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Memo TO: Hugh McCullough
CC: Kieran Harrington, Chris Muller
Date: 8/9/13
Subject: **Comments on Papua Mining's Nakru project**

This memo summarises CMC's technical review of Papua Mining's Nakru Project commenting on the technical program delivery, prospectivity and prospect ranking.

Technical program delivery

Papua Mining have established a systematic approach to exploration and data collection where all levels of the geotechnical team are encouraged to think innovatively and contribute ideas. The exploration camp and Kimbe offices are well established and promote safe productive exploration. Chris Muller, with many years of experience exploring in PNG, has an excellent command of the PNG culture and sound knowledge of how to get-things-done in a difficult terrain and a challenging country. Kieran is providing expert technical oversight of the project.

Prospectivity

The island of New Guinea, including Papua New Guinea and Irian Jaya, currently hosts world-class porphyry copper-gold and epithermal gold deposits, namely Grasberg, Panguna, Ok Tedi, Wafi-Golpu and Porgera. The Nakru project area is located within the under-explored, Kulu-Fulleborn fault trend which hosts a number of copper-gold prospects. When exploring for porphyry copper-gold systems CMC utilise established vectors to focus work programs, namely: zoned wall rock mineral assemblages; proximal to distal quartz-sulphide vein styles; zoned surface metal content in soil and rock samples, the presence of multi-phases of igneous intrusion activity and prominent geophysical targets. The review of Nakru project identified:

- well defined wall-rock mineral assemblage and quartz-sulphide veins typical of the upper parts of mineralised porphyry copper-gold bearing environments,
- elevated copper-molybdenum in surface soil samples similar to copper-gold deposits elsewhere,
- multiple phases of igneous intrusions and
- geophysical targets indicative of mineralisation.

Therefore, considering the projects location and geological features, it is CMC's opinion that the project area remains highly prospective for porphyry-related copper-gold mineralisation.

Prospect ranking

CMC utilise a prospect ranking scheme, with decreasing prospectivity, from A to C. Work on the Nakru project prospects should be completed in the following order:

1. Tripela prospect requires immediate surface mapping and sampling, followed by drilling as a priority A
2. Flying Fox project require follow-up surface sampling and drilling as a priority B
3. A deep drill-hole (>1500m) could be bored into Junction prospect. As this is a deeper target, and will therefore be more expensive, it has been given lower priority (B)

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COMMENTS ON PAPUA MINING'S NAKRU PROJECT AREA, NEW BRITAIN, PAPUA NEW GUINEA

Doug Menzies and Greg Corbett September 2013

Introduction

Corbett and Menzies Consulting Pty Ltd (CMC) were engaged by Papua Mining plc to carry out a field and an office-based review of the Nakru Project New Britain, Papua New Guinea, assessing the potential to host economic porphyry Cu-Au style mineralisation. This review was performed at the Papua Mining's field office in Kimbe, at the Nakru Project area, and the Corbett and Menzies Consulting offices. All field data collected was collated in MS Excel and analysed using XLSTAT and MapInfo Discover. The brief for this work included:

- A review of current and historical exploration data, commenting on the porphyry Cu-Au mineralisation potential. This includes an interpretation of the position of the project area within porphyry Cu-Au style mineralisation models.
- Provision of a ranking for the different prospects within the project area.

The following is the priority ranking scheme CMC routinely utilises when making recommendations on a projects future work programs.

Priority

Exploration projects are rated with priorities to proceed with the planned work program to take them to the next decision point. Any such grading might include a number of projects at widely differing stages of evaluation, some with substantial data bases, while others might be unexplored, but may display considerable untested potential. Priorities are based upon the data to hand at the time of inspection, and are subject to change as increased exploration provides improved and additional data. Projects are categorised as:

A – Of highest interest such that the proposed exploration program should be carried out immediately. However, early stage projects with untested potential might be rapidly downgraded from this stage by completion of the planned work program.

B – Of some interest and should be subject to further work if funds are available, often with smaller components of continued exploration expenditure than higher priority targets.

C – Of only little interest and subject to further work at a low priority if funds are available, but not to be relinquished at this stage.

Porphyry Cu-Au deposits.

Porphyry Cu mineralisation is typically recognised as Cu-Fe sulphides hosted within stockwork quartz veins or as disseminations within, and immediately adjacent to, intermediate composition island and magmatic arc porphyritic intrusions, varying to Au-bearing in the SW Pacific rim, and also locally Mo-bearing. Recent geological models (Corbett, 2009; Sillitoe, 2010) suggest quality mineralisation occurs within polyphasal spine-like quartz veined porphyry intrusions overlying magmatic source rocks, although much of the Cu-Au may post-date quartz vein formation (see Figure 3). CMC uses the following vectors to aid in the identification of porphyry Cu-Au mineralisation:

Alteration zonations – Porphyry systems typically exhibit a prominent prograde potassic-propylitic and later retrograde phyllic hydrothermal alteration zonation (Figure 1). Zoned prograde hydrothermal alteration grading out from the mineralised intrusion as potassic to marginal propylitic alteration (stage A in Figure 2) was not recognised in this review. While hydrothermal epidote was recognised within dykes, the progression inwards to actinolite would be most encouraging but none were identified. Retrograde phyllic (silica-sericite-pyrite) hydrothermal alteration overprints prograde alteration in response to the collapse of hot acid waters onto the upper porphyry environment during cooling and drawdown (stage C in Figure 2). The sericite-pyrite associated with phyllic alteration recognised in drill holes bored to investigate chargeability anomalies at Nakru and at surface at Tripela, is typical of many Pacific rim ore systems. Permeable volcanic breccias tend to be more readily altered than more competent rocks and so alteration might extend some distance from the source. Consequently, phyllic alteration, extending into lower temperature argillic alteration (Figure 1), provides the main source of pyrite which produces chargeability anomalies, and can occur some distance from any mineralised intrusion and so the chargeability anomalies should be treated with caution. Not all chargeability anomalies equal Cu-Au mineralisation. On the other hand chargeability anomalies associated with D vein mineralised sulphides, and marginal phyllic alteration, are more likely to be mineralised.

Porphyry style veins- Porphyry systems display well defined set of vein styles commonly grading outwards from the intrusion stock. The recognition of proximal sheeted B or A veins, or more distal quartz-sulphide veins which include D veins (in the classification of Gustafson and Hunt, 1975) will aide vectoring to any source intrusion. The latter distal porphyry veins (Figure 2) lie within the class of low sulphidation deep epithermal quartz-sulphide Au $\pm$ Cu style mineralisation (in the classification of Corbett and Leach, 1998) recognised marginal to many porphyry Cu-Au intrusions. D veins at Nakru are similar to those seen elsewhere in the Pacific rim and comprise quartz with pyrite, chalcopyrite with variable galena, and sphalerite.

Surface geochemical anomalism - Porphyry systems typically produce a unique, concentric metal zonation manifest in surface geochemistry. The analysis of these data, with reconciliation against published (Corbett in prep) geochemical zonations above porphyry deposits, provides a robust vectoring and drill targeting tool.

Intrusive activity - Identification of multi-phase intrusive events and phreatic (pebble dykes) or hydrothermal brecciation in the project area is indicative of a long lived magmatic system.

Geophysical prospecting - Prospecting for buried porphyry systems is aided by geophysical analysis of the complex relationships of magnetite introduction during prograde potassic alteration and magnetite destruction during retrograde phyllic alteration, with the latter also hosting locally significant chargeable pyrite (Figure 2). Figure 2 illustrates the overprinting relationships of alteration and mineralisation in porphyry systems used as vectors to identify buried mineralisation.

Some recent porphyry Cu-Au discoveries such as Wafi-Golpu (Menzies *et al., 2013,* and Muller *et al, 2011),* Ridgeway, Australia; Oyu Togoi, Mongolia (Corbett, in prep) feature substantial Cu-Au mineralisation located within the overlying wall rocks. Exploration models which rely on zoned hydrothermal alteration and marginal vein styles can be used to prospect for blind intact porphyry systems as ideal exploration targets.

