PHOTOGEOLOGICAL INTERPRETATION
OF THE
MAUD CREEK AREA, NORTHERN TERRITORY

FOR

HARMONY GOLD OPERATIONS LIMITED

October 2002

Stephen Snodin
PhD FGS
Consulting Services in Geological Image Interpretation

ABN 86 954 127 880

36 Custance Street
Farrer
ACT 2607
Australia

Phone/Fax: 61 (0) 2 6286 2957
Email: stephen.snodin@bigpond.com

Summary

Photogeological interpretation was carried out over the 280 sq km Maud Creek area near Katherine in the Northern Territory. 1:25,000 scale colour aerial photography was the main data used for interpretation, supplemented by air-photos at larger scales and Landsat/SPOT and aeromagnetic imagery. Three days of field orientation were also carried out.

Final products comprise a Photogeological Interpretation Map in ArcView and MicroStation on CD-ROM plus a colour plot of the map at 1:25,000 scale.

Litho-units delineated include subdivisions of the Pine Creek Geosyncline sequence, several discrete areas of Maud Dolerite and the extensive younger Kombolgie Formation**,** Cambrian volcanics and limestone cover. Numerous dykes (mainly dolerite) and alignments of resistant breccia associated with faulting were also interpreted.

The Tollis Formation is complexly deformed into multiple folds with moderate to steep limbs, and variable axial trends. The Chessman Low is a younger transverse rift-like structure possibly coeval, either with Antrim Plateau volcanism, or with extrusion of the much earlier Mount Shepherd Rhyolite dome. Regional fold structures with local associated thrust/reverse faults include the Edith Falls and Eastern Synclines, Seventeen Mile and Carpentaria Highs and the Carpentaria Low. All have northwesterly trends and affect the post-Tollis Formation sequence. The Maud Creek Lineament Zone has a similar orientation, but possibly an earlier origin because Au mineralisation appears spatially associated with a segment of it.

Extensions of the Main Zone Structure to the north and south of the Main Zone deposit have been interpreted and form high priority Target Zones F and G for follow-up, if this has not already been done. Ten other target zones have also been delineated, based on criteria which include favourable lithostructure, presence of known mineralisation, interpreted breccias and air-photo anomalies, proximity to Maud Dolerite and coincident aeromagnetic features. These, together with those air-photo anomalies which lie outside the target zones have been assigned priorities for follow-up.

CONTENTS

	Page
1. INRODUCTION	1
1.1 Objectives	1
1.2 Project area	1
1.3 Physiography, general geology and mineralisation	1
2. PROJECT DATA	3
2.1 Aerial photography	3
2.2 Satellite imagery	4
2.3 Airborne geophysics and other data	4
3. FINAL PRODUCTS	4
4. METHODOLOGY	4
5. SUMMARY OF RESULTS	5
5.1 Interpreted litho-units	5
5.2 Structure	9
5.3 Photogeology of the Main Zone Deposit area	12
6. EXPLORATION POTENTIAL	13
6.1 Air-photo anomalies	13
6.2 Target zones	13
6.3 Potential in the Plum Tree Creek Volcanics/ Mount Shepherd Rhyolite	15
7. CONCLUSIONS	15
REFERENCES	17
APPENDIX 1: Descriptions of Geomorphic and Colour Anomalies	18
APPENDIX 2: Descriptions of Target Zones	20
Figure 1: Project area location and general geology	2

1. INTRODUCTION

This report summarises the results of photogeological mapping of the Maud Creek area near Katherine in the Northern Territory. The work was based mainly on interpretation of 1:25,000 scale colour stereoscopic aerial photography supplemented by other air-photos at larger scales together with Landsat/SPOT and aeromagnetic data.

Three days of field orientation were also carried out.

Results are presented as a Photogeological Interpretation Map in digital (GIS) form.

1.1 Objectives

In the area, Harmony Gold is currently drill testing the Main Zone primary Au deposit near Maud Creek and also has a number of other exploration tenements. The objective of the current work was to generate a new photogeological interpretation of the area leading to identification of targets for possible follow-up work.

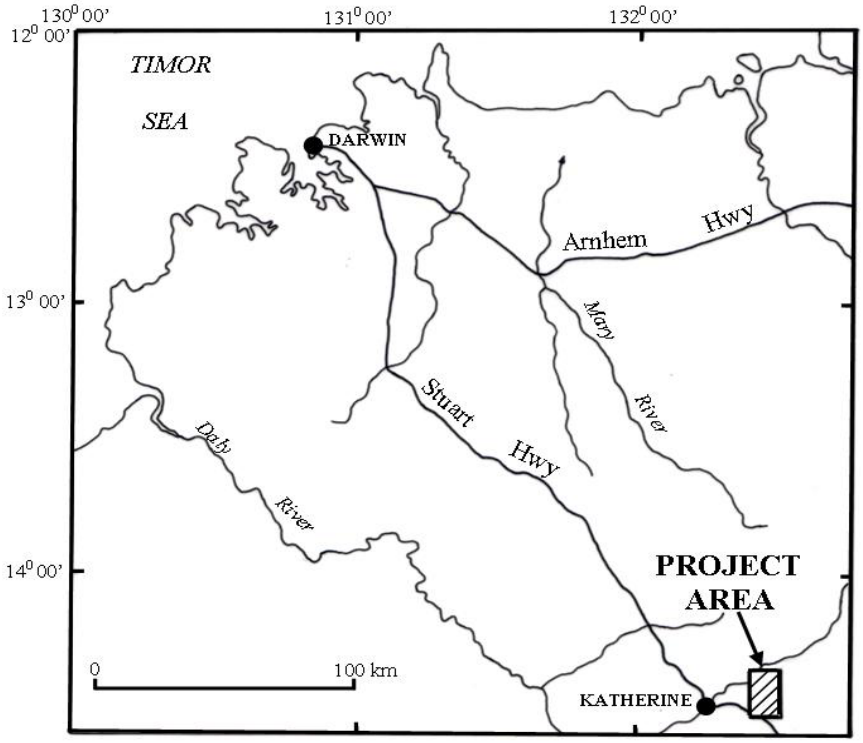
1.2 Project area

This is approximately 280 sq km in size and lies 280 km southeast of Darwin and about 20 km east of the town of Katherine. Together with generalised geology it is shown in Figure 1.

1.3 Physiography, general geology and mineralisation (see Figure 1)

Relief is variable from undulating plains, rounded low hill, ridge and mesa topography, to the elevated, scarped and deeply dissected landforms of the southwestern margin of the Arnhem Land Plateau. The Katherine River flows southwest across the northwest corner of the area and other drainages are tributaries to this system and flow from the east and south.

The area straddles the southern margin of exposed Early Proterozoic rocks of the Pine Creek Geosyncline represented here by the Finniss River and younger Edith River Groups. Only the upper part of the Finniss River sequence is represented and comprises the greywacke/tuff assemblage of the Tollis Formation and the interleaved mafic rocks of the Dorothy Volcanic Member. These were folded (Maud Creek Event) and prior to, or concurrent with this, there was emplacement of sills and more irregular bodies of the Maud Dolerite. The Edith River Group rests unconformably on the folded Finnis River rocks and is dominated by ignimbrite, rhyolite, basalt and tuff of the Plum Tree Creek Volcanics. A local rhyolite component (Mount Shepherd Rhyolite) also crops out which may represent an acid dome (Kruse et al., 1994). The Edith River Group is overlain by the Middle Proterozoic Katherine River Group of the McArthur Basin. In the project area it comprises the oldest parts of the sequence (sandstone-dominant Kombolgie Formation with interlayered volcanic members) which crop out extensively in the northwest and northeast. The basal contact is locally concordant, but in a more regional sense is unconformable and transgressive. The Kombolgie Formation was folded on northwest-trending axes with geometry possibly related to reactivation of basin faults. It was also intruded along fault/fractures by



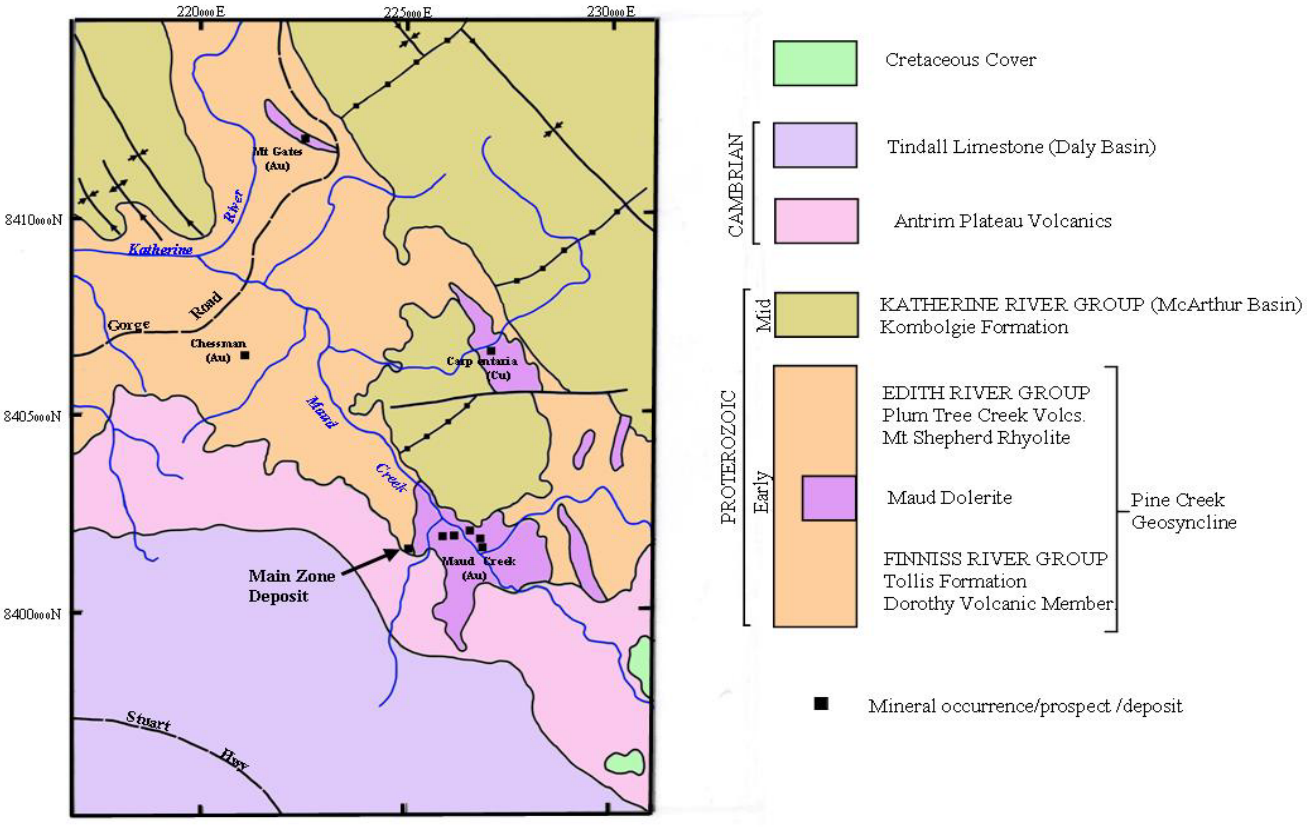


Figure 1. Project area location and general geology

numerous NE-trending dolerite dykes. A hiatus followed until Cambrian times when flood basalts of the Antrim Plateau Volcanics and the overlying Tindall Limestone of the Daly Basin were deposited. Their outcrop, together with local remnants of Cretaceous sedimentary rocks, conceals older units in the southern third of the project area.

Known gold mineralisation occurs mainly near and within the southernmost large outcrop area of Maud Dolerite on both sides of Maud Creek. Early workings were in veined and fractured Maud Dolerite, but later the Main Zone Deposit was delineated in country rocks near the margin of the intrusion. The oxidised and transition portions have been mined and Harmony is currently drill-testing the primary ore. The mineralisation occurs at the sheared/brecciated contact between bedded Tollis Formation sediments (footwall) and mafic tuff (hanging wall). The contact (Main Zone Structure) is a N-striking, E-dipping complex multistage reverse dislocation cut by cross-faults which interacted to assist dilation and focussing of the mineralisation (Harmony, 2002).

Other known mineral occurrences in the project area are Mount Gates, Chessman and Carpentaria. Mount Gates occurs in separate northern outcrop area of Maud Dolerite, and a small past gold production is recorded (Kruse et al., 1994). The Chessman Au occurrence occurs to the SSW and the host is recorded as Maud Dolerite (Kruse, op. cit.) although no such lithology is shown on the published geological maps. The Carpentaria occurrences further east, comprise copper mineralisation in sheared, brecciated and altered Maud Dolerite and there is a record of minor past production (Kruse, op. cit.).

2. PROJECT DATA

2.1 Aerial Photography

1:25,000 scale, 1997 vintage, colour stereoscopic aerial photography (44 prints) formed the main dataset for photogeological interpretation. These were supplied by Harmony Gold and their quality was excellent.

Other air-photos forming supplementary datasets were:

- 1:12,000 scale, 1998 vintage, black and white prints (total 40) covering the pre-Kombolgie Formation outcrop areas only. They were purchased for the project from the NT government.

- 1:10,000 scale, 1978 vintage, colour prints (total 64) covering the eastern half of the project area. They were borrowed from Geoscience Australia's library archive in Canberra.

- 1:10,000 scale, 1993 vintage, colour prints (total 9) covering a sector of Maud Creek supplied by Harmony Gold.

2.2 Satellite imagery

This comprised Kalmet Resources Landsat TM and SPOT Pan data now owned by Harmony Gold. For the current work these data were used to generate 1:25,000 scale, geocoded hard copy of the Landsat sharpened with the higher resolution SPOT data. It gave complete coverage of the project area. The Landsat band combination was 1,4,7 in BGR. The hard copy was used both as a supplementary dataset for interpretation and as an accurate base for compiling the photogeology.

2.3 Airborne geophysics and other data

Airborne geophysical data comprised an aeromagnetic shaded TMI plot and various interpretation/targeting maps with an accompanying report by SRK (1998). These cover only central and southeastern parts of the current project area and formed supplementary information when delineating and prioritising target zones.

Other data consulted for the project included published geological maps at 1:100,000 scale (Mulder and Whitehead, 1988; Needham et al., 1989) and the KATHERINE 1:250,000 geological map (Sweet et al., 1994) with accompanying Explanatory Notes (Kruse et al., 1994). These gave useful guidance during the interpretation by providing information such as field measured dips, and formation ages and their contained lithologies.

3. FINAL PRODUCTS

These are as follows:

- Final Photogeological Interpretation Map in ArcView and MicroStation formats on CD ROM (2 copies)
- The above map as colour plot at 1:25,000 scale with legend and schematic cross-sections
- Summary report (2 copies)
- Landsat/SPOT hard copy and air-photos acquired for the project.

In addition, a preliminary photogeological map was delivered prior to project completion. This comprised interim coloured copies of annotated overlays assembled into an uncontrolled mosaic. Two copies were delivered.

4. METHODOLOGY

The 1:25,000 scale colour air-photos were examined under a Topcon mirror stereoscope and interpreted detail was annotated on clear overlays to alternate prints. This examination was under x 6 magnification to capture fine detail. Features annotated included surface traces of bedding, their estimated dips, geological contacts, fold axial traces, faults/fractures and more subtly expressed lineaments, and geomorphic and colour anomalies. Several interpretation passes were made. During

the course of this phase the larger scale air-photos were also examined selectively to help resolve ambiguities in photogeological detail.

The finalised annotation on the overlays was then recompiled to the accurately geocoded, 1:25,000 scale Landsat/SPOT hard copy using features common to both datasets for control. Concurrently with this, the interpretation was modified and added to, based on inspection of the imagery. On completion, the compiled data were re-examined in overview in conjunction with the aeromagnetics, and selected faults/lineaments and other features were identified and highlighted as major structures. At this stage also, target zones were delineated and, together with the geomorphic/colour anomalies, were ranked in terms of exploration interest.

The digital map product was generated under subcontract to the Geospatial Applications Branch of Geoscience Australia (AGSO) in Canberra. Their procedure involves scanning the compilation, autovectorising the linework, on-screen feature attribution, minor hand digitising, and translation from Microstation into ArcView before burning onto CD-ROM.

A 3-day period of reconnaissance field orientation was carried out midway through the interpretation phase. This involved traversing selected areas by 4WD vehicle to gain a better understanding of the relationships between photogeological expression and lithostructure observed and recorded in outcrop. Traverses were made along the Gorge Road where it crosses the project area and along tracks and fence lines radiating up to 8 km from the Main Zone Deposit.

5. SUMMARY OF RESULTS

5.1 Interpreted litho-units

The **Tollis Formation (Pbt)** crops out extensively in the central-west of the project area and near the eastern margin, south of the Carpentaria Fault. Further north it occurs in smaller inliers along the Seventeen Mile and Maud Highs. Generally it forms undulating terrain with subdued relief or low rounded ridge and valley topography with sparse tree cover. Associated soils are pale coloured. On the air–photos, bedding is generally poorly and intermittently displayed by faint tonal striping or, more crudely, by aligned ridge topography. Near the northern end of the Maud Creek Lineament Zone, dissection is more pronounced and youthful. Here the very fine and steeply dipping bedding which characterises the sequence, is well expressed photogeologically.

The **Dorothy Volcanic Member (Pbtd)** within the Tollis Formation crops out mainly along the Carpentaria High and extends further south from the Carpentaria Fault for another 5 km. Its photo-expression is variable. In the region of the Carpentaria High it underlies flat terrain with brown soils, and there is very little photogeological evidence of layering. These characteristics could indicate that the younger Plum Tree Creek Volcanics are also present, especially if they are the mafic component.

South of the Carpentaria High the interpreted Dorothy Volcanic Member forms rounded ridge topography with a cover of evenly distributed larger trees and buff to

patchily red-brown soils. Layering is visible on the air-photos as subtle tonal and vegetation striping, and is more coarsely developed than in adjacent Tollis Formation.

Maud Dolerite (Pdm) is expressed on the air-photos as zones of slight negative relief or low undulating positive relief with fracture controlled, weakly incised drainage. Patchy to more continuous bright red-brown soils are characteristic and these areas sometimes also lack tree cover. In the aeromagnetic data, the dolerite as mapped at surface shows no coincident signature, although there are sporadic, small more magnetic areas, possibly reflecting a different intrusive phase.

The unit is interpreted to crop out as a 3 km x 3 km body with irregular outline east of the Main Zone Deposit and straddling Maud Creek. South and east of this (in Target Zone I), smaller inliers of dolerite are interpreted within the younger Antrim Plateau Volcanics. They are not shown on the published mapping, but if the current interpretation is correct, the Maud Creek intrusion has a significant extension to the south beneath the volcanic cover.

Maud Dolerite also crops out extensively in the Carpentaria High north of, and truncated by, the Carpentaria Fault. South of this fault and apparently offset sinistrally across it, the dolerite continues southwards as a number of separate smaller bodies within Tollis Formation/Dorothy Volcanic Member country rocks. We suggest from the above that the Carpentaria Fault also has a vertical (south block down) component of throw, so that the intrusion is largely concealed.

In the far north of the project area (Mount Gates) Maud Dolerite crops out as an elongate body with shape and orientation suggestive of a sill. Its southwestern contact with the Tollis Formation appears partly fault-bounded and its northeastern one with this unit is concealed by younger Plum Tree Creek Volcanics.

The **Plum Tree Creek Volcanics (Pep)** form an extensive outcrop area in the north surrounding the Seventeen Mile and Maud Highs and continue west to the project area margin on both sides of the Katherine River. The outcrop may also continue southwest into the Chessman Low, though this interpretation is more tentative (**5.2**, below). Relief over the unit varies from very subdued to more moderate and rugged with small hills and ridges. Associated soils are patchily brown, buff and reddish and overall darker than those of the Tollis Formation. Coarse layering is expressed sporadically as low cuestas, mesas, and variations in the soil colour and vegetation density. Small very rugged, dark coloured bedrock outcrops are present locally and may indicate rhyolite components of the volcanic sequence.

The **Mount Shepherd Rhyolite Member (Peps)** crops out around the northern end of the Carpentaria High. It has a distinctive photo-expression of rugged relief with brown bedrock and very pale buff associated soils. Coarse layering is expressed as well defined scarplets. Three short cross-cutting E-W ridge features are interpreted as associated possible **acid dykes**. Assuming that the Mount Shepherd Rhyolite does represent an extrusive dome, the attitude of the layering suggests that the centre of the feature lies close to the northern acid dyke (1.5 km east of Maud Creek).

The **Kombolgie Formation (Phk)** forms broad scarp-bounded, rough-textured outcrop areas occupying the Edith Falls and Eastern Synclines and the Carpentaria

Low. The thickest section is preserved in the more tightly structured Edith Falls Syncline. In the north the unit rests on Plum Tree Creek Volcanics or locally, on the Mount Shepherd Rhyolite. Further south it oversteps these to rest directly on older sequences and the Maud Dolerite.

Relief over the Kombolgie Formation is high with deep drainage dissection and fracture- and recessive dyke-controlled gorges and gullies. On the air-photos, the well bedded nature of the unit is expressed as ridge and valley, cuesta and mesa topography, and as changes in vegetation density and bedrock/soil colour. Individual beds in the sequence can sometimes be traced photogeologically for many kilometres along strike. By carefully mapping offsets on these, the sense of movement has been determined on cross-cutting faults and dolerite dykes. One particularly prominent siltstone marker bed is mapped as a separate unit (**Phks**).

Two interbedded volcanic units have also been delineated within the Kombolgie Formation. The lowermost and thickest is the **McAddens Creek Volcanic Member (Phm)**. It crops out over a broad area in the axial zone of the Eastern Syncline and as a narrower zone in the eastern limb and nose of the Edith Falls Syncline. The unit is recessive relative to the Kombolgie sandstone sequence, and the associated soils are reddish brown in keeping with its basic composition. Thick layering is expressed locally as rounded cuestas and flatirons. The younger **Henwood Creek Volcanic Member (Phh)** crops out only in the Edith Falls Syncline. It is similarly recessive, but is much thinner.

The **Antrim Plateau Volcanics (Cla)** occur as a 1-3 km wide NW-SE belt of cover rocks in the southern half of the project area and, unlike other lithologies, they have a distinctive aeromagnetic signature. The unit generally underlies a gently undulating plain and crops out rarely. On the air-photos it is characterised by low relief, variegated brown, buff and reddish soil colours, patchy distribution of vegetation and scattered small breakaways. Locally, better defined scarplets surround outcrop/subcrop. Associated black soil/clay surficials are common and the larger more continuous zones of these have been delineated (**Qf**).

The **Tindall Limestone (Cmt)** overlies the Antrim Plateau Volcanics in the southwest. Where outcrops of massive limestone are not developed, the base of the unit is difficult to interpret and may include underlying Jindare Sandstone (lateral equivalent of the Antrim volcanics). This may be the case for example in the region 3km SW of the Main Zone Deposit. Typically the Tindall Limestone is expressed on the air-photos as patchy developments of grey and pale brown bedrock outcrop forming irregular pavements and more elevated remnants surrounded by zones of soil and other surficials. The outcrops are intermittently bounded by ragged scarplets and are often well jointed with a karst microrelief.

Cretaceous Sediments (Kl) occur only near and straddling the SE corner of the project area where they form partly scarp-bounded outcrop areas mantling the Antrim Plateau Volcanics.

Quaternary alluvium associated with active drainage channels (Qa) occurs as ribbons up to 500m wide along the Katherine River and its tributaries. Sometimes their interpreted boundaries include colluvium on adjacent very gentle slopes.

Other surficial deposits (Qf) include slope colluvium derived from adjacent outcrop, levee deposits of the Katherine River, black soil/clay (mainly associated with Antrim volcanics outcrop) and sand deposits which conceal Tindall Limestone and Cretaceous sediments near and straddling the project area southern margin. Some of Qf may be Tertiary in age.

Dolerite dykes are abundant in the project area. They intrude the Kombolgie Formation and older units and have northeasterly trends sometimes bending to ENE. They pinch and swell and occasionally split. Individual examples can be traced over distances of more than 5 km and swarms continue for over 12 km. They are most easily identified in the Kombolgie Formation where their soft-weathering nature results in development of coincident narrow flat-floored gullies. In many cases there is significant offset of strata across them on coincident faults. Their linearity indicates steep or sub-vertical dips and only very rarely do they appear to be sills.

In older country rocks (Plum Tree Creek Volcanics/Tollis Formation) the geomorphic photo-expression of the dykes is more subtle (slight negative or positive relief), but an associated markedly darker brown soil colour helps to identify them.

The dykes have strong linear aeromagnetic signatures which sometimes extend beyond the traces mapped photogeologically, perhaps because in these areas they are not at surface.

Breccias form prominent photogeological features in pre-Kombolgie parts of the sequence. Some are shown on the published mapping variously as hydrothermal breccia, quartz breccia or quartz/hematite breccia, but there is no description of them in the accompanying explanatory notes. On the air-photos they are expressed as linear or sinuous, intermittent to continuous narrow ridges from 200m to 3 km long. Crests vary from rough textured and rounded to sharp. They appear to have steep or sub-vertical dips. In general there is no aeromagnetic signature. Where observed in the field (2 localities) the lithology is a silicified and patchily ferruginous breccia of quartz and adjacent country rock.

The breccias are assumed to coincide with alignments of faulting or shearing; for example they form the linear (faulted) NNE-trending contacts between Plum Tree Creek Volcanics and Tollis Formation on the margins of the Chessman Low. In the southeast of the project area (Target Zone J) they lie along what is presumably a sheared contact between Maud Dolerite and Tollis Formation, and this appears also to be the case locally in the Carpentaria High.

Some of the breccias must be younger than the Plum Tree Creek Volcanics because the latter host them or are displaced along them. Others may be older, for example those marginal to the Maud Dolerite or hosted by Tollis Formation. They include a breccia zone in Target Zone D which is possibly folded together with the Tollis Formation.

Possible undifferentiated dykes/veins comprise a few short (<200m) linear features with variable trend that can't be assigned with confidence to dolerite dykes or breccias. Most occur within the Plum Tree Creek Volcanics/Mount Shepherd Rhyolite, and 2 examples occur in the Tollis Formation. Their subtle photo-

expression is as slight positive relief or alignment of vegetation and darker or paler soil colours than the surround.

5.2 Structure

1) In the northern part of the project area, structure is dominated by the development of large-scale folds with NNW axial trend. These comprise the Edith Falls and Eastern Synclines (with associated of Kombolgie outcrop) and an intervening antiformal zone. The latter brings the Plum Tree Creek Volcanics to surface together with more local windows of Tollis Formation and Maud Dolerite in the Seventeen Mile and Maud Highs. Further south the Kombolgie sequence is also preserved in the Carpentaria Low and is separated from the Kombolgie outcrop of the Eastern Syncline by the Carpentaria High of exposed older rocks. West of the Carpentaria Low, folded Tollis Formation with variable strike crops out and is bisected by the Chessman Low in which overlying Plum Tree Creek Volcanics are preserved. South of this, the extensive Antrim Plateau Volcanics and Tindall Limestone cover is sub-horizontal or dips gently and regionally to the south or southwest away from the exposed basement.

2) The Edith Falls Syncline is a relatively tight fold with a straight, moderate to steeply dipping eastern limb and NNW axial plunge. Its western limb is modified by a similarly trending anticline/syncline pair but with shorter axes. These and the main axis are offset sinistrally on three NE to ENE partly dyke-filled faults. Other faults (some also dyke filled) with similar orientation have apparent south-block down movement. Beyond the Kombolgie Formation outcrop area, the Edith Falls Syncline may continue to the southeast as the Maud Low defined by preservation of Plum Tree Creek Volcanics between outcrop areas of older Tollis Formation.

3) The antiformal zone between the Edith Falls and Eastern Synclines extends NNW from the Maud High and is mainly occupied by Plum Tree Creek Volcanics outcrop. Interpretable dips are sparse in this unit, but where present they do appear to define a broad antiformal structure approximately concordant with bedding in the overlying Kombolgie Formation of the adjacent synclines. However there are exceptions. For example west of the Seventeen Mile and Maud Highs near the base of the Kombolgie Formation, the volcanics appear to be folded and overturned against a NNW-trending thrust/reverse fault with E-vergence. Similarly in the narrow zone between the Seventeen Mile and Maud Highs, the volcanics are more complexly deformed by small-scale folding on northerly and northeasterly trending axes. The partly fault bounded inliers of Tollis Formation outcrop which define the Seventeen Mile and Maud Highs have northwesterly alignments paralleling the internal older deformed and strike-faulted fabric. This is markedly oblique to the overall NNW trend of the enclosing younger antiform.

4) The Eastern Syncline with contained outcropping Kombolgie Formation and McAddens Creek volcanics, is a broad, gentle fold with a steeper western limb. Axial plunge reversal defines a basin structure. Numerous long northeasterly trending fault/fractures cut across it and many coincide with dolerite dykes. There is vertical offset of the stratigraphy across them with both north- and south-block down senses of movement. Less commonly, faults strike parallel to the synclinal

axis and form the contact between the Kombolgie Formation and McAddens Creek volcanics. Based on their orientation, they are probably reverse faults.

5) The Carpentaria High is an elongate (7 km long) NNW-trending zone of outcropping Dorothy Volcanic Member, Maud Dolerite, Tollis Formation and interpreted breccia alignments. Sparse structural fabric and most litho-unit contacts strike parallel or slightly oblique to its axial trend. Around its northern end there is photogeological evidence for multiple NNW-trending and W-vergent thrust/reverse faults affecting the the Kombolgie sequence and the underlying Mount Shepherd Rhyolite. In addition along most of its length, the western boundary of the Carpentaria High is interpreted to be thrust/reverse faulted, juxtaposing the contained sequence against the younger Kombolgie Formation of the Carpentaria Low. At its southern end, this dislocation appears to be offset dextrally on a southern boundary fault to the Carpentaria Low and then continues further to the SSE for 4 km as the mapped reverse fault/thrust just east of Target Zone K.

6) The Carpentaria Low is defined by a zone of Kombolgie outcrop with gentle overall basin geometry and a NNW axial trend. At its northern end, the axis plunges south off the elevated Mount Shepherd Rhyolite dome. In the south, the basin is bounded by ENE to NE trending faults. The age of juxtaposed units across these and rotation of adjacent bedrock fabrics indicates north-block down movement and, on the NE segments, a dextral wrench component. Along the western margin of the Carpentaria Low, the easterly dips steepen, and north of the Carpentaria Fault the Kombolgie and underlying Tollis Formations along this margin are locally disrupted by interpreted WSW-vergent thrust/reverse faults. Along much of the eastern margin, the basin structure is modified by a small anticline which lies in the footwall to the western boundary thrust/reverse fault of the Carpentaria High.

The Kombolgie Formation in the Carpentaria Low is highly fault/fractured. Long examples, including dyke-filled ones, have ENE to NE trends and a shorter fracture set trends NW. The dips which define the overall basin structure are modified against them.

7) The Carpentaria Fault is a major anastomosing dislocation with E-W trend, which disrupts lithostructure across the Carpentaria High and Low. Its sense of movement is sinistral wrench with horizontal throw of about 800m. A vertical component is also inferred (**5.1**, above). Westwards beyond the Carpentaria Low there is little evidence for continuation of the fault in the Tollis Formation outcrop area, probably because photostructural expression in this area is very poor. A few short interpreted fractures do however line-up with the fault as does an "anomalous" disruption of the brecciated margin of the Chessman Low further west.

8) The Chessman Low is an interpreted 3.5 km long, rift-like structure with downfaulted margins along which there is coincident breccia. The orientation is about 035^0 and hence slightly oblique to the more northeasterly dolerite dyke trend. It appears to have a very subdued signature on the aeromagnetics. The

photo-expression of low relief with extensive masking soils is clearly very different from that of the Tollis Formation outcrop areas beyond its margins. Published mapping shows mainly a tuff component of the Plum Tree Creek Volcanics confined within the structure. The current interpretation also shows this, albeit tentatively. There is a small interpreted inlier of northerly striking folded Tollis Formation within the structure itself. This does form more elevated relief and was confirmed in the field. The current interpretation also shows Antrim Plateau Volcanics in the southwestern sector of the structure. This may be a function of topography when the volcanics were deposited rather than indicating a post-Antrim volcanics age for the structure.

9) Tollis Formation Deformational Fabric in the form of bedding surface traces is generally poorly expressed photogeologically because of its small-scale nature and the weak dissection of the associated landforms. Hence in the current interpretation, the traces of the bedding fabric are considered generally reliable, but the dip directions and small-scale fold closures are more tentative. Bearing this in mind, the overall conclusion is that the fabric is moderately to steeply dipping and at least in places, tightly folded with wavelengths of less than 300m. Strike-parallel faults occur and some are interpreted to be thrusts, for example in the Tollis Formation outcrop area of the Seventeen Mile High.

The strike of the steeply dipping fabrics and fold axes is variable and it is difficult to integrate this into a coherent structural pattern because younger rocks conceal information between the Tollis Formation outcrop areas. Mostly the fabric strikes NW to northerly except in the outcrop area up to 2.5 km east and southeast of the Chessman Low. Here the fabrics cross the Maud Creek Lineament Zone and swing in an arc from northerly to almost E-W, possibly representing larger scale refolding (of earlier deformation) on a NNW axis.

10) The Maud Creek Lineament Zone is a 9 km long NW-trending composite feature, principally defined by the straight alignment of Maud Creek itself. Along about half of its length it follows the western margin of the Kombolgie Formation outcrop of the Carpentaria Low. Near its northern end, WSW-vergent thrust/reverse faults in the Kombolgie/Tollis Formations along this margin form part of the lineament zone. Assuming some offset on the Carpentaria Fault, the lineament zone may continue northwestwards as the faulted western margin of the Maud Low and beyond this, as the "anomalous" anticline which modifies the western limb of the Edith Falls Syncline.

There is little or no aeromagnetic expression of the lineament zone except at its southeastern end. Here it continues as a well defined magnetic feature for a further 2.5 km beyond that shown in the current study.

We suggest that the Maud Creek Lineament Zone may have been a basin margin normal fault during Kombolgie sedimentation in the Carpentaria Low area, and was subsequently mildly inverted to produce the observed marginal thrust/reverse faulting. Sense of movement (if any) in pre-Kombolgie times is more problematical. In the northern part of the lineament zone the bedding fabric in the Tollis Formation is well expressed photogeologically, but its attitude provides no

evidence for a sense of movement. However north of the Main Zone Deposit there is possible evidence for sinistral movement (**5.3**, below).

The clustering of Au occurrences in the Maud Dolerite within 500m of the lineament zone suggests that it did play a role during pre-Kombolgie times in focussing the mineralisation.

11) **The South West Lineament Zone** is a NW-trending, 15 km long corridor of subtly expressed drainage lineaments and some better defined fault/fractures, which crosses the outcrop areas of Antrim Plateau Volcanics and Tindall Limestone. Northwest-trending aeromagnetic lineaments also occur within the zone and, at its northern end, it parallels the structural trend of the folded Tollis Formation. We suggest that at least in part, the lineament zone represents the subtle surface expression of a faulted margin of the Tindall Limestone basin of deposition. It could though have had earlier origins because its orientation is similar to the NW structuring affecting older sequences.

5.3 Photogeology of the Main Zone Deposit Area

The 1:25,000 scale colour air-photos used in the current study pre-date the disturbance associated with pit development on the Main Zone Deposit. In this area there is a contact visible on the air-photos which is interpreted to be the irregular trace of the Main Zone Structure and its northward continuation for 2 km to merge with the Maud Creek Lineament Zone. It follows a marked soil colour change with a coincident very low discontinuous ridge feature. Local asymmetry of the latter suggests an easterly dip. On the eastern side brown soils are interpreted to represent the mafic tuff "hanging wall" sequence (**Pbth**), which from its composition, could be part of the Dorothy Volcanic Member. Over a shorter strike length (750m) on the western side, underlying pale coloured Tollis sediment "footwall" rock (**Pbtf**) is interpreted. It is characterised on the air-photos by smooth texture and pale buff soil colour, and scattered along it there are small very bright-toned patches forming colour anomaly 19c. Northwards this footwall unit merges with undifferentiated Tollis Formation and the photogeological expression of the latter is different from elsewhere, with bedding generally absent. The reason for this is unknown.

The Main Zone Structure is intersected and offset sinistrally by interpreted NW-trending faulting. This would agree with the stress field that produced the known reverse faulting on the Main Zone Structure. Shorter NNE to NE fault/fractures also occur but air-photo evidence for sense of movement is uncertain. In the above stress field they would be dextral.

The northern end of the Main Zone Structure appears rotated anticlockwise where it merges with the NW-trending Maud Creek Lineament Zone. We suggest that this could indicate sinistral movement on the latter, which again is in agreement with the above stress field. Here also the Main Zone Structure is orientated obliquely to faintly visible NNW bedding trends in the Tollis Formation. Notwithstanding its irregular surface trace in places, it supports a structural rather than sedimentary contact origin for it.

West and south of the Main Zone Deposit, the host rocks are concealed by Antrim Plateau Volcanics and associated black soil/clay. However a southward continuation of the Main Zone Structure is suggested in the form of a well defined drainage lineament with straight and arcuate segments. This extends over a distance of 4 km into the Antrim Plateau Volcanics and Tindall Limestone outcrop areas. Perhaps significantly it is inflected where intersected by the South West Lineament Zone.

There appears to be no expression of the Main Zone Structure on the aeromagnetics.

6. EXPLORATION POTENTIAL

6.1 Air-photo anomalies

These are numbered 1-33 on the Photogeological Interpretation Map and are described in Appendix 1. They comprise both geomorphic and colour anomalies.

The geomorphic anomalies are mostly prominent small "anomalous" hills and more rarely they are features with negative relief. They are delineated for the possibility that they represent small intrusive phases or pipe-like brecciation/silicification. In this context it is worth noting that "Chlorite Hill" located 900m NE of the Main Zone Deposit forms geomorphic anomaly 18g and is surrounded by small old Au workings.

The colour anomalies are small patches with paler air-photo tones or higher Landsat albedo than the surround. They are identified as possible alteration.

Some of the anomalies occur within, and contribute to defining the larger Target Zones described and prioritised in **6.2**, below. For the remainder, priority in terms of exploration interest and a field check is given to those within the Tollis Formation, Dorothy Volcanic Member and Maud Dolerite because of the known potential for Au mineralisation within these hosts.

The anomalies are: 9g, 10g, 11c, 13g, 14c, 15c, 16g, 20g, 23g

Anomalies within the Plum Tree Creek Volcanics are assigned lower priority (see **6.3,** below).

Anomalies within the Kombolgie Formation and Antrim Plateau Volcanics are assigned lowest priority because these units are assumed to lack prospectivity for Au. Nevertheless some are very prominent (e.g 1g and 4g in the Kombolgie), and others have an aeromagnetic signature (12g in interpreted Antrim volcanics).

Over the Tindall Limestone and associated sand cover the air-photo anomalies are probably solution collapse features or karstic remnants and can be ignored.

6.2 Target zones

From north to south, these are identified as Zones A to L on the Photogeological Interpretation Map and they are described in Appendix 2. Their selection and prioritisation in terms of exploration interest is based on the technical outcomes of the current project and the presence of known mineral occurrences. It is not influenced

by the results of past exploration or land access factors because we do not have full knowledge of these.

The criteria for delineating and prioritising the target zones are as follows:

- Presence of known mineralisation
- In Maud Dolerite, Tollis Formation or Dorothy Volcanic Member outcrop areas. The latter may be especially favourable because of the mafic tuff host in the Main Zone Deposit.
- Proximity to the Maud Dolerite contact.
- Along-strike extensions of Main Zone Structure
- Proximity of Maud Creek Lineament Zone
- Presence of interpreted breccias and geomorphic or colour anomalies
- Similar northerly-trending structure to that at the Main Zone Deposit
- Coincident aeromagnetic signature (?magnetic Maud Dolerite phase)

Prioritisation of the target zones is as follows:

Zones F and G (First Priority)

These are assigned highest priority because they are interpreted possible extensions of the Main Zone Structure. Zone F, if not already fully explored, is of more interest because it is not concealed beneath cover, it lies closer to the Maud Creek Lineament Zone and there appears to be some field evidence for the structure in subcrop (Appendix 2). The intersections with interpreted NW and NE faults may have more potential. Zone G has less interest because prospective bedrock is concealed beneath Antrim Volcanics and Tindall Limestone; however in the northern half of the zone the Antrim Volcanic cover could be quite thin.

Zones A, D and J (Second Priority)

Zones A and D both have known Au occurrences in them and in the case of Zone A an alignment of interpreted breccia is associated with Maud Dolerite. Zone D contains a cluster of several breccias (one with aeromagnetic signature), geomorphic anomalies and interpreted fault/fractures with "favourable" northerly trends. Although Maud Dolerite has not been mapped photogeologically, there is indirect evidence (Kruse et al., 1994) that it may be present.

In Zone J, interpreted breccias and a colour anomaly are sited along the margin of the Maud Dolerite and presumably reflect tectonic disturbance along it. Also they have a "favourable" northerly trend and there is a coincident aeromagnetic "anomaly".

Zones B, C, E, H, I, K, L (Third Priority)

None of these have recorded associated Au mineralisation. However Zones B, C and L are considered of more interest than the others because one (Zone B) contains copper mineralisation and all three contain interpreted breccias, Maud Dolerite and its contacts with surrounding Tollis Formation or the Dorothy Volcanic Member.

6.3 Potential in the Plum Tree Creek Volcanics/Mount Shepherd Rhyolite

These litho-units form an extensive cover in the northern half of the project area. Although there is no record of Au mineralisation within them, we speculate that they could have some exploration potential, in particular for epithermal-type mineralisation. The contained lithologies include felsic and basic volcanics, and the Mount Shepherd Rhyolite with associated possible acid dykes may itself be an extrusive dome covering a feeder pipe.

In this context the geomorphic anomalies, breccias, and possible acid dykes and undifferentiated dykes/veins within these litho-units could be of interest. So could the rift-like Chessman Low, especially if it formed coevally with the rhyolite dome. Its margins are extensively brecciated and, assuming the interpretation of Plum Tree Creek Volcanics in the structure is correct, this sequence could include favourable high structural levels preserved from erosion.

7. CONCLUSIONS

1) The 1:25,000 scale colour air-photos form an excellent dataset for interpretation of lithostructure in the area. Their stereoscopic view and high resolution allows interpretation of much more detail than can be extracted from the Landsat/SPOT imagery, although the latter does provide a useful overview for integrating results across the area. The aeromagnetic data is less useful because most of the litho-units are non-magnetic. Exceptions are the dolerite dykes, Antrim Plateau Volcanics and inferred small more magnetic phases in the Maud Dolerite.

2) Orientation of deformational fabric in the complexly structured and possibly refolded Tollis Formation is very variable and cannot be integrated into a coherent pattern because information is lacking where younger cover rocks intervene. Because of this, a regional stress direction for Tollis deformation (Maud Creek Event) is uncertain. However from the broader overview provided by published mapping beyond the project area, the orientation of shortening fabrics points to approximately E-W compression.

3) The Chessman Low is an (extensional) rift-like structure, post-dating deposition of the Plum Tree Creek Volcanics. Its oblique orientation suggests it is unrelated to the extensive post-Kombolgie dolerite dyke emplacement. We suggest that it formed coevally, either with Antrim Plateau volcanism or much earlier in association with extrusion of the Mount Shepherd Rhyolite dome to the northeast.

4) Post-Komblogie deformation involved NE-SW compression to produce shortening on northwesterly alignments including pre-existing ones. This deformed the

Kombolgie sequence to produce the Edith Falls and Eastern Synclines, the Seventeen Mile/Maud and Carpentaria Highs and the Carpentaria Low with associated local marginal thrusts/reverse faults. At a later stage, in this same stress regime, there was normal faulting and dolerite dyke intrusion along the NE-SW extensional trend and finally there was sinistral offset on the E-W trending Carpentaria Fault.

5) The 9 km long NW-trending Maud Creek Lineament Zone was the site of local thrust/reverse faulting in post-Kombolgie times, but probably had earlier origins because the Maud Creek Au mineralisation is clustered around it. At that time we suggest that faulting associated with it would have been sinistral in keeping with the stress regime in (2), above.

6) Around the southern end of the Maud Creek Lineament Zone several areas of Maud Dolerite are interpreted which are not shown on the published maps.

7) Possible extensions of the northerly trending structure associated with the Main Zone Deposit have been interpreted northwards to Maud Creek and southwards as a lineament in the younger cover sequences. During the Maud Creek Event this structure would have been a reverse fault; see (2), above. These extensions are included as target zones.

8) Numerous alignments of breccia have been interpreted and they contribute to defining the target zones.

9) Twelve target zones have been delineated for field checking to further assess their exploration potential. Their selection and ranking, is based on favourable host lithologies and structure, existing Au mineralisation, the presence of breccias, geomorphic and colour anomalies and (rarely) coincident "aeromagnetic" anomalism.

Highest priority is given to Zones F and G (extensions of Main Zone Structure). Second priority is given to Zones A, D, and J and third priority to the rest.

10) Air-photo geomorphic and colour anomalies occurring outside the target zones also warrant a field check, particularly those within the favourable Tollis Formation and Maud Dolerite hosts.

11) Although there is no record of Au mineralisation in the Plum Tree Creek Volcanics and Mount Shepherd Rhyolite, we speculate that there could be potential for epithermal mineralisation associated with these units. In this context their contained geomorphic anomalies, breccias, possible acid dykes and undifferentiated dykes/veins, together with the graben-like Chessman Low could warrant attention.

REFERENCES

Harmony, 2002. Part of an internal Hill 50 Gold report on the Maud Creek gold deposit; provided by Harmony Gold Operations

Kruse, P.D. et al., 1994. KATHERINE SD53-9, Explanatory Notes. Northern Territory Geological Survey

Mulder, C.A. and Whitehead, B.R., 1988. Geology of the Katherine Gorge National Park. Northern Territory Geological Survey, Report 3

Needham, R.S., Stuart-Smith, P.G., Bagas, L., and others, 1989. Geology of the Edith River Region (1:100,000 scale map). Bureau of Mineral Resources, Canberra

SRK 1998. Maud Creek N.T., Structural Assessment and Aeromagnetic Interpretation.Unpublished report by SRK Consulting for Kilkenny Gold NL

Sweet, I.P. et al., 1994. KATHERINE Second Edition (1:250,000 scale geological map). Australian Geological Survey Organisation, Canberra

APPENDIX 1: Descriptions of Geomorphic and Colour Anomalies

Anomaly No	Interpreted host lithology	Description
1g	Kombolgie Fm.	Sub-circular (250m dia.) depression with flat floor enclosing discontinuous rounded ridge feature. More tree-covered than surround and Kombolgie bedding terminates abruptly against it.
2g	Plum Tree Ck Volcs.	Prominent elongate hill; 500m along strike from Mt Gates Maud Dolerite intrusion.
3g	Plum Tree Ck Volcs.	Small (50m) but very prominent conical hill.
4g	Kombolgie Fm.	Elliptical depression with central small (50m) very prominent hill with rounded top.
5g	Plum Tree Ck Volcs.	Conical hill with flat top.
6g	Plum Tree Ck Volcs.	Three small hills with darker photo-tone than surround. Southernmost example is the most prominent.
7g	Tollis Fm.	Very prominent conical hill with resistant outcrop at summit. Small interpreted breccia zone on eastern slope.
8g	Tollis Fm.	Cluster of 3 low elongate hills with rounded crests near Chessman Au prospect. Southernmost example examined in field, has been trenched to expose sheared/brecciated, chloritised, ferruginised and quartz veined Tollis Fm. Published map shows coincident Antrim Volcanics but no air-photo evidence for this.
9g	Tollis Fm.	Low hill feature with outcrop at summit. Could be an outlier of Plum Tree Creek Volcanics.
10g	Tollis Fm.	Very small (25m) conical hill within 75m of major breccia zone.
11c	Tollis Fm.	Elongate (125m) northerly trending, flat-floored zone with paler soil colour. Slight negative relief.
12g	?Antrim Plateau Volcs.	Small (50m) very prominent hill with rounded top and pale soil/outcrop colour. Coincident aeromagnetic anomaly.
13g	Tollis Fm.	Prominent large (150m) hill with irregular summit.
14c	Tollis Fm.	Elongate (250m) NNE-trending zone of paler soil colour. Slight negative relief. Coincident high albedo on Landsat.
15c	Tollis Fm.	Small patches of very pale soils. Coincident and more extensive high albedo on Landsat.
16g	Tollis Fm.	Very small (30m) conical hill with outcrop on summit.
17g	Dorothy Volcanic Member	Elongate (120m) hill in flat plain. Rounded summit. May represent southern extension of breccia zone north of Carpentaria Fault.
18g	Maud Dolerite	Small (50m) prominent hill with rounded crest and outcrop. Dark grey photo-colour contrasts with surrounding reddish brown dolerite soils. In field central outcrop appears to be unaltered dolerite but surround includes old workings in brecciated, chloritised and quartz invaded dolerite.

APPENDIX 1: Continued

Anomaly No	Interpreted host lithology	Description
19c	Tollis Fm-footwall beds	Six very small patches of paler soil colours. Possibly not natural but result of disturbance associated with drilling.
20g	Maud Dolerite	Low rough textured hill feature (separate dolerite phase?).
21c	Maud Dolerite	500m elongate zone with patchy pale soil colours and slight negative relief associated with drainage incision. ?Softer-weathering zone. Partly coincident prominent aeromagnetic anomaly (magnetic Maud Dolerite phase?)
22g	Dorothy Volcanics	Very small area of anomalous more resistant outcrops.
23g	Antrim Plateau Volcs./Tollis Fm.	Two low hills with irregular summits and denser tree cover than surround.
24c	Antrim Plateau Volcs.	Elongate (500m) zone of pale grey photo-colour and low relief (black soil?). Linked to an interpreted NNW fault/fracture at northern end
25c	Maud Dolerite	Northerly trending 600m long alignment of small patches with higher albedo on Landsat. On air-photos coincide with bare reddish brown soils on interfluve.
26c	Maud Dolerite	Small smooth-textured patches of pale grey photo-colour. Slight negative relief.
27g	Antrim Plateau Volcs.	Slightly raised circular area. In field coincident soils are reddish brown in contrast to surround. Partly coincident aeromagnetic feature.
28g	Tindall Limestone	Flat-floored slight depression with pale soil colours/alluvium. Probably a sinkhole
29g	Tindall Limestone	Very prominent small outcrop with karstic form. Probably more resistant limestone remnant.
30g	Antrim Plateau Volcs.	Very small hill of more resistant outcrop. Coincident small aeromagnetic low.
31g	Surficial cover near Cretaceous sequence outcrop	Rounded alluviated depressions. Probable solution collapse features.
32g	Plum Tree Ck Volcs.	Small elongate hill feature adjacent to WNW-trending air-photo lineament
33g	Plum Tree Ck Volcs.	Semi-circular area of slightly more elevated relief adjacent to interpreted breccia.

APPENDIX 2: Descriptions of Target Zones

Target Zone	Description
A	1600m NW alignment of interpreted breccia in Maud Dolerite (?sill) near contact with younger Plum Tree Creek Volcanics. At SE end, breccia is well-defined with high relief and pale air-photo coloured patches. Here confirmed in the field (highly silicified, brecciated and quartz stringered). To the NW the feature is more subtle and identification is tentative. It is suggested that the breccia could follow a fault line associated with emplacement of the dolerite. Old Mt Gates Au workings in vicinity
B	In the Carpentaria High. 3.5 km N to NNW alignment of discontinuous, generally resistant (ridge forming) interpreted breccias within Maud Dolerite, Dorothy Volcanic Member and Tollis Formation. The southern 1 km sector of breccia is much more tentatively identified but the old Carpentaria Cu workings occur on or near it.
C	In Carpentaria High. Delineated principally for presence of well defined 800m resistant breccia along contact between interpreted Maud Dolerite and Tollis Formation. Northerly trend similar to that of Main Zone Structure. Breccia terminates against Carpentaria Fault but south of this, Zone C encompasses a small but prominent geomorphic anomaly in Dorothy Volcanic Member (possible subtle expression of breccia offset sinistrally across the fault).
D	In Tollis Formation with partial cover of Plum Tree Creek Volcanics. In the west there is an array of interpreted strike-parallel fault/fractures and a short (250m) resistant breccia zone with similar northerly trends to the Main Deposit structure. Fault/fractures disrupt the dolerite dyke signature in the aeromagnetic data. At their southern end, geomorphic anomaly (8g) comprises three rounded hills. Published maps show Antrim volcanics coincident with these hills but photogeologically this appears incorrect. A rapid field check on the southernmost example found sheared Tollis Formation with trenching at 290^0 on it. 8g should be more thoroughly checked for possible presence also of Maud Dolerite. 600m and 1300m NE of anomaly 8g, two prominent interpreted resistant breccias occur up to 750m long with ENE to NE trend. One may be folded and the other has a coincident aeromagnetic signature. Also in same area there are geomorphic anomalies 7g and 32g. 7g has ?breccia outcrop on a prominent summit and eastern slope. 32g is a low anomalous hill on a short WNW photogeological lineament which in the aeromagnetic data disrupts dolerite dyke signatures over a length of 1.5 km. The Chessman Au prospect occurs in the western part of Zone D but its exact position is uncertain. Kruse et al., (1994) record the host as Maud Dolerite though none shown on published maps.
E	Encompasses inlier of interpreted folded Tollis Formation in axial zone of Chessman Low. Tollis outcrop contains a 500m long, resistant, strike-parallel breccia on similar northerly trend to the Main Deposit structure. No Maud Dolerite mapped photogeologically but SRK (1998) interpretation shows nearby small areas with Maud Dolerite-type radiometric (K) signature.

APPENDIX 2: Continued

Target Zone	Description
F	Comprises 1400m long interpreted northern extension of Main Deposit structure (contact between mafic tuff and Tollis sediments). Near its northern end, subtle photogeological bedding traces in the Tollis Formation are oblique to the contact suggesting it is tectonic. Contact zone sub-outcrops on track near Maud Creek and appears sheared and ferruginous, and quartz-veined/brecciated. Areas where intersected and offset by NW and NE interpreted faults could have more exploration interest.
G	4 km long drainage lineament which could be southern extension of Main Deposit structure. In Antrim Volcanics and Tindall Limestone cover but as drainage is incised (weakly), this could be very thin particularly along the northern half of the lineament. For example the adjacent geomorphic anomaly 27g with coincident weak aeromagnetic anomalism possibly indicates the older rocks at/near surface.
H	In the main Maud Dolerite outcrop area. Encompasses part of a 2 km long fault/fracture zone with similar northerly orientation to that of the Main Zone Structure and colour anomalies 26c and 25c, the latter also with northerly alignment.
I	Encompasses several interpreted possible inliers of Maud Dolerite straddling the Maud Creek Lineament Zone. Dolerite not shown on published maps but current fieldwork gives some confirmation for at least one of the inliers. Aeromagnetic highs (apparently not younger dolerite dykes) are partly coincident.
J	Northerly trending tectonic contact zone of Maud Dolerite with Tollis Formation. Same orientation as Main Zone Structure. Coincident 1.5 km long swarm of narrow, pale interpreted breccia zones with weak to strong positive relief. Also sub-parallel colour anomaly (21c) of patchily paler, softer weathering soils along creek (?alteration). Southern part of zone coincident with prominent aeromagnetic anomaly (?magnetic Maud Dolerite phase).
K	Encompasses 3 km long NNW striking, sill-like body of Maud Dolerite and adjacent country rocks. Of possible exploration interest are the dolerite/country rock contact zones. Western contact with Tollis Formation is modified by several long (up to 2.5 km) strike parallel NNW trending faults. The eastern contact (although less fault-modified) could be of more interest because interpreted country rocks are mainly Dorothy Volcanic Member. A very narrow (<70m) band of possible Tollis Formation occurs along the dolerite margin itself. Because it follows the margin so closely it may be an intrusive contact effect rather than Tollis Formation.
L	Encompasses several discrete small bodies of interpreted Maud Dolerite and surrounding/intervening folded Tollis Formation/Dorothy Volcanic Member. Of possible exploration interest are the dolerite contact zones where coincident and modified by faulting, especially strike-parallel northerly trending ones. One such is interpreted to extend NNW into Tollis country rock as a breccia; weakly expressed on the air-photos but also shown on the published geological maps.