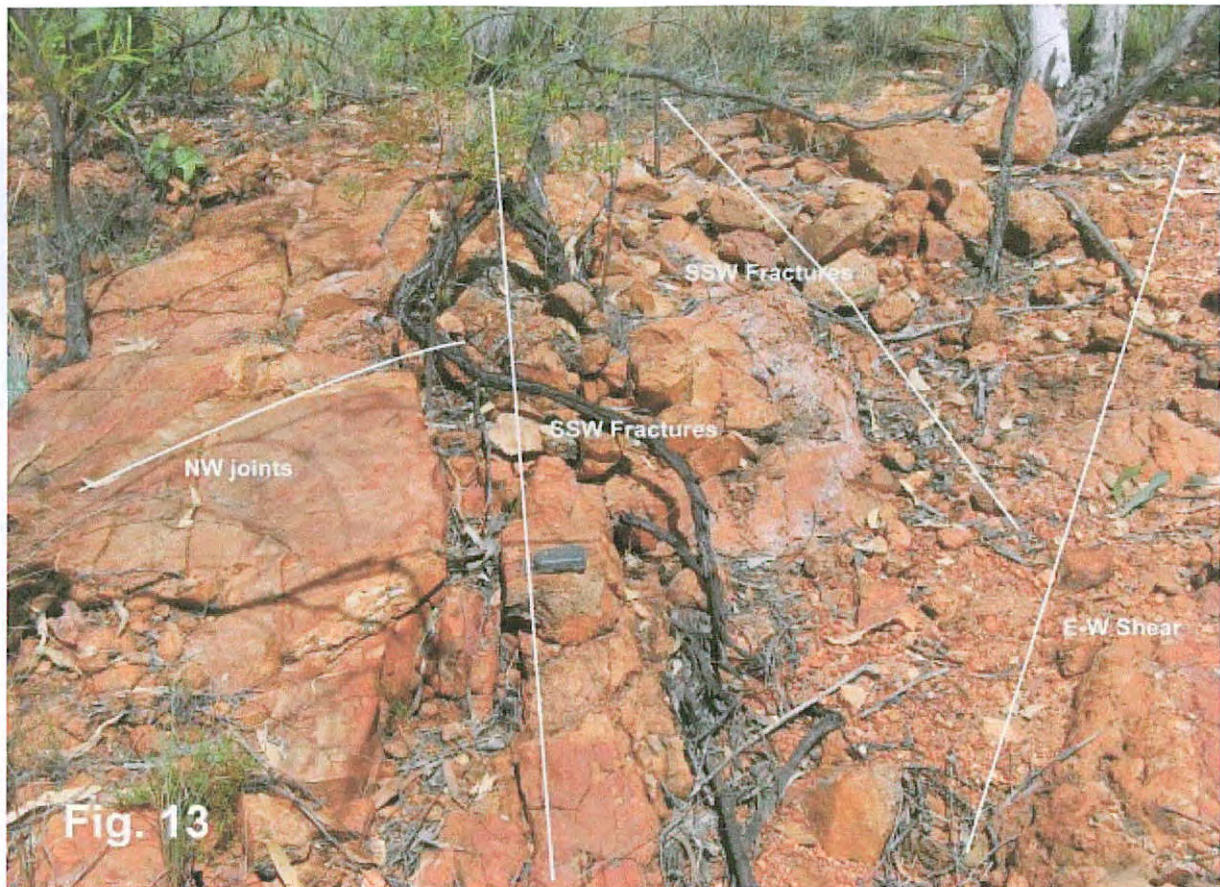


Fig. 10





The only indication of movement along these E-W fractures was noted at East Bluff where slickensides in a minor fault face showed N block E movement based on the preservation of breaks in the slickensides. Based on the slickensides the movement was mostly strike slip.

In conclusion:

- structures seen in outcrop give valuable hints as to likely localization and form of breccia pipes,
- e.g. Fig. 12 shows the intersection of fractures set likely to provide zones of weakness and incipient brecciation for the formation of breccia pipes,
- and the flat lying breccia shown in Fig.'s 8 & 9 may form the model for the Azurite mineralization;
- and the model of submerged grabens with associated slumping and fracturing may explain the features seen in the field.

Copper Mineralization and Associated Alteration

Secondary copper mineralization is abundant at the surface at Redbank, Azurite and Bluff; all sites of detailed resource drilling and consequent site preparation. Rainfall runoff fills the Redbank pit. Previous workings at Azurite have been obliterated by dozing. Small amounts of oxide ore and low grade mineralized material exist at both sites.

Small amounts of copper stained trachyte and grayish vesicular silica altered rock were noted at Punchbowl (exposed by access dozing), Quartzite (exposed in an old pit) and East Bluff (exposed in a bulldozer scrape and as scattered specks along adjacent outcrop faces). Only East Bluff is shown on the map. Possible minor traces of secondary copper were noted on the southern rim of the San Manuel structure. In addition traces of copper and silica alteration were noted east of Azurite and also east of Quartzite.

Fig. 13 shows the locations of the known copper showings and the copper noted in the field. Note there is a Cu showing on the map 500 m NNW of Quartzite that was not noted until a detailed examination (zoomed in) of the map was made. This showing has not been named therefore it is possibly of only minor significance. In addition manganese stained fractures and minor amounts of manganese filled breccias were noted south of Punchbowl (see Fig. 14). None of these finds are regarded as particularly significant.

The copper mineralization is accompanied by:

- argillic alteration of the wall rock which is quite possibly extensively modified during weathering
- limonite-clay alteration of adjacent trachyte
- blocks of sandstone and mudrocks both as rotated fragments and as re-cemented breccia – presumably basal Echo sandstone,
- ‘pink’ alteration and bleaching of adjacent trachyte,
- larger zones of reddening and tan coloration in the trachyte,
- limonite-hematite veining,
- outcrops of slumped and brecciated sandstone at some localities,
- and topographic depressions.

[All of which have been commented on by previous workers.](#)

Also noted was a zone of argillic alteration within the sandstone outcrop west of Redbank Pit. This may indicate the presence of a second adjacent pipe. Nearby a single occurrence of possible pebbles of copper stained clay in the sandstone was noted (see Fig. 15 for picture). They are rounded but not concentrically zoned blue-green clay pebbles (?) in the sandstone. This would suggest erosion of the copper mineralization during the sedimentation of the basal part of the Echo Sandstone.

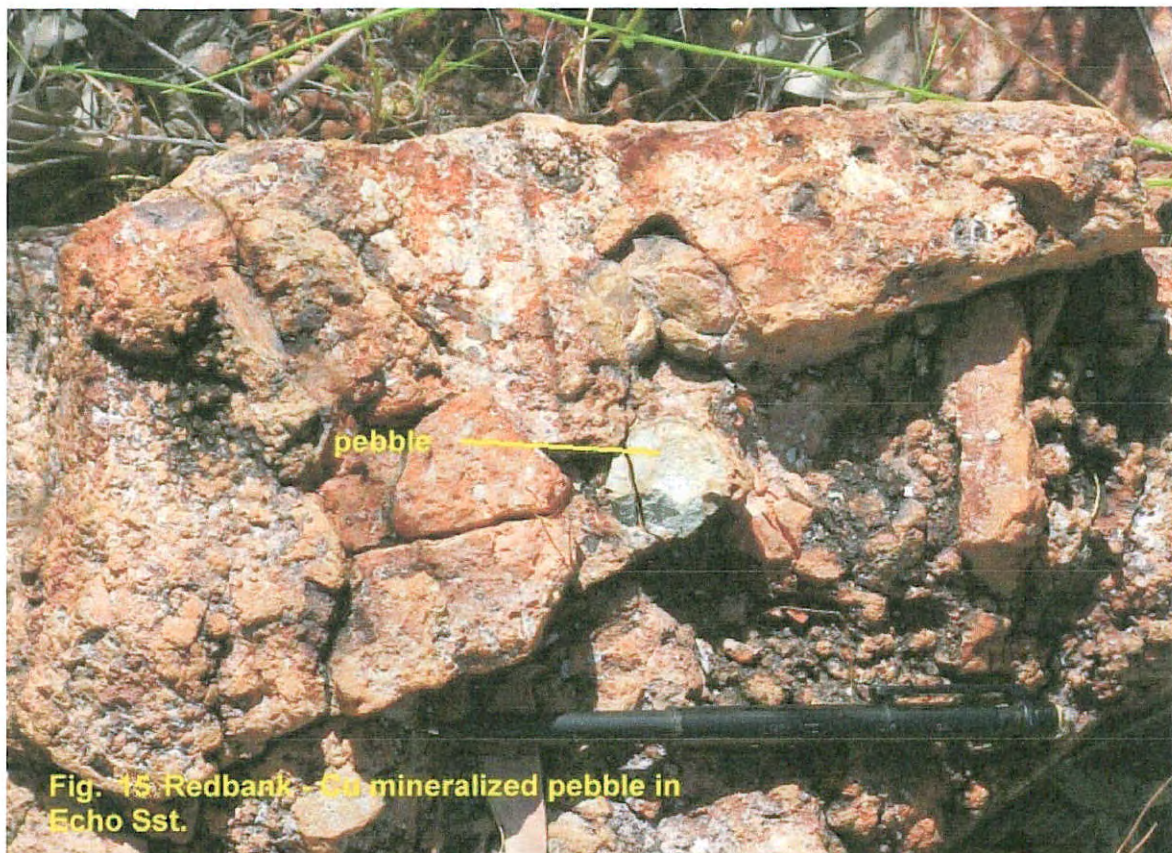
An examination of the map and of the air photo mosaics resulted in several spots on the map showing one or more of the above features being selected for possible follow-up work. These targets are shown on Fig. 14. These are just preliminary and need some follow-up before being regarded as genuine targets for say ground EM work.

Within the Redbank-Bluff zone itself the following points were noted:

- the zone between San Manual and Azurite is a target because of the minor copper stain found along the edge of the outcrops and present drainage and associated scree slopes may have disguised a breccias zone.
- at San Manual the two drill holes noted only tested the NE portion of the target. A limonite-clay altered trachyte outcrop on the SE part of the ring structure was not tested,
- and at Roman Nose a fairly large topographic depression rimmed by tan altered trachyte was perhaps not fully tested.

Summary: In general the Redbank-Bluff zone has been fairly well investigated and the chances of a further discovery seem limited. Perhaps the best potential is to the west where presumably shallow sandstone cover may conceal additional mineralized pipes.





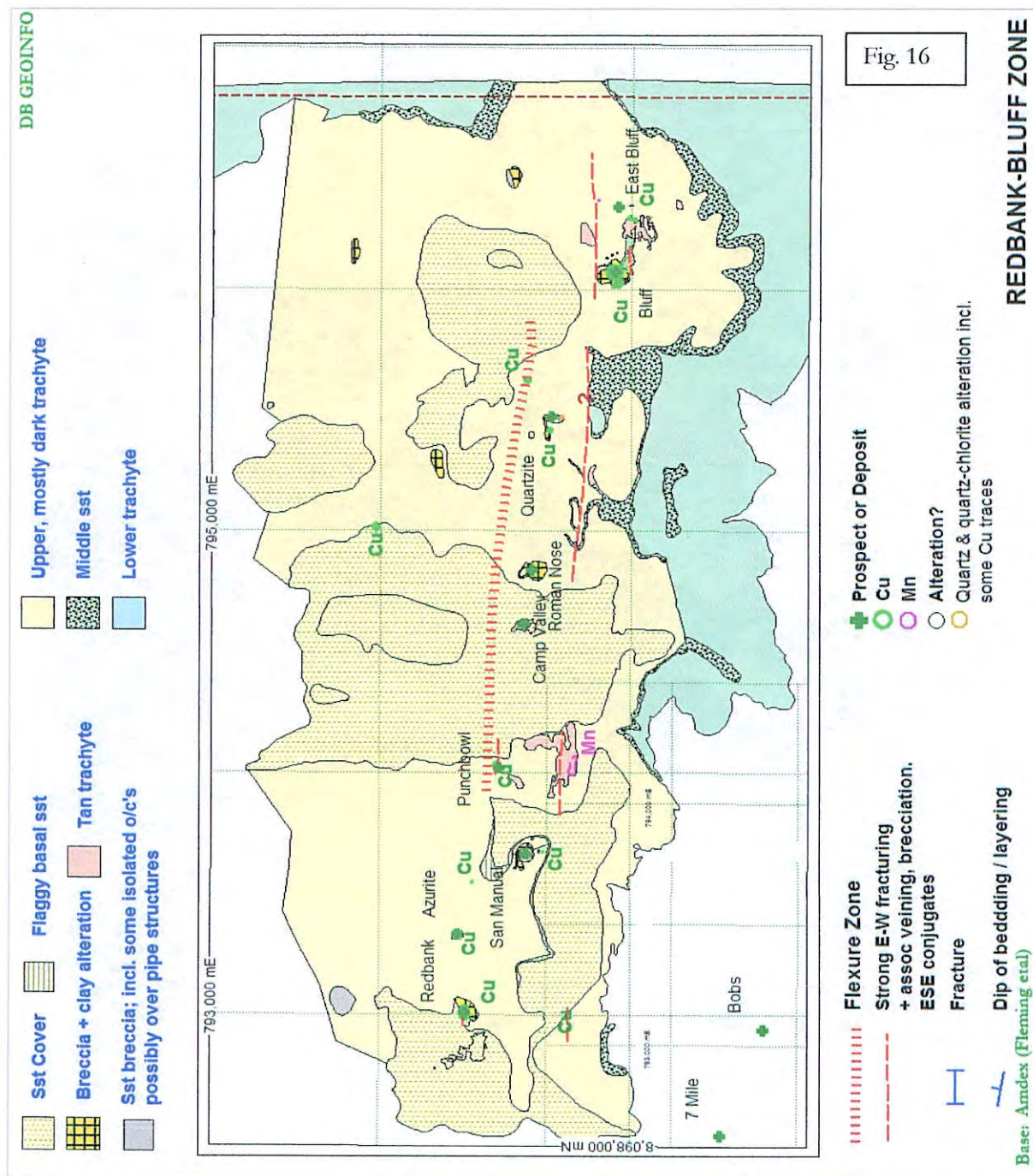
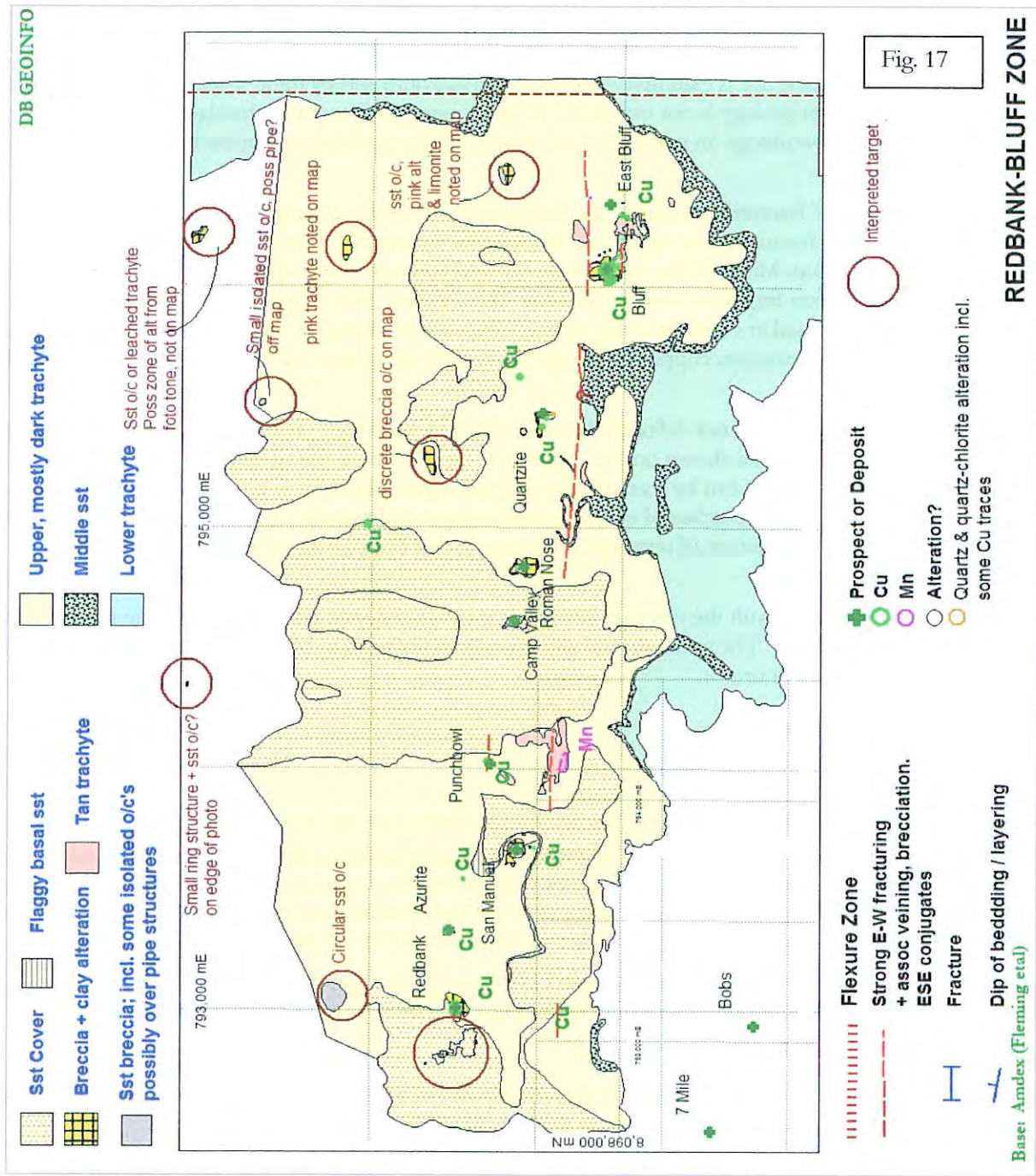


Fig. 16



Sandy Flat Area

The area around the mine site is extensively covered with alluvium and by mine workings. The pit itself is full of water and the pit geology is not exposed. Traverses were made to the high ridge that runs along the east edge of the mine workings. In particular a site where sandstone fragments in trachyte were reported in a faulted block.

A zone of strong E-W fracturing similar to the Redbank-Bluff zone was located associated with tan trachyte. Many of the fracture show quartz and limonite (hematite) fills. Some of the fractures show strong chlorite alteration. Much of the tan trachyte showed zones of vuggy drusy quartz and sintery silica as infills between breccia fragments and/or fractures fills. Incipient secondary copper specks were noted on fractures and dispersed in vesicular sintery silica. This zone of alteration could be also followed in a SE direction towards the Masterton copper showings. See Fig. 18 with structural information and Fig.19 with possible targets.

As these alteration zones were not delineated on the AMDEX map their distribution is not known. They may be more widespread than shown on Fig.'s 18 & 19. Fig. 20 shows the alteration zones plotted over the original AMDEX map. It can be seen that tan (or pink) altered trachyte was noticed as small outcrops but not as a larger zone. The patches of quartz-limonite alteration have not been delineated. Certainly the run of fracturing and distribution of outcrops does suggest that the fault as mapped does exist. Fig. 12 shows the area in close up.

In conclusion: This zone with the obvious fracturing, incipient copper, tan colored trachyte needs to be investigated in more detail. The structure and alteration patterns need to be mapped out to determine if they represent a real target or not.

Masterton & Yellow Girl

This area (see Fig.'s 18 & 22)) was visited briefly on two afternoons. The zone is associated with strong linear feature readily interpreted at a fault.. There are some quite spectacular rock faces with malachite staining. The western occurrence at Yellow Girl is associated with a series of fractures associated with the fault system while the eastern occurrence seems to be strongly disseminated malachite through a fractured slab of trachyte in the north wall of the fault. It may be controlled by a NW fracture.

At Masterton the copper is associated with quartz blebbing and sintery silica alteration along the fault faces. To the SW a new (?) zone of alteration with minor Cu stain was noted that runs NW-SE.

One old DDH was found (AD3) at Masterton.

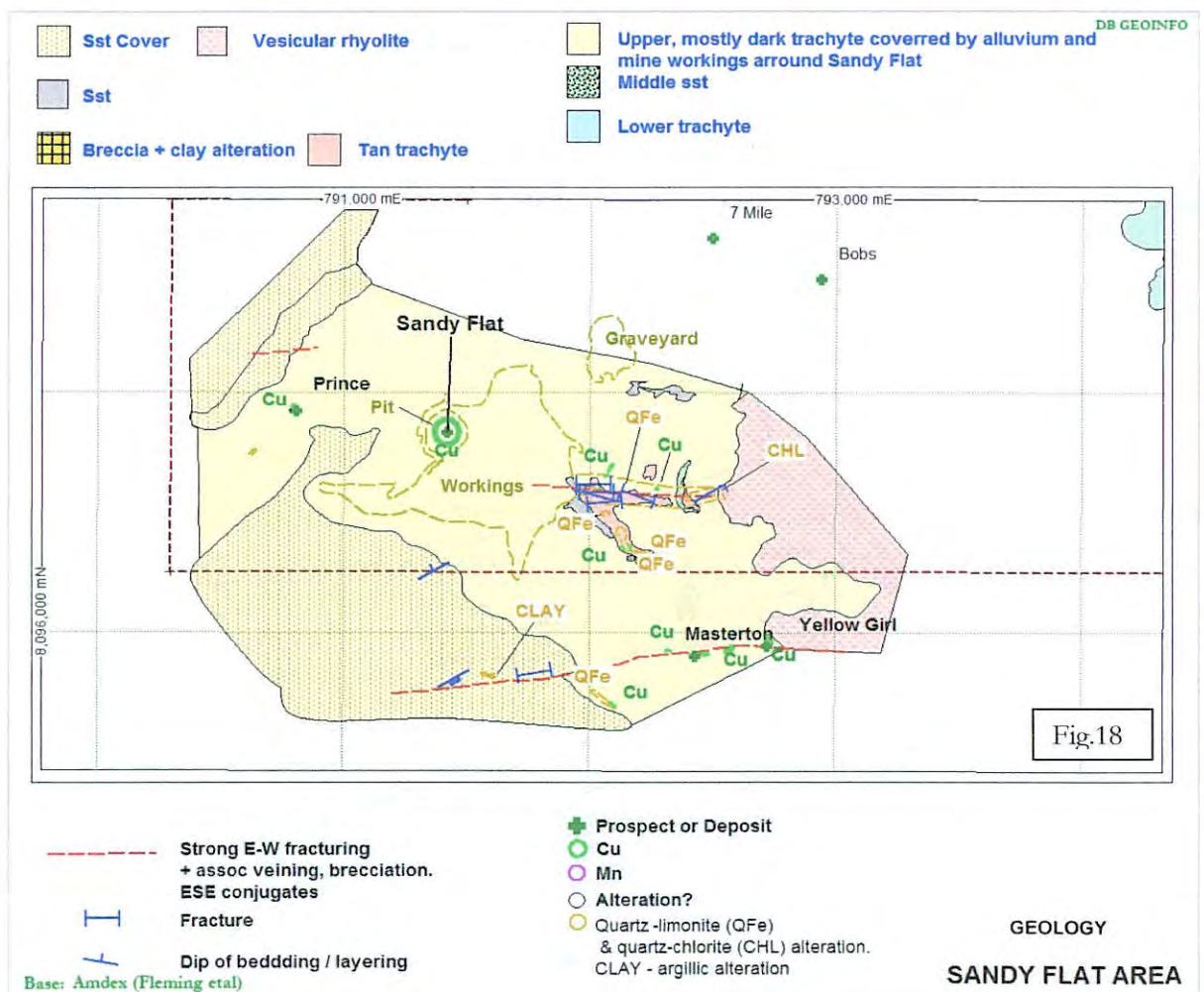
West of Masterton, within Echo Sandstone, presumably on the extension of the Masterton Fault a 155 m deep RC hole was located (az 000, decl 050, mapping point 182).

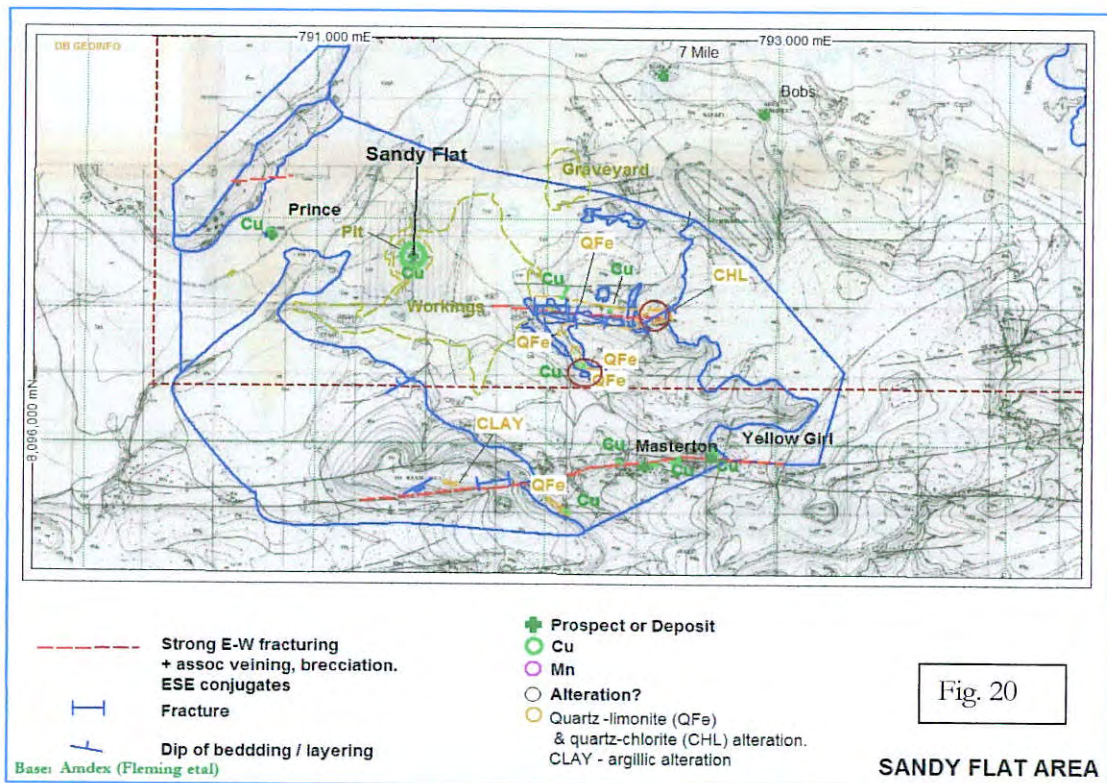
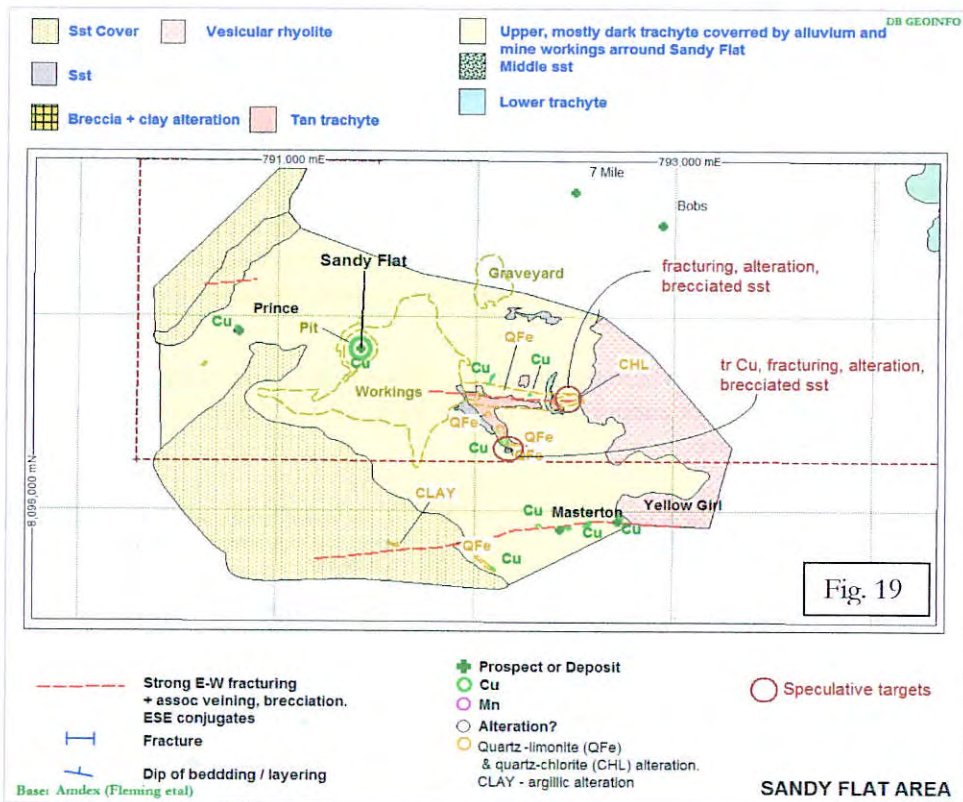
The limited results to date (at Masterton and east of Sandy Flat) suggest that the valley that runs from Masterton to Sandy Flat should be looked at as a linking structure between an E-W structure at Sandy Flat and the E-W Masterton Fault. As shown in Fig.'s 16-20 there are suggestions that the alteration runs in along this postulated link.

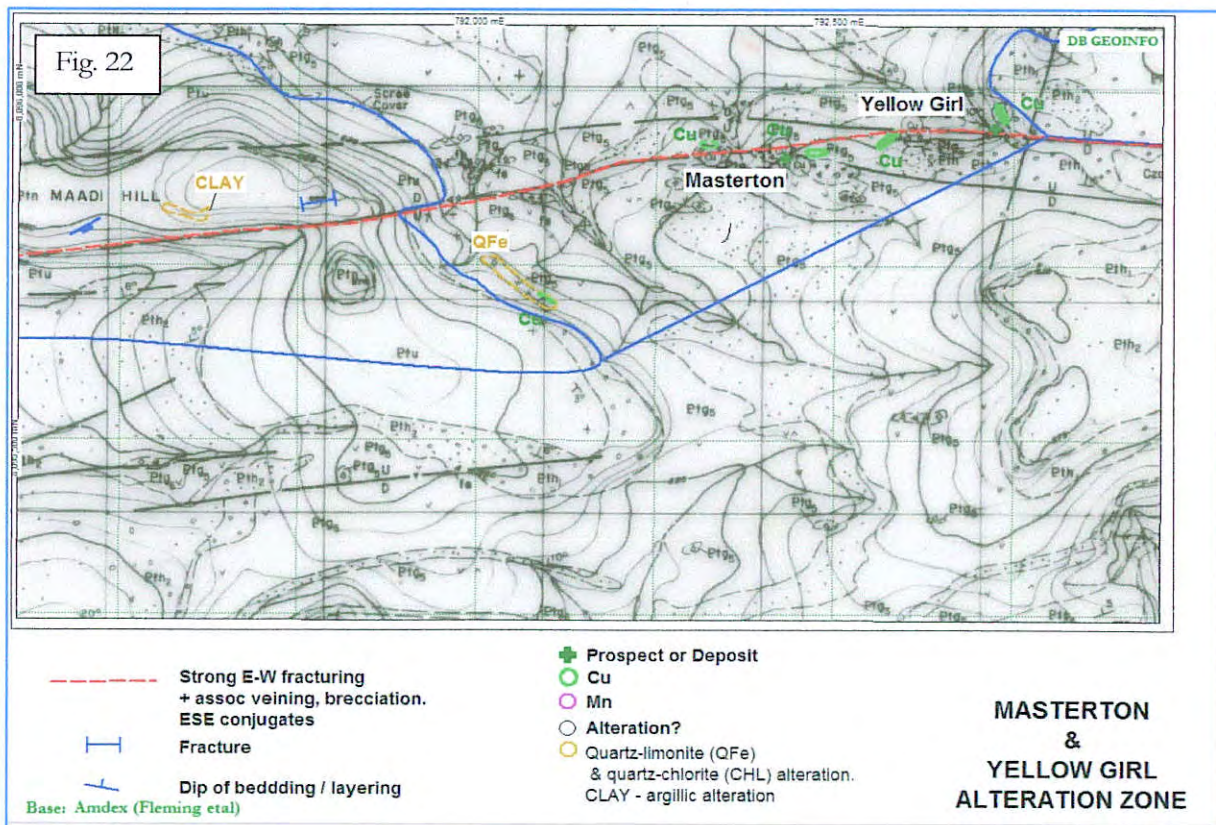
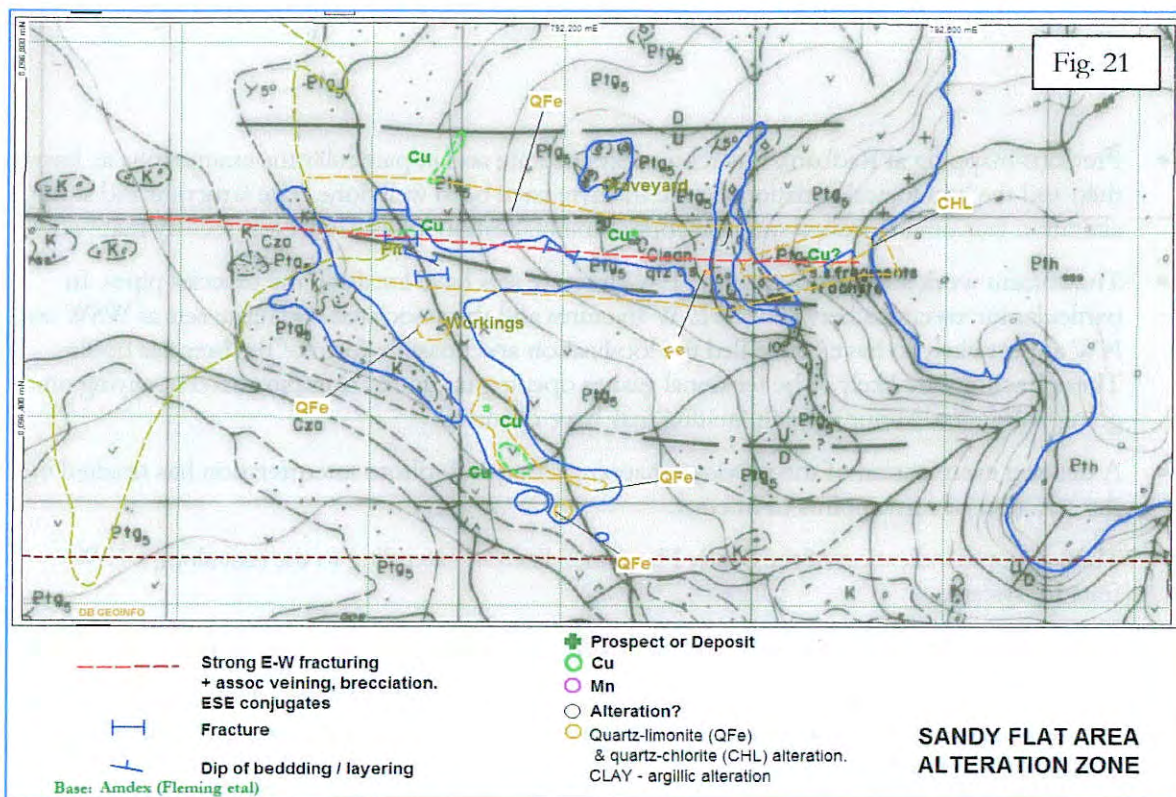
Prince, 7 Mile, Bobs & Black Charlie

Each of these showings was briefly visited. At each very weathered, clay altered (?) and brecciated tan trachyte was exposed in shallow pits. At Prince there was an abundance of surficial copper stain on weathered and broken trachyte beneath thin remnant laterite. Three DDH's were noted.. The copper stain at 7 Mile and Bobs was much less being limited to a few areas of outcrop. At 7 Mile the trachyte is covered by a thin layer of conglomeritic sandstone. At Bobs there were only a few specks of secondary copper associated with limonite veins. At Black Charlie there are two elongate pods (+/- 15 m in length, 1m wide) of mineralized brecciated trachyte. Some ironstone occurs at the west end of the second pod. See Fig.'s 3 & 18 for locations.

Prince based on the spread of pits where presumably some ore was won is a target of some size. Apparently the drill holes were not encouraging. Black Charlie and 7 Mile look interesting while Bobs appears to be a minor occurrence.







Summary

- Previous mapping at Redbank was reasonably accurate and in particular the stratigraphy as known then and the lithological variations in the trachyte have been well done. The structure and some alteration features associated with the copper mineralization appear to be less reliably mapped.
- The current work suggests that strong E-W fracture sets have localized the breccias pipes. In particular intersections between the E-W fractures and the associated conjugate sets at WSW and NW appear likely to have controlled the localization and possible form of the breccias bodies. These fractures are likely to be tensional gashes opening up due to slumping accompanying on-going volcanism. Minor wrench faulting may have occurred.
- A detailed examination of the previous mapping along with photo interpretation has resulted in the selection of some points of interest.
- There is some indication of the Sandy Flat mineralization extending to the east along a E-W fracture system.
- There is also some preliminary indication that the Masterton showings may join with Sandy Flat along a NW structure.
- Of the known but relatively untested prospects within the tenement Prince is probably the best followed by Quartzite.
- Masterton and Yellow Girl are certainly of interest if the ground south of Redbank can be acquired.

Recommendations

- The Amdex map should be digitized and colored to enable a full evaluation.
- Drillhole information needs to be sourced and added to the mapping layers.
- The ideas put forward for Redbank-Bluff Zone should be followed using some detailed traverse to quantify the more intense zones of fracturing and the localization of the flexure.
- The areas of interest cited for the Redbank-Bluff Zone and to the north should be ground checked.
- Further mapping is recommended in the Sandy Flat area to attempt to resolve the structural situation and the variation in rock types and alteration in the trachyte.
- Further exploration would be aided by detailed airborne geophysics in (probable order of priority):
 - Heli-borne Hoist EM to directly detect the sulphide bodies and possibly the argillic alteration halo,
 - Detailed heli-mag and associated spectral radiometrics to help delineate structure and stratigraphy and perhaps directly using the uranium signature in the mineralization,
 - And possibly Hy-Map Hyperspectral Imagery to delineate alteration.

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Appendix

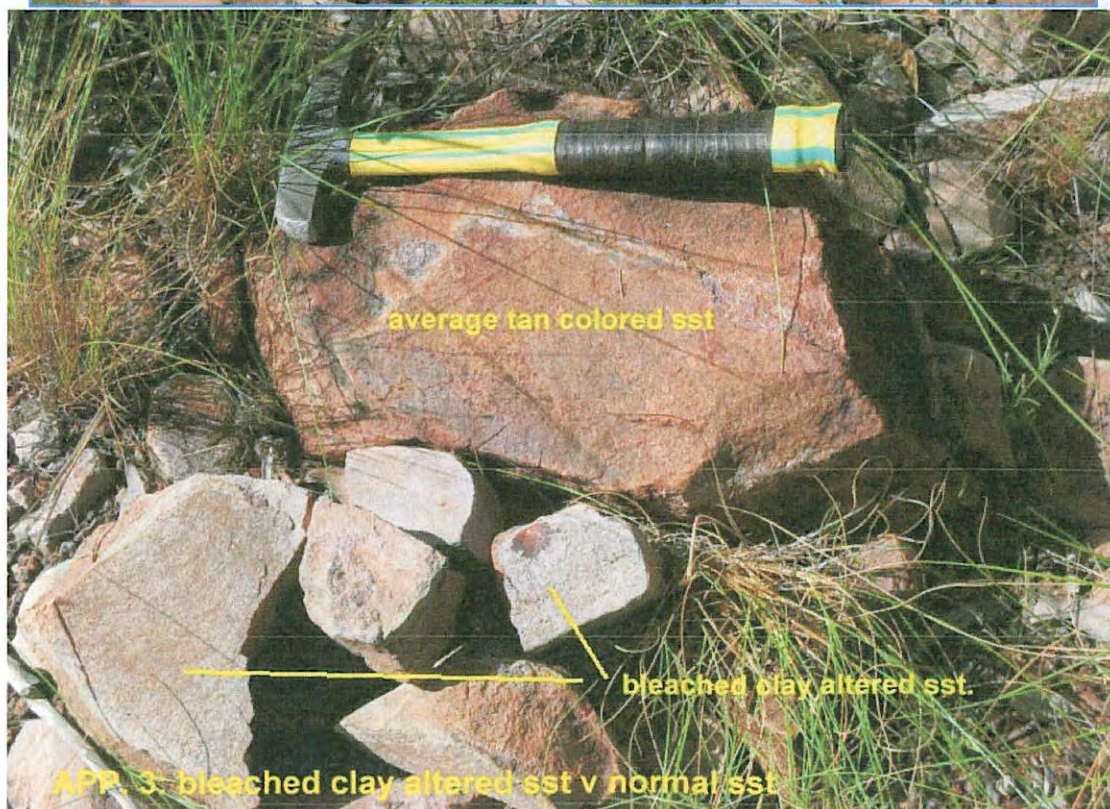
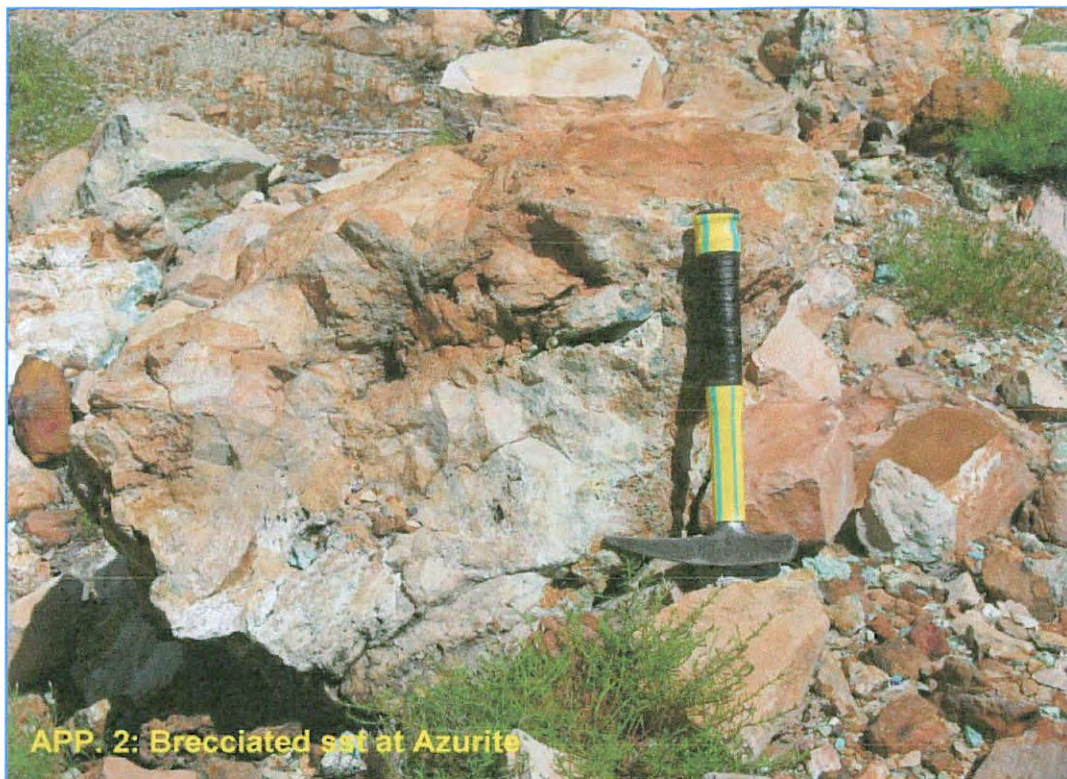
Additional photos are listed below with explanatory remarks. Note App.'s 8 and 12 are missed out.

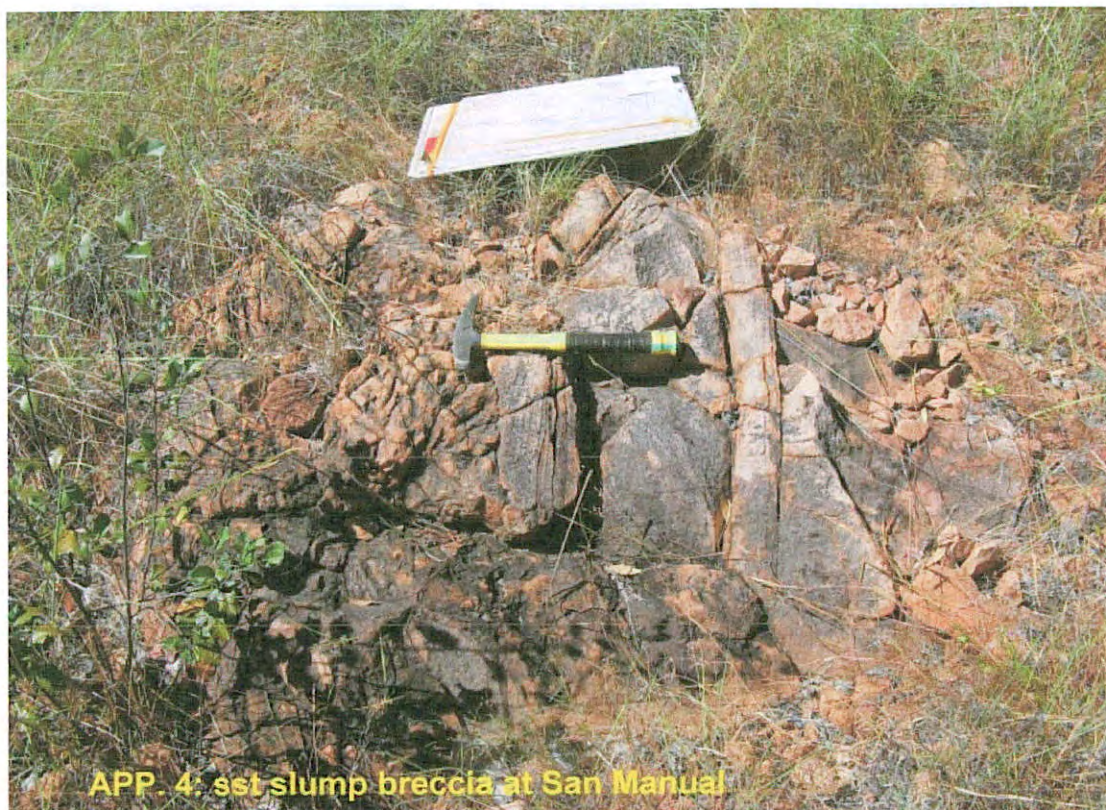
App.'s 1 to 7 are from the Redbank-Bluff Zone.

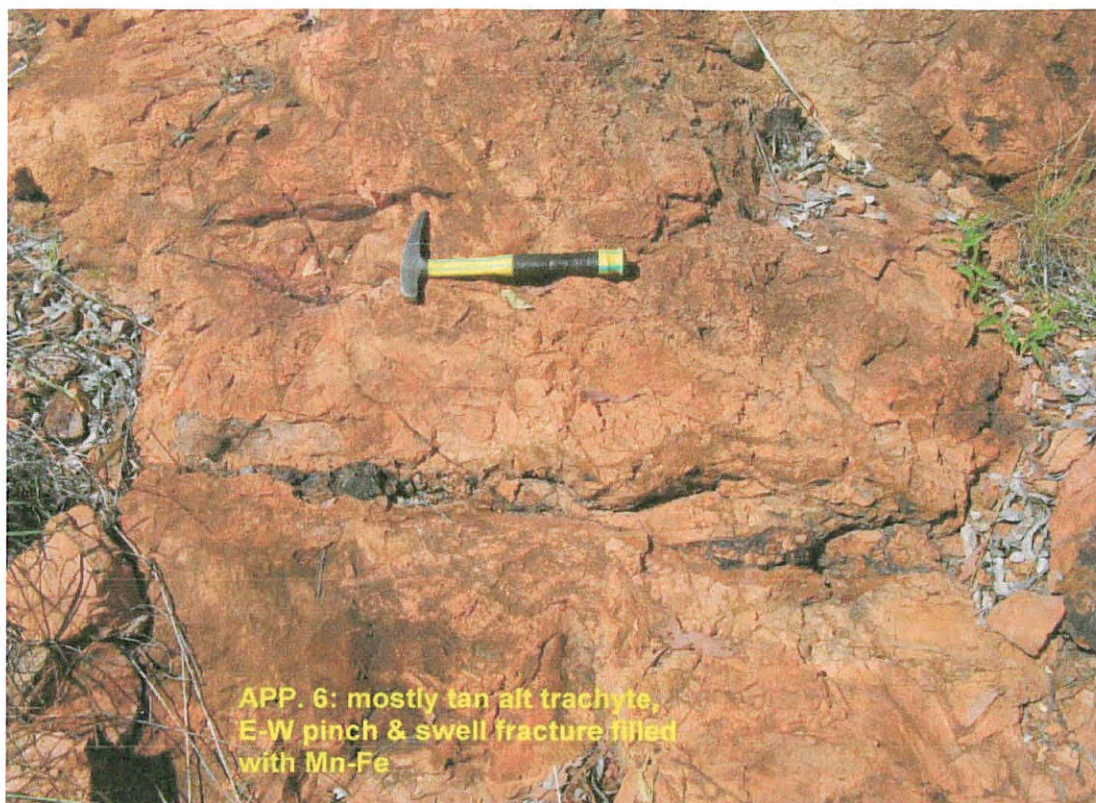
App.'s 9-14 are from the East Sandy Flat Area

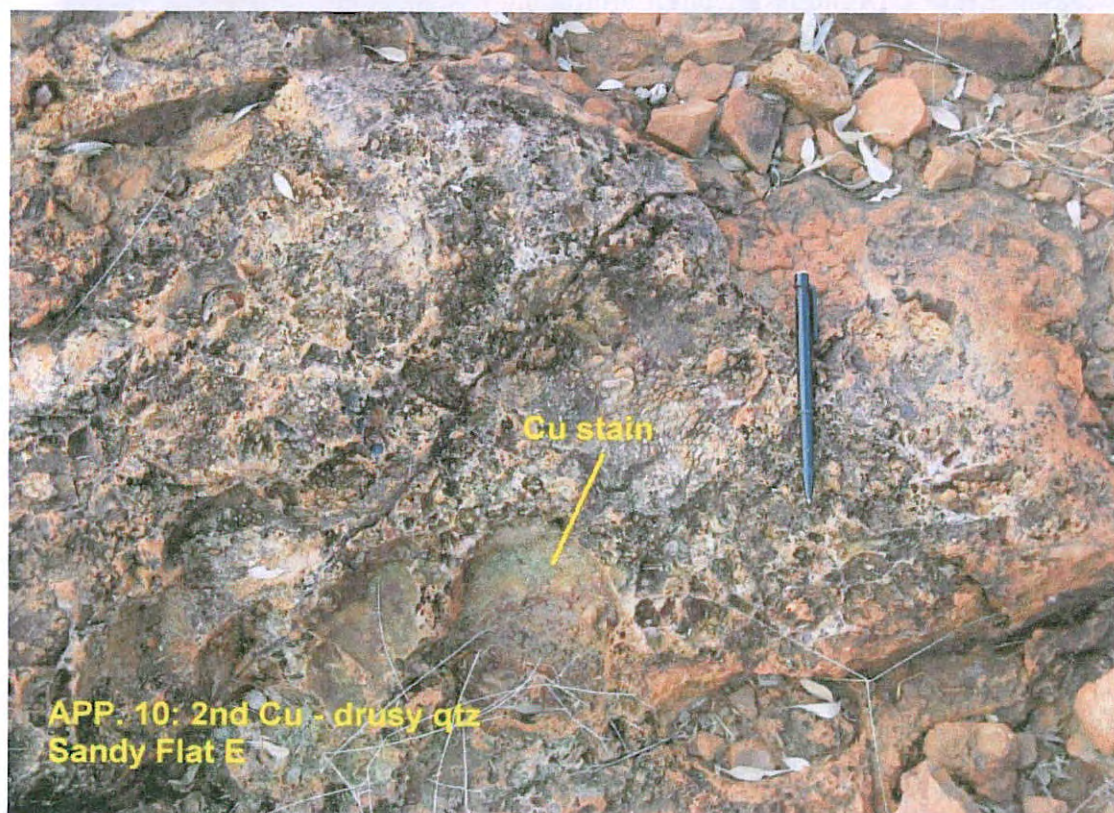
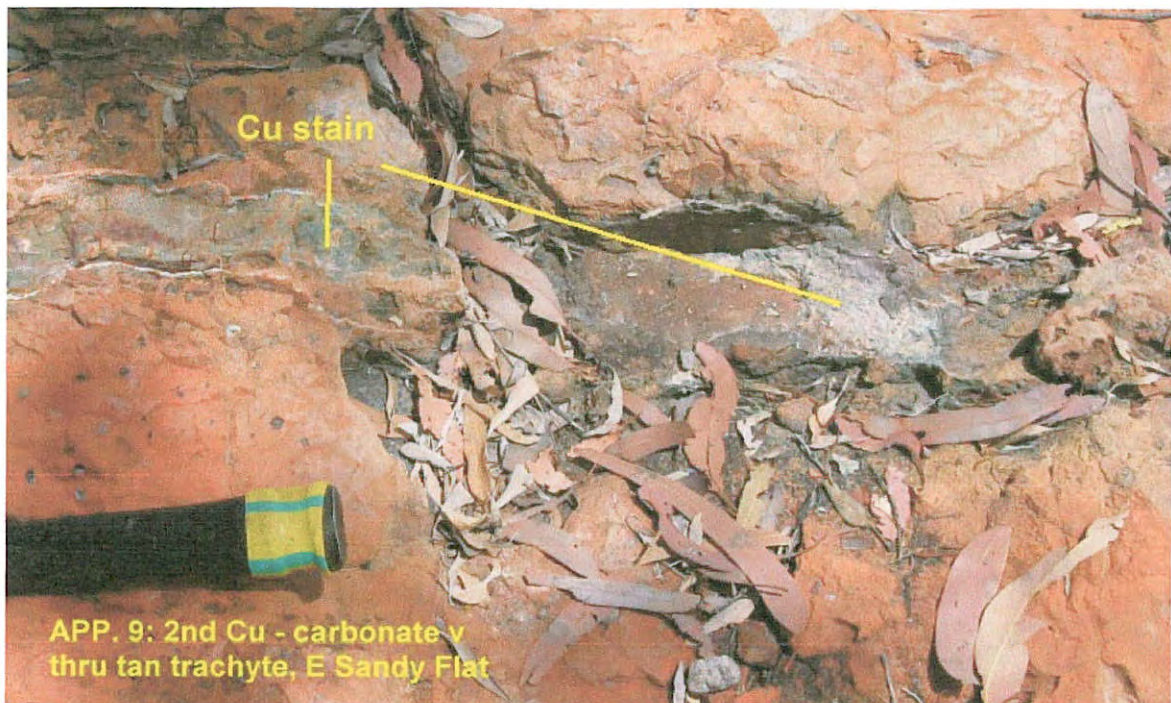
App.'s 15-17 are from Yellow Girl and Masterton

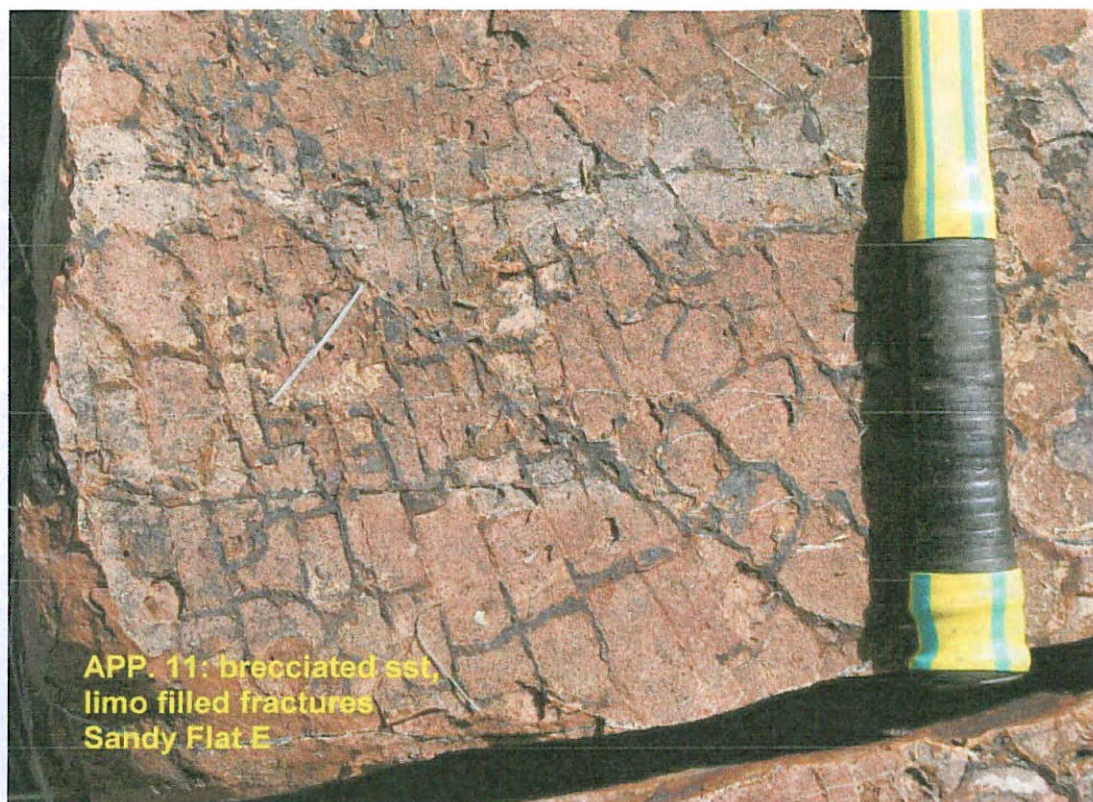










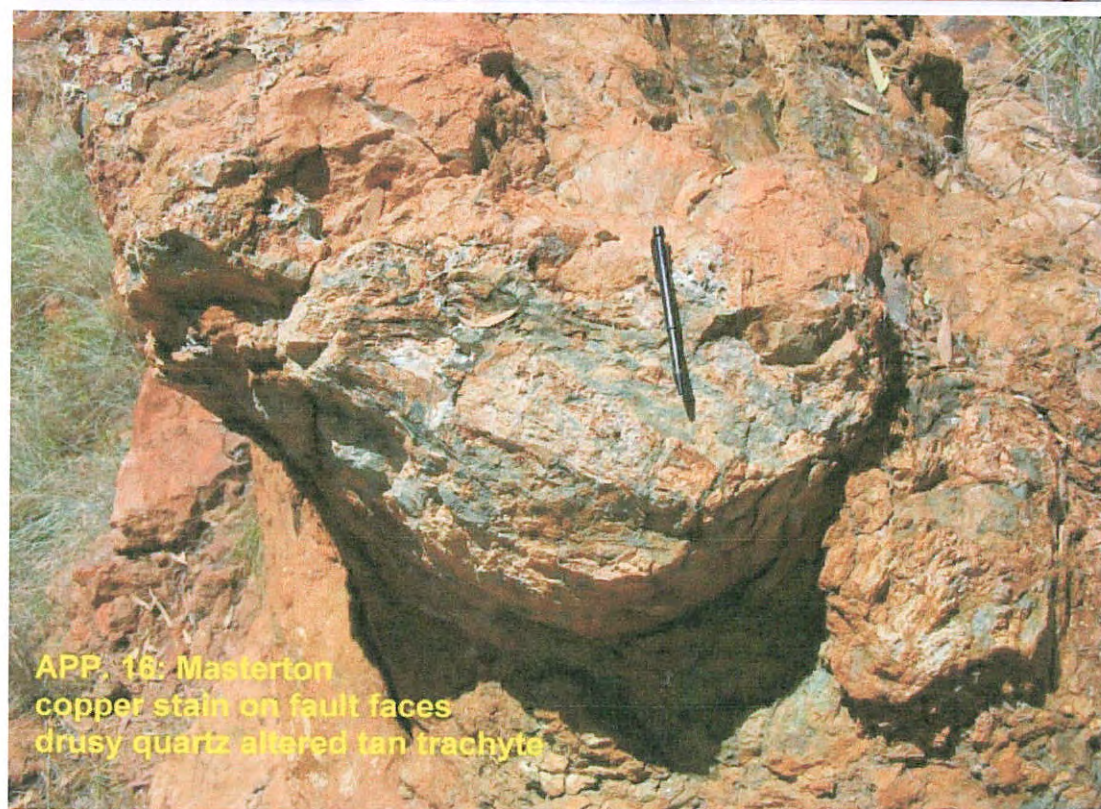


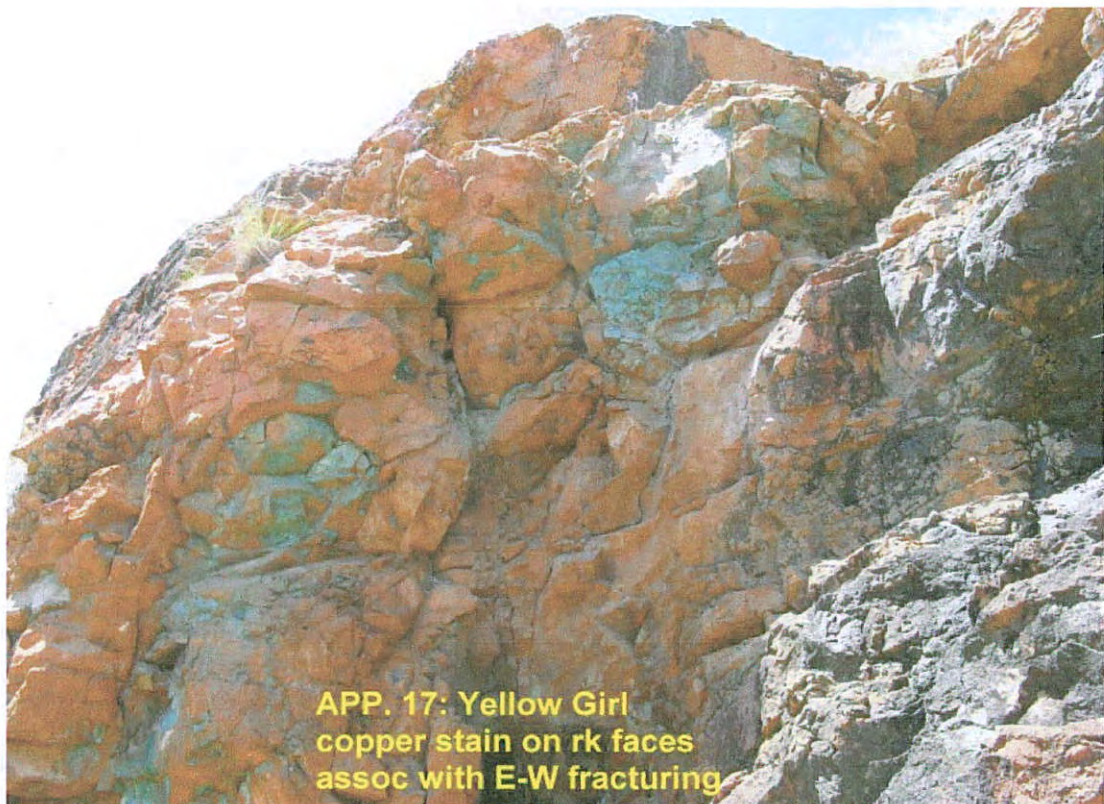


APP. 13: sintery qtz-limo
with trace Cu stain
on tan trachyte
Sandy Flat E



APP. 14: E-W fractured
tan trachyte, limo v
Sandy Flat E





APP. 17: Yellow Girl
copper stain on rk faces
assoc with E-W fracturing