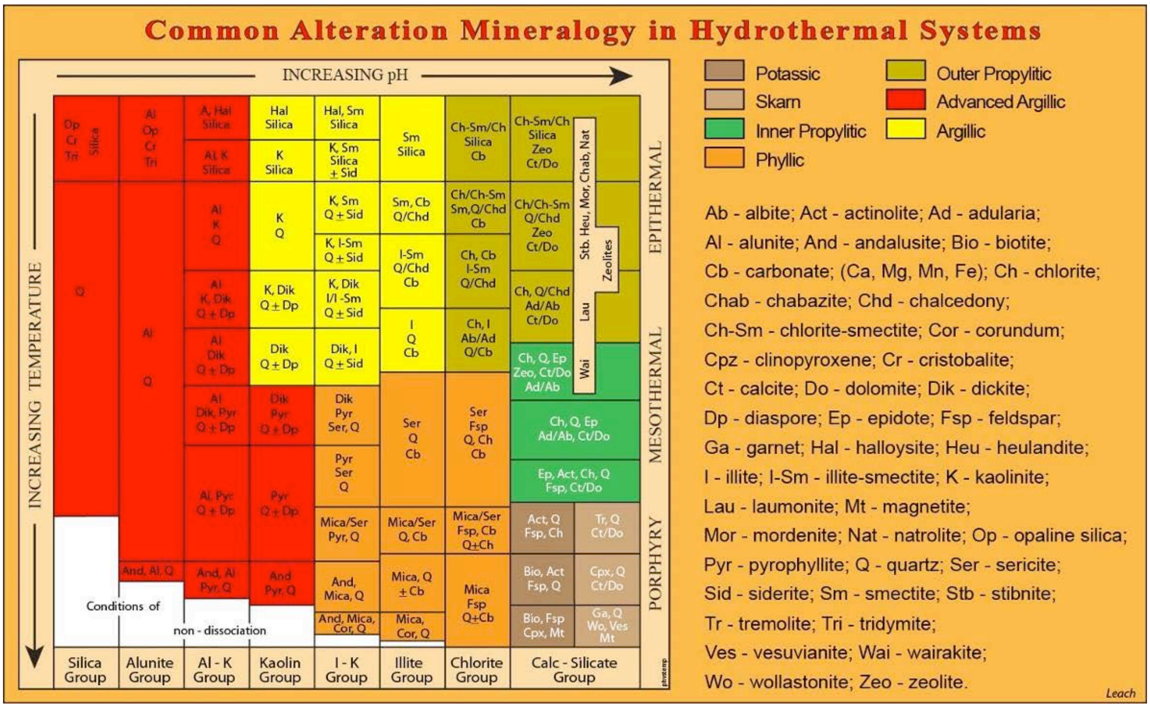


Figure 1. Common alteration mineralogy in hydrothermal systems (Corbett and Leach, 1998).

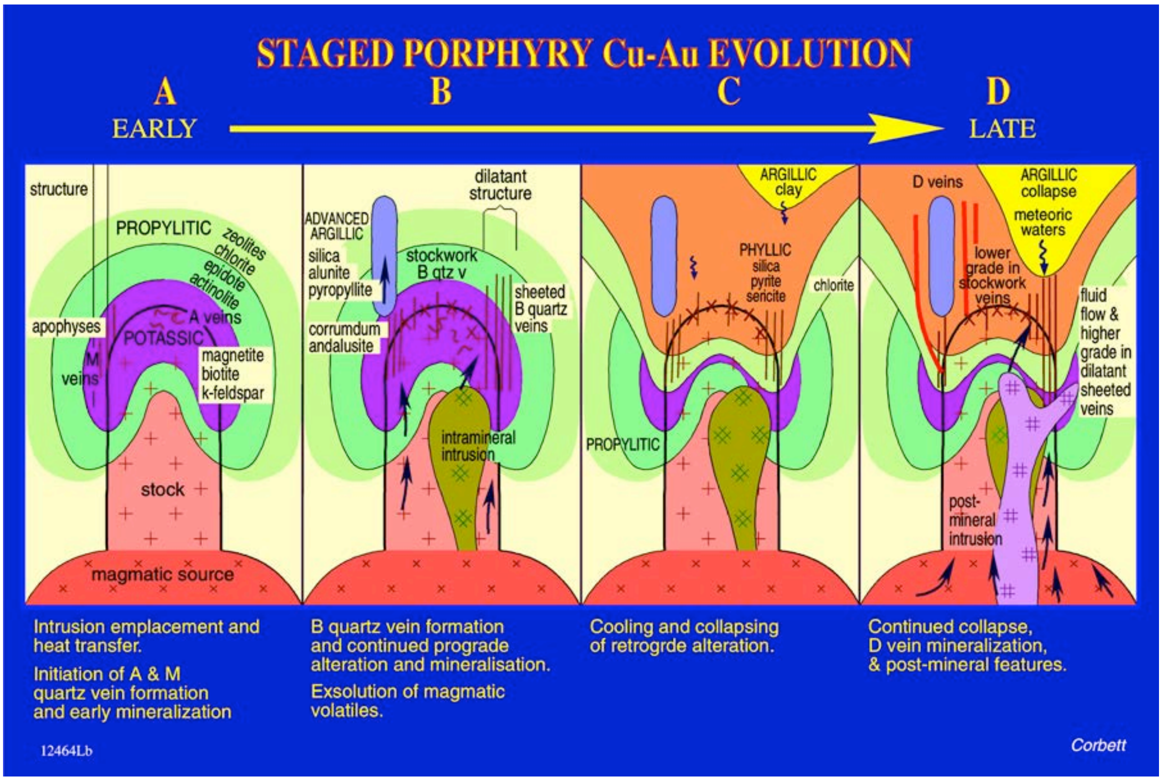


Figure 2. Conceptual model for the staged development of porphyry Cu-Au deposits (from Corbett, in prep; modified from Corbett, 2009).

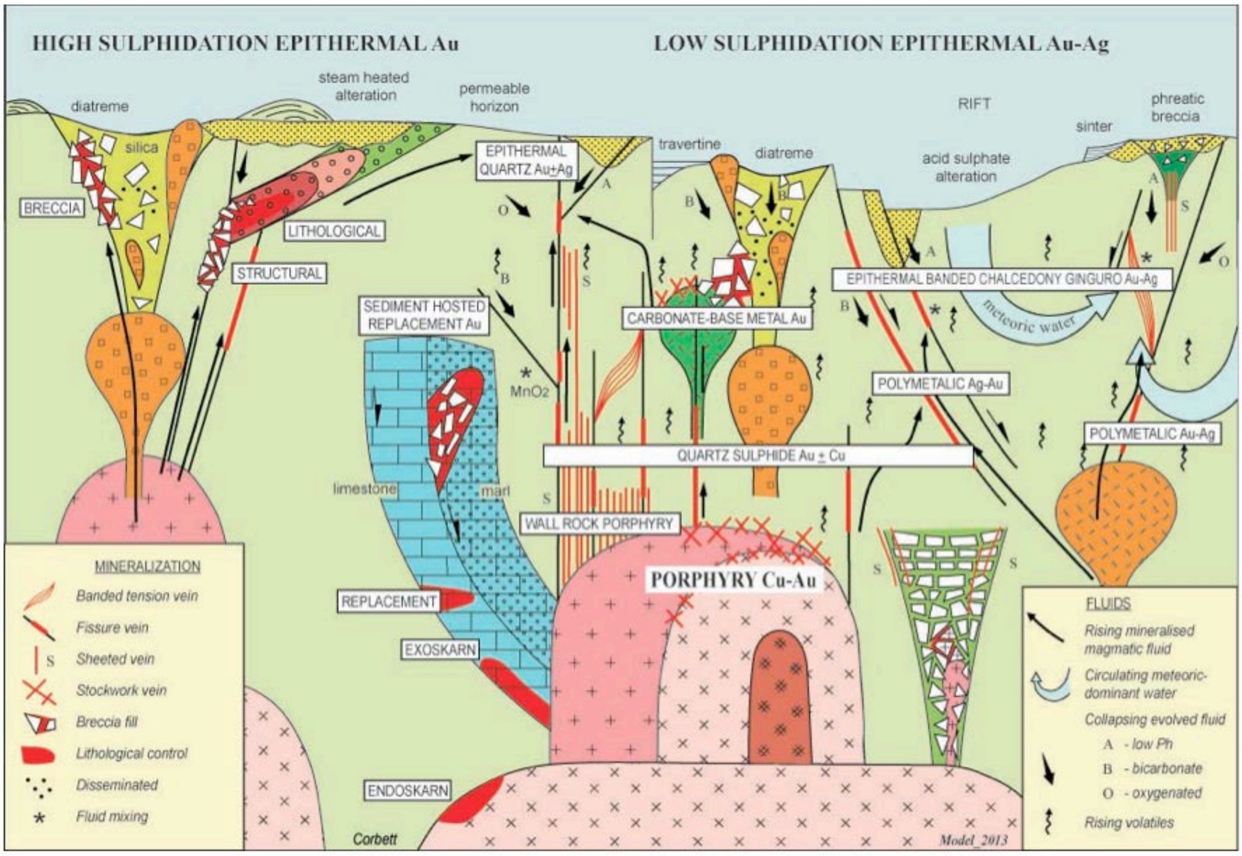


Figure 3. Model for porphyry-related Cu-Au-Ag mineralisation illustrating the progression from porphyry Cu-Au to intrusion-related epithermal style Au-Ag styles (from Corbett, in prep).

Regional Geological Setting

New Britain comprises a thick basal sequence of late Eocene basaltic to andesitic lava, breccia and associated sedimentary rocks that are overlain by Oligocene island-arc volcanic rocks and intruded by their plutonic equivalents (Sheppard and Cranfield, 2012). The hiatus in volcanism in the Miocene is marked by an extensive limestone shelf sequence, now discernible as karst topography, which overlain by Pliocene volcaniclastic sedimentary rocks (Sheppard and Cranfield, 2012). The Nakaru property is hosted within andesitic to dacitic volcanic and volcaniclastic rocks of the Oligocene Kapuluk Volcanics, and the Eocene Baining Volcanics (Christopher, 2002). The volcanic rocks are of basic to intermediate composition and believed to be over 600m thick. Sediments consist mainly of marine conglomerates, sandstones and siltstones with minor limestone lenses. The Kapuluk volcanics are compositionally similar to the Banning Volcanics being acid to intermediate composition and co-magmatic with the upper Oligocene volcanic rocks (Christopher, 2002).

The Kullu-Fulleborn Trend represents a prominent corridor of Upper Oligecene-Pliocene intrusive and volcanic rocks in the West New Britian area (Muller et al., 2013) (see Figure 4). The trend has a strike length of 150km and width of 25km passing from south-east and north-west to across New Britain from the Fulleborn on the south coast to Eleonora Bay on the north coast. An interpretation of the gravity data and crustal depth studies by Wiebenga (1973) and

Finlayson and Cull (1973) indicates that the Kulu-Fulleborn trend is a fundamental structural boundary of sub-crustal extents. Significant zones of mineralisation have been previously reported along this trend including: Kavola East Prospect (Pliocene; epithermal Au), Kulu-Simuku porphyry Cu system (Upper Oligocene; Cu, Au), Plesyumi porphyry Cu (Upper Oligocene; Cu), Mt. Nakru Prospect (?Lower Miocene; Au, Cu) (Mackenzie, 1975; Hine and Mason, 1978; Titley, 1978).

Reduced to pole aeromagnetic data for the Nakru area was supplied by Papua Mining plc and highlights a large sigmoidal shaped magnetic low, coincident with mapped zones of silica-sericite alteration and Cu occurrences. It is inferred herein that this aeromagnetic feature represents a sigmoidal shaped zone of dilation along the Kulu-Fulleborn trend that has localised the Cu mineralisation observed within the Nakru project area (see Figure 5). The sinistral movement on the NW structure suggested by the dilatant zone in figure 5 is consistent with emplacement of porphyry mineralization during NS regional extension, thereby providing abundant space for intrusion emplacement.

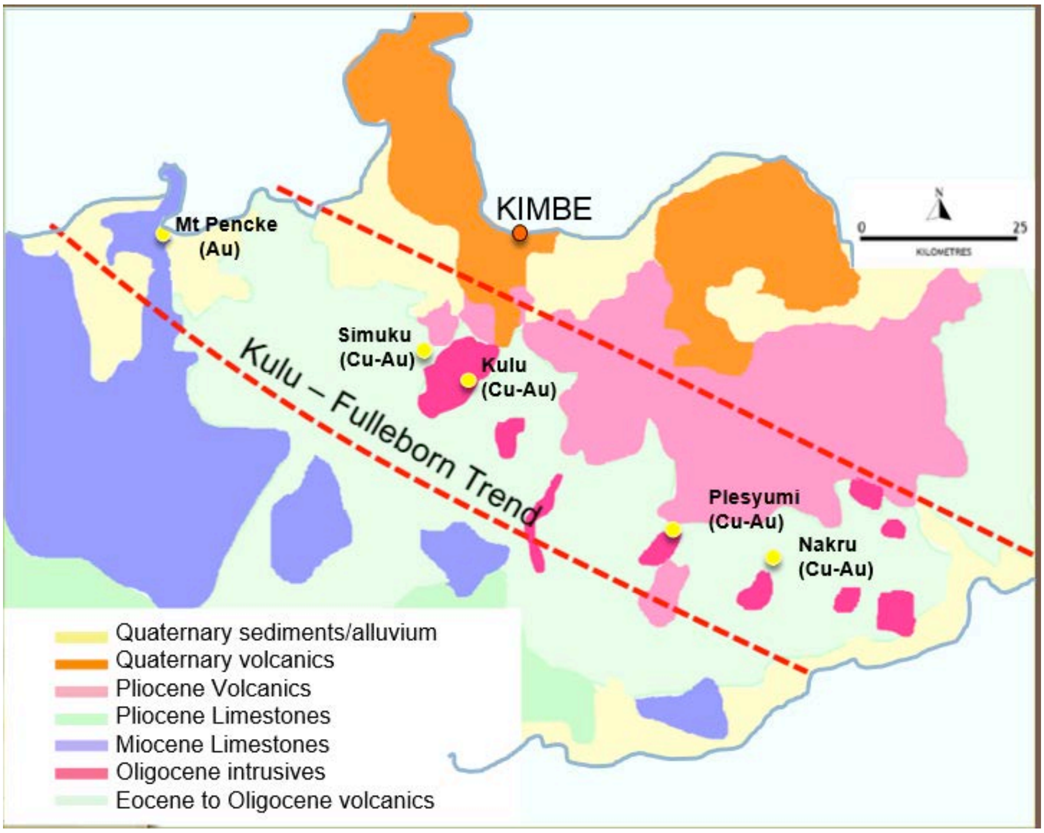


Figure 4. Showing Oligocene intrusives within Eocene to Oligocene volcanics, and areas of mineralisation along the Kulu-Fulleborn trend (Muller, *et al.* 2013).

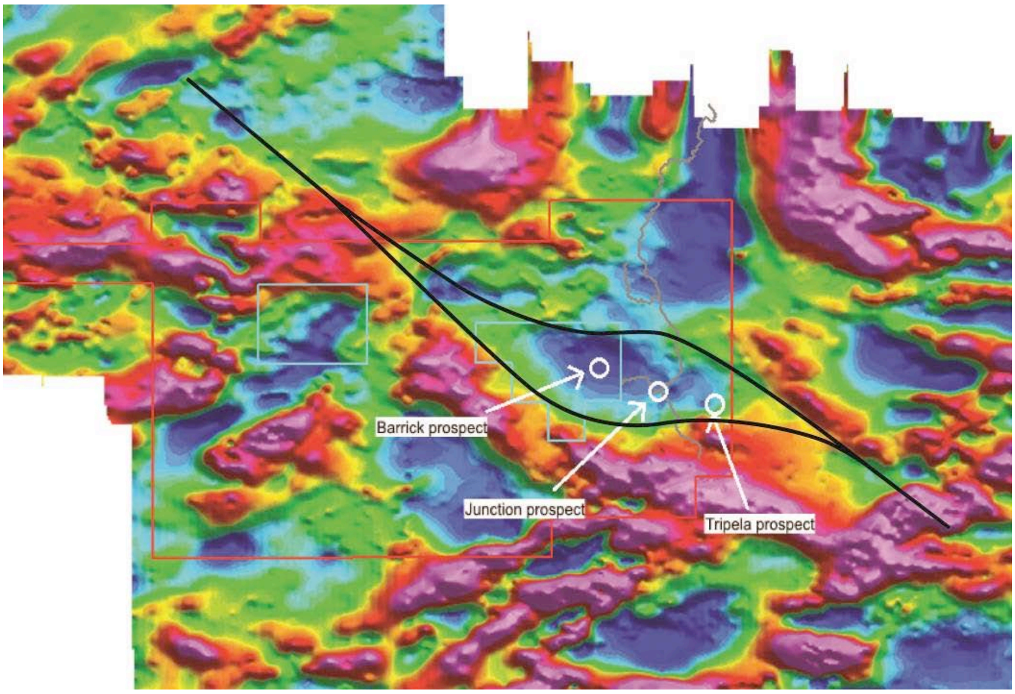


Figure 5. Reduce to Pole aeromagnetic data showing Cu-Au prospects within an interpreted sigmoidal shaped dilational structure developed as a link zone during sinistral movement on the NW regional fractures.

Local Geology

A traverse over the Junction, Tripela and Flying Fox prospects areas of the Nakru project identified large volumes of dacitic volcanics which exhibit strong to intense silica-sericite-pyrite alteration. A zone of intensely silica- sericite altered volcanics at the *Junction Prospect* area returned a crystallinity indicative of illite from XRD analyses by Duckworth (2013). Photo 1 shows this unit in outcrop. This zone of silica-sericite alteration, which extends from Tripela prospect west to Junction prospect, has been resistive to surficial weathering and created the prominent topographic high within the area (see Figure 6). Duckworth (2103) also reported the presence of Mn-wad in petrological analysis. Rhodochrosite, the precursor for Mn-wad, is often associated with Au deposited by the mixing of metal-bearing magmatic fluid with bicarbonate-bearing ground waters, to develop carbonate-base metal Au deposits or D veins developed marginal to porphyry intrusions.

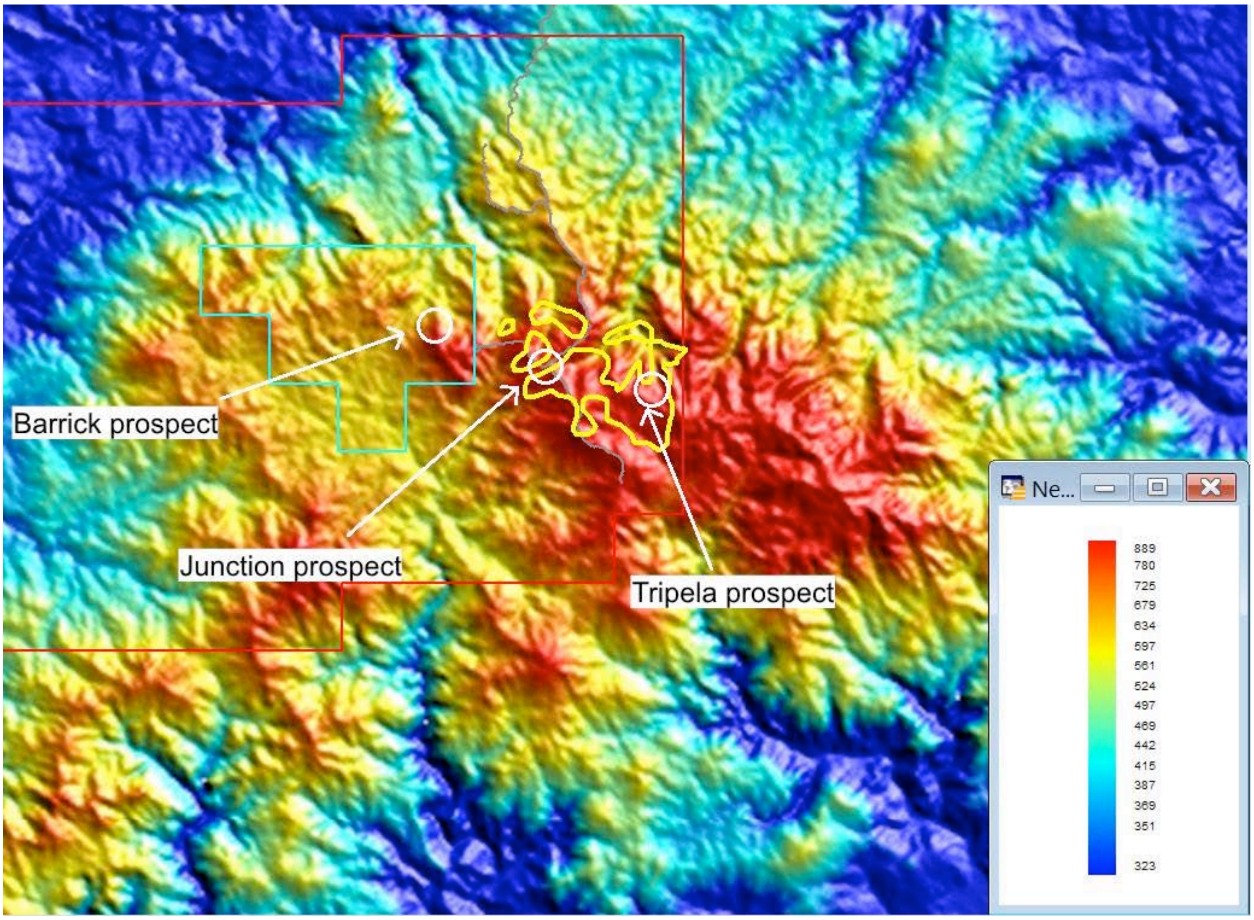


Figure 6. Showing Tripela, Junction and Barrick prospects associated with areas of high relief (SRTM data) produced by resisitive silica-sericite alteration (yellow lines) of the host dacite volcanic rocks. Silica -sericite alteration is redrawn from Muller *et al* (2013).

Several trenches traversed in the *Tripela prospect* area contain a large zone of intense silica sericite-pyrite alteration over approximately 1.5 x 1.5 km area. A massive chalcopyrite bearing vuggy quartz vein lode (see Photo 2 and Photo 3), cropping out at *Tripela prospect*, trends 117 degrees 70 deg W. Previous sampling of this unit reported assay results of up to 30% Cu (see photos). These lodes are interpreted to represent large D veins, using the classification of Gustafson and Hunt, (1975) or quartz-sulphide epithermal (Corbett and Leach, 1998) and are typically found within the silica-sericite-pyrite (phyllic) alteration zone of a porphyry Cu-Au-Mo mineralised environment. At Tripela these D veins form an annulus on the margins of intense silica-sericite alteration and high Cu-Mo in soil samples. Appendix 1 shows the descriptions of the samples taken during a traverse of this prospect. Samples collected at Tripela displayed two vein populations, firstly a massive chalcopyrite-pyrite rich quartz vein (see Photo 3) and secondly lower temperature chalcopyrite-galena-white sphalerite (low Fe rich) rich quartz veins.

The *Flying Fox Prospect*, situated on the north-western side of the Nakru project area, occurs close to the Ayung River, and contains a weakly feldspar porphyritic andesite volcanic containing minor blebs of disseminated native Cu. Soil sampling has been completed over the area which reports anomalous Cu, negligible Mo (<5ppm) from creek channel samples. Some rock chip samples collected within this zone have yielded up to 30% Cu. One interpretation is that this Cu occurring as native Cu and malachite, may have originally been derived from the cooling andesite. The andesite is strongly magnetic indicative of primary magnetite. This primary magnetite would have been destroyed during appreciable hydrothermal alteration, none of which is observed in the host rocks. Another interpretation is that the elevated Cu seen throughout this prospect has been remobilised by supergene processes from unsighted quartz-pyrite-chalcopyrite veins (D veins).

Drill core logged from the Junction prospect displays a sequence of dacite volcaniclastic and fiamme-bearing dacite tuffs, with intercalated dacite domes. Two drill holes, N62DDH001 and N62DDH002, bored into a zone of high Induced Polarisation (IP) chargeability, were logged at the Kimbe core shed. A summary log of each of these holes is give below and a detailed log is provided in Appendix 2. A fact cross section for these holes, is shown in Figure 7. Both of these drill holes interested a sequence dominated by dacite domes and polymictic, fiamme-bearing dacitic volcanic breccias (see Photo 4 and Photo 5) and tuff which is locally flow banded (see Photo 6 and Photo 7). This unit exhibits strong to intense silica-sericite alteration over chlorite alteration of probable primary volcanic origin (see Photo 6). The upper portions of both drill holes have intersected pebble dykes, which appear to be more prominent on the margins of the prospect than the central parts. The pebble dykes are clast-supported with well-rounded clasts of andesite, dacite and minor pyrite in fine grained matrix (see Photo 8). One pebble dyke was observed to contain a clast of an epidote altered juvenile intrusive (see Photo 9). Another pebble dyke was observed with significant silica-sericite alteration indicating it had been emplaced while the alteration system was still active (see Photo 10). Several faults zones were observed throughout this zone often dominated by puggy clay rich brecciation (see Photo 11). Where preserved the dacite volcanics have undergone strong to intense silica-sericite-pyrite alteration overprinting chlorite alteration, which is more intense in association with feeder faults zone (see Photo 12). Minor hypogene hematite alteration was observed with intense silicification proximal to a fault zones (see Photo 13). The lower parts of both drill holes intersected a large number of aphanitic to feldspar porphyritic andesite dykes with varying moderate to strong chlorite and moderate to strong epidote alteration, locally exhibiting vesicles and chilled margins (see Photo 14, Photo 15, Photo 16 and Photo 17). Locally strong to intense silicification of the dacite grades into intense quartz vein stock-working (Photo 18, Photo 19 and Photo 20). Locally matrix supported hydrothermal breccias are evident with angular clasts in a fine grained rock flour groundmass (see Photo 21). Several quartz-pyrite veins with sericite alteration selvages (D veins) occur in both drill holes (see Photo 22 and Photo 23). The lower part of N6DDH002 intersected intensely silica-sericite altered dacite with a “pitty” texture due to the leaching out of primary magnetite (see Photo 24).

Figure 7 is a hand-drawn cross section through both of these holes showing the predominance of pebble dykes on the eastern and western margins of the prospect area.

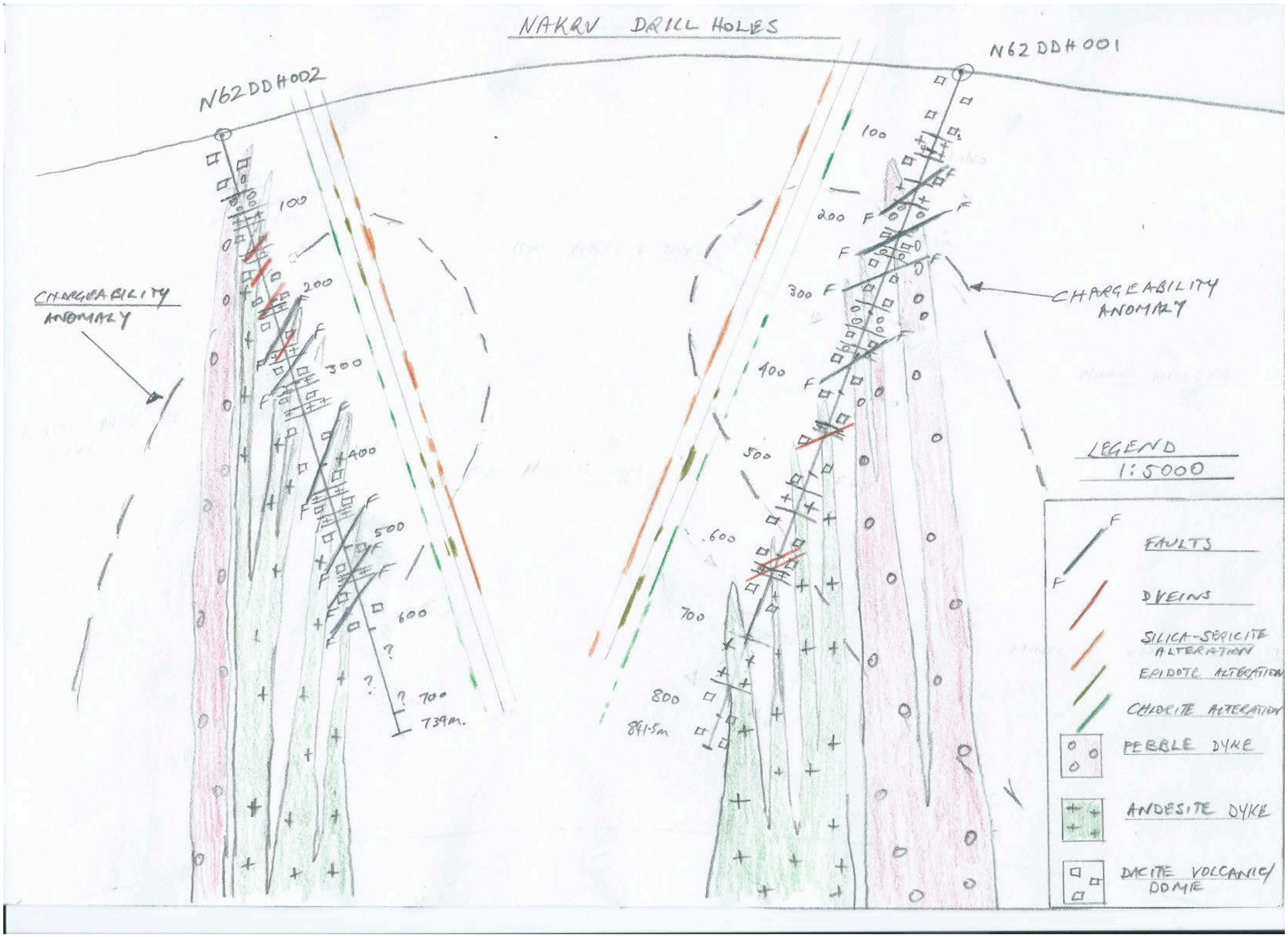

NAKRU DRILL HOLES
N62DDH002
N62DDH001
CHARGEABILITY ANOMALY
CHARGEABILITY ANOMALY
739m.
841.5m
LEGEND
1:5000
FAULTS
DVEINS
SILICA-SERICITE ALTERATION
EPIDOTE ALTERATION
CHLORITE ALTERATION
PEBBLE DYKE
ANDESITE DYKE
DACITE VOLCANIC/ DOME

Figure 7. Hand-drawn cross section showing drill holes N62DDH001, N62DDH002 in relation to IP chargeability anomalies

Surface soil sample geochemical data

Papua Mining plc have collected 1866 B-C horizon soil samples in the Nakru project area which were analysed using by a handheld XRF device. Due to reporting time constraints a quick analysis of the surface geochemical data was complete and a Principle Component Analysis (PCA) statistical model of all data produced. All data was gridding in MapInfo/Discover using the inverse distance weighting method, a cell size of 100, and search distance of 1000m. The "geochemistry.clr" colour table was used with a sun shade of 49 deg and sun highlight of 45 deg to highlight NW trending structural control to the dataset. Selected grids of this data are shown in Figure 8. This analysis highlights a zone over Tripela prospect area with elevated Cu (>85ppm), Mo (>3ppm up to 24ppm), As (>6ppm), Hg (>7 ppm), Pb (>9ppm), Fe (>7%), and to a lesser extent Zn (>105ppm) extending for 800m in a N-S direction and 1200m in an E-W direction. A correlation matrix for geochemical data is included in Appendix 3, and shows that Cu has a positive correlation with K (0.238), Ti (0.342), V (0.423), Fe (0.562), Zn (0.369), As (0.318), Se (0.428), Sr (0.300), W (0.336), Hg (0.551) and Pb (0.212). Anomalous Cu associated with zones of K enrichment is indicative of Cu mineralisation associated with sericite alteration. A Principle Component Analysis (PCA) grid was produced confirming areas of "known" geochemical anomalism and mineralisation (see Figure 8). This multivariate statistical method may assist constraining areas of geochemical anomalism for drill targeting, potentially removing the effect of surficial processes and element mobility. It should be noted that the multi-element anomalism mentioned above is defined by sparse data on 400m spaced sample lines. The soil sampling should be in-filled to 100m spacing in order to more accurately defined drill targets.

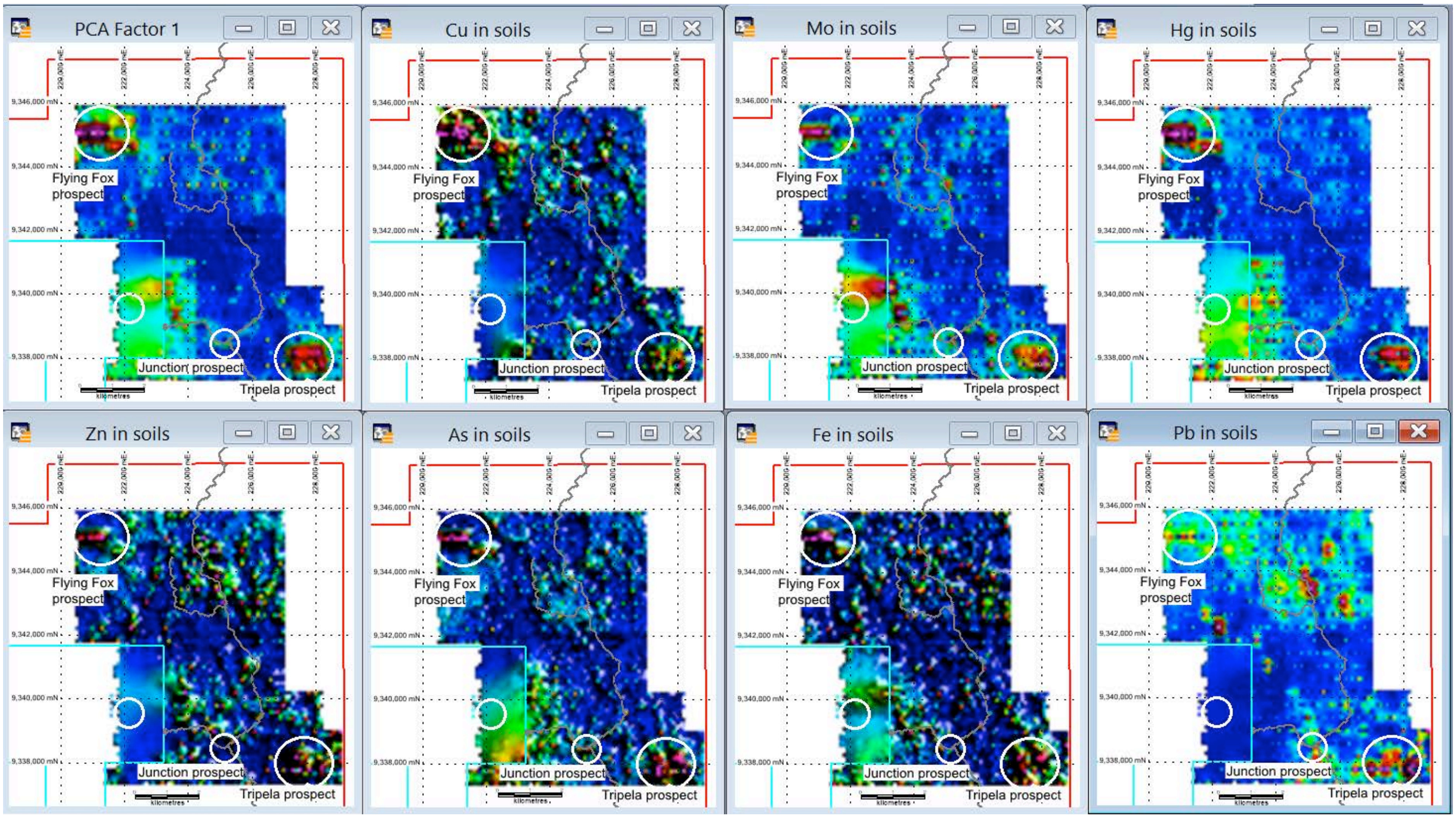


Figure 8. Gridded XRF results for surface soil samples showing PCA Factor1 (see text), Cu, Mo, Hg, Zn, As, Fe, and Pb

Metal Zonations around porphyry Cu-Au deposits

In general porphyry Cu-Au-Mo deposits have kilometre-scale metal zonations defined by anomalous Zn-Pb and Ag peripheral to the porphyry system associated within the propylitic zone, grading into to Mo, then Cu-Au rich. Mo is typically relatively immobile in the weathered and advanced argillic.

The Miocene Wafi-Golpu gold-rich porphyry Cu-Au deposit, and associated epithermal Au mineralisation, located in the Morobe Province of PNG, currently has a published resource of 28.5 million ounces of gold, 9.06 million tonnes of copper and 50.6 million ounces of silver (Newcrest, 2012; Harmony, 2012). The upper portions of the porphyry Cu-Au deposit has been overprinted by a high-sulphidation epithermal advance argillic alteration, which has remobilized and deposited Cu and Au. Surface geochemical data describes a broad annulus 2.94km x 2.7km which contains >140ppm Zn rimming the entire system, centred on the diatreme breccia pipe and is broadly coincident with the propylitic alteration zone. The Zones A and B high sulphidation epithermal Au mineralisation manifests at surface as a zone of anomalous Au values in soil samples (1.0 x 0.4km @ > 0.48 g/t Au). The southern portion of the Golpu porphyry Cu-Au mineralisation is identified at surface by spotty Cu (>150ppm) and Mo (>35ppm) anomalism in soil samples (see Figure 9). Mo is immobile in both the weathered zone and the advanced argillic alteration zone. The surface geochemical expression for both the Golpu and Nambonga porphyry Cu deposits is well defined using the multivariate statistical analysis method, Principle Component Analysis (PCA). The PCA Cu-Mo and Au-Cu-Mo factors are the best indicator of both the Golpu and Nambonga porphyry Cu-Au mineralisation at depth (see Figure 10).

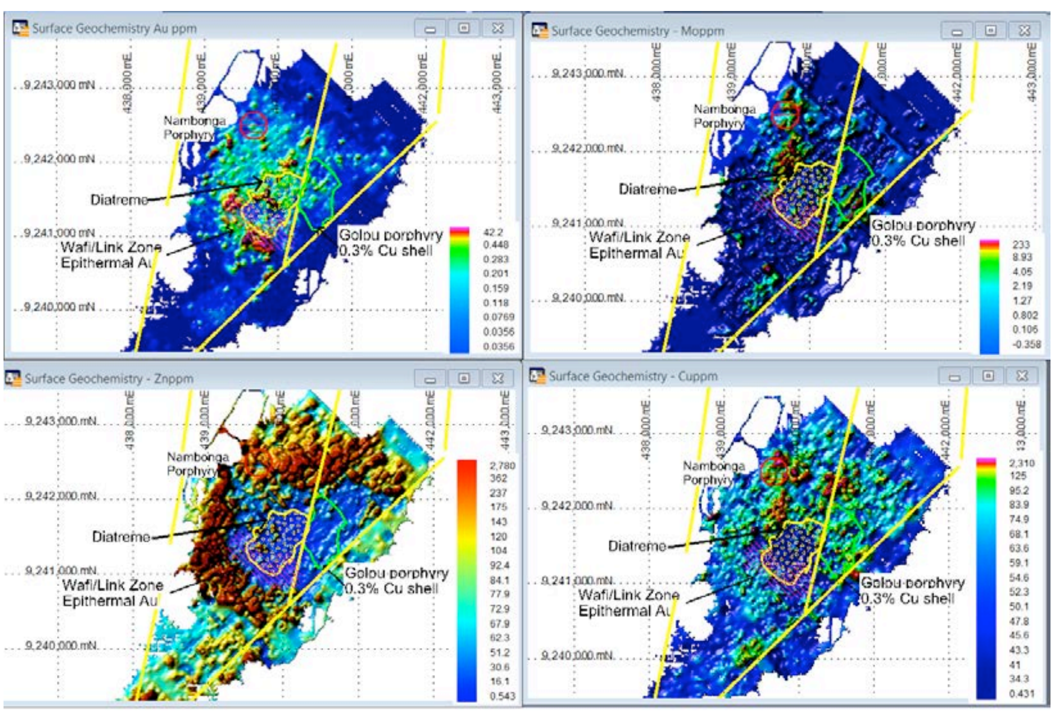
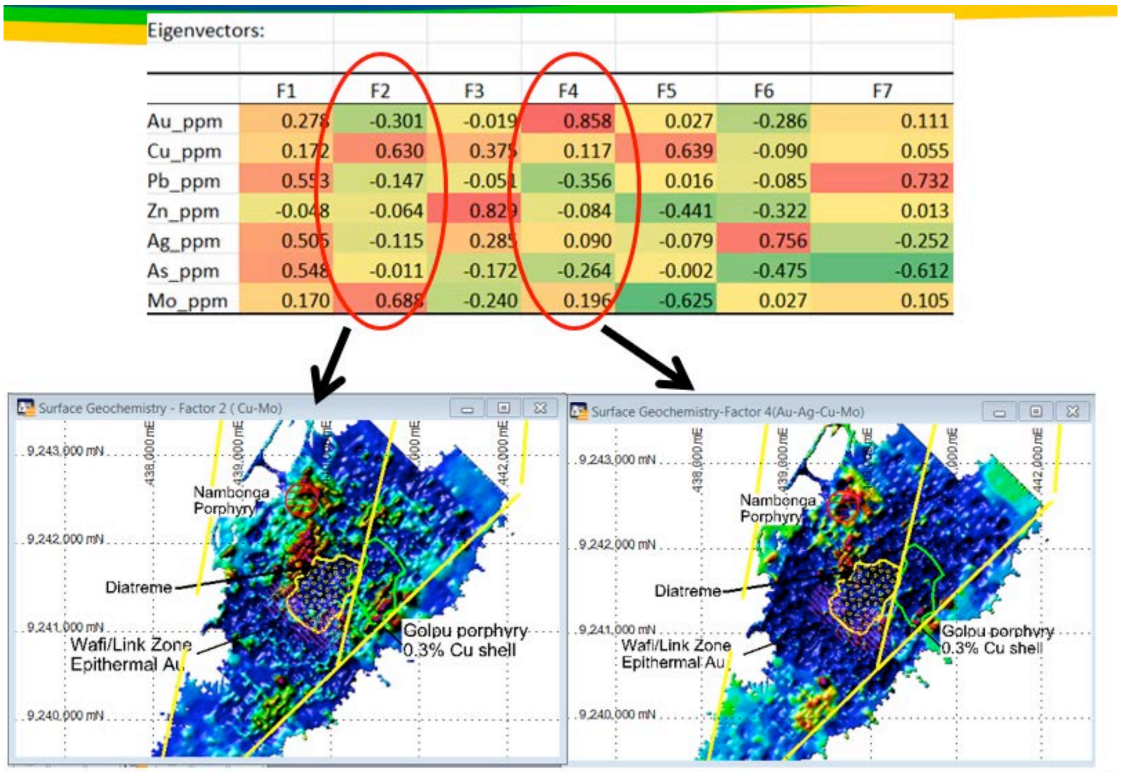


Figure 9. Wafi-Golpu surface geochemical sampling results for Au, Mo, Zn, and Cu (Menzies *et al*, 2013).



Eigenvectors:

	F1	F2	F3	F4	F5	F6	F7
Au_ppm	0.278	-0.301	-0.019	0.858	0.027	-0.286	0.111
Cu_ppm	0.172	0.630	0.375	0.117	0.639	-0.090	0.055
Pb_ppm	0.553	-0.147	-0.051	-0.356	0.016	-0.085	0.732
Zn_ppm	-0.048	-0.064	0.829	-0.084	-0.441	-0.322	0.013
Ag_ppm	0.506	-0.115	0.285	0.090	-0.079	0.756	-0.252
As_ppm	0.548	-0.011	-0.172	-0.264	-0.002	-0.475	-0.612
Mo_ppm	0.170	0.688	-0.240	0.196	-0.625	0.027	0.105

Figure 10. Principal Component Analysis of surface samples from Wafi-Golpu. Note PCA Factors 2 and 4 correlation well with known Cu mineralization at Golpu and Nambonga (Menzies *et al*, 2013).

Bajo de La Alumbera represents a concentrically zoned Au-rich porphyry Cu deposit in Farallon Negro district of Argentina with a resource totaling 694 million tonnes averaging 0.51% Cu and 0.66 g/t Au (Sillitoe, 1995). The surface expression of this deposit is defined by a zone 800m x 1300m with >260ppm Cu and >43ppm Mo. Surface rock-chip geochemistry shows a correlation between Cu anomalism and potassic alteration and Mo anomalism on the margins of the potassic alteration (see Figure 11)

The Batu Hijau porphyry Cu-Au deposit in Indonesia has a reported resource of 334 million tonnes averaging 0.8% Cu and 0.69 g/t Au (Meldrum *et al.*, 1994). The surface expression of the deposit is manifest as a zone 1400m x 1100m of > 30ppm Mo and 400m x 700m of >3000ppm Cu. The surface metal zonation exhibits a proximal Au-Cu anomalism and with peripheral Mo anomalism to the main ore zone (see Figure 11

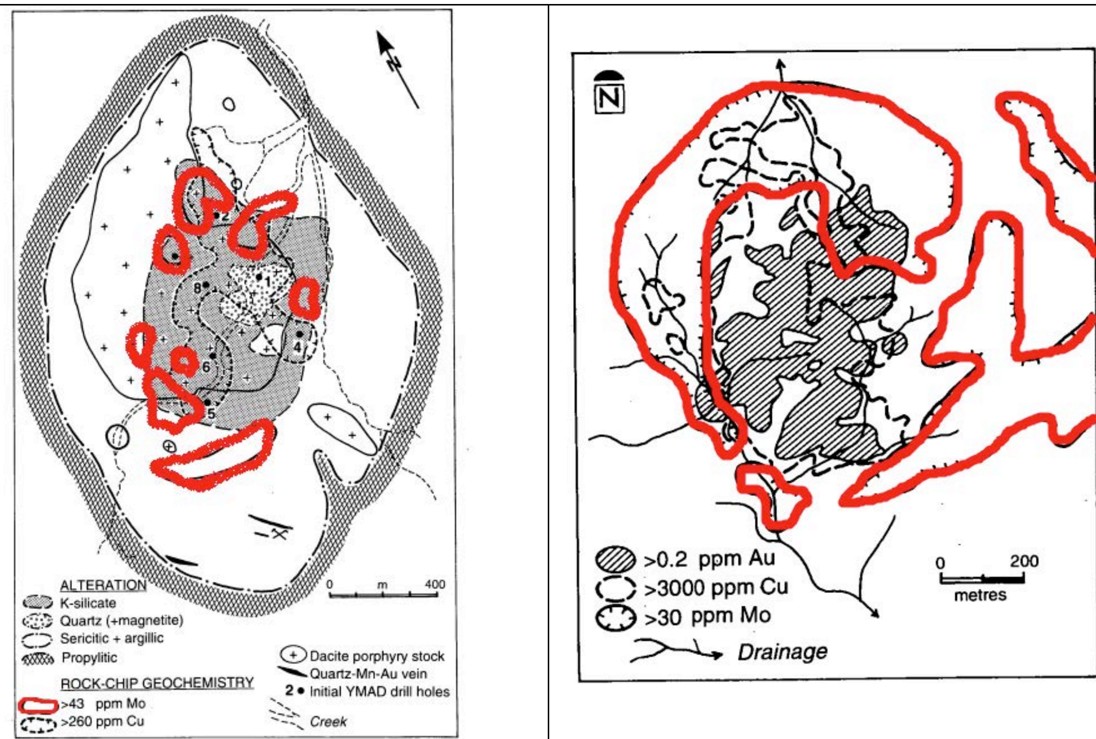


Plate A **Plate B**

Figure 11. **Plate A**. Surface alteration at Bajo de La Alumbrera porphyry copper-gold deposit, Argentina, rock-chip geochemical results for Cu and Mo. Note the broad correlation between the K-silicate altered core and the Cu anomaly, and the tendency for the highest Mo geochemical (red lines) values to occur to peripheral to the Cu anomalism (Sillitoe, 1995). **Plate B**. Bedrock geochemical anomalies for Au, Cu, Mo obtained from trench sampling over the Batu Hijau porphyry copper-gold deposit, Indonesia. Note the position of Mo in relation to Cu and Au (red lines are Mo>30ppm) (Meldrum, *et al*., 1994).

Geophysical data

Dipole-dipole induce polarisation (IP) surveys were completed over Flying Fox and Junction prospects in the Nakru project area. These programs defined a “pants-leg” style chargeability anomaly under the Junction prospect area and a 1.6km long chargeability anomaly in the vicinity of the Flying Fox project area (see Figure 12). Chargeability anomalies are interpreted to have been derived from pyrite within the phyllic (silica-serictie-pyrite) alteration.

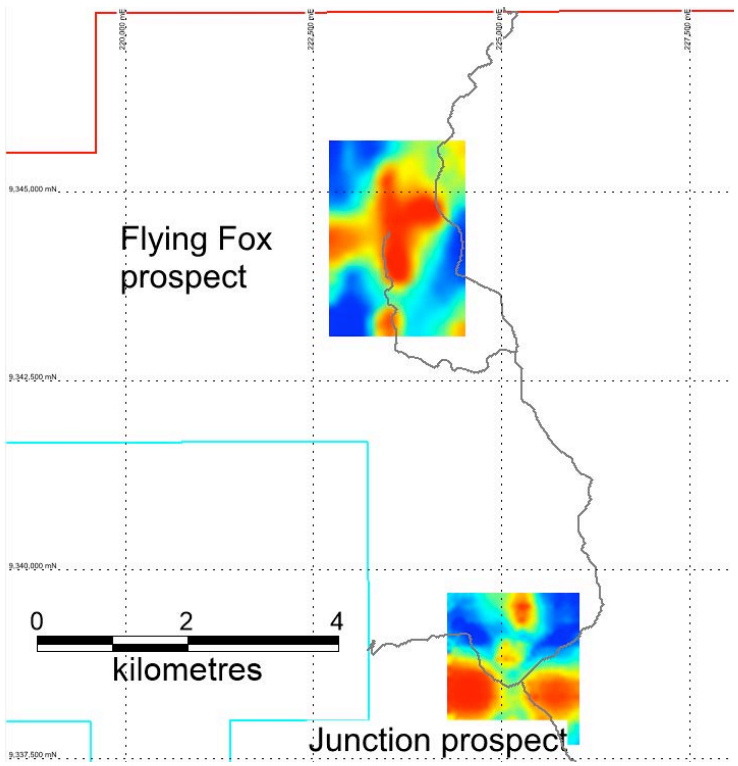


Figure 12. IP chargeability anomalies at Flying Fox and Junction prospects.

Geological Discussion and conclusions

The geology Nakru project area is dominated by a sequence of quartz-eye bearing, partly flow banded and brecciated dacitic domes with minor amount of fiamme-bearing dacitic volcaniclastic breccia. Tuff and volcanic breccias are interpreted to be air-fall volcanic tuffs that have settled in a submarine environment and redeposited as debris flows, as shown by the mixture of lithic and fiamme clasts. These units have then undergone weak-moderate chlorite alteration, some of which is related to primary seafloor diagenetic processes and another component related to prograde propylitic alteration associated with a porphyry Cu-Au environment. This alteration is then overprinted by retrograde sericite-silica-pyrite alteration in proximity to permeable volcaniclastic horizons or fault zones. The intense silica-sericite-pyrite (phyllic) alteration covers an area of approximately 3.8km by 2.1km as shown in Figure 6 (after Muller *et al.,* 2013*)*. In comparison the phyllic alteration zonation at Wafi-Golpu porphyry Cu-Au project is approximately 1.5km in diameter, and the phyllic alteration zonation at Pebble Creek deposit extends 5km x 1km around the deposit (Gregory *et al.,* 2013). Although the Nakru empirically mapped alteration system is comparable to that of porphyry Cu-Au deposits elsewhere, alteration mineral confirmation by spectral or XRD analysis is required.

Silica-sericite-pyrite alteration is also most intense proximal to quartz-pyrite veins of the quartz-sulphide classification (Corbett and Leach, 1998) or D veins of the Gustafon and Hunt (1975) classification. Two generations of D veins where recognised with the first being quartz-pyrite-chalcopyrite bearing and the second being quartz-pyrite-low Fe sphalerite bearing. It is interpreted that the second generation of these D veins has been derived from either a deeper, more distal, porphyry source, or there has been a significant amount of erosion prior to the deposition of this vein set. The quartz-pyrite-chalcopyrite veins, which define an annulus around the margins of the Tripela, provide ideal vectors to porphyry elsewhere in the Pacific rim, and so are regarded as highly encouraging. Hematite staining observed within drill hole N6DDH001 (see Photo 13) is evidence of mixing of Fe-bearing magmatic fluids with oxygenated ground-waters. This mixing will often cause the deposition of significant amounts of Au and Ag in epithermal systems (Leach and Corbett, 2008).

Several phases of late fine to medium grained, weak to moderately feldspar porphyritic andesite dykes have intruded the sericite altered dacite domes and volcaniclastics. These dykes display moderate to strong chlorite alteration grading into higher temperature epidote alteration. Multiple intrusion phases, including early and late mineralisation phases, are indicative of multi-phase intrusive activity as seen in other porphyry Cu-Au mineralised environs.

The latest event identified in the project area has been the emplacement of a pebble dykes into the wall rock volcanic sequence. These dykes are clasts supported containing rounded to sub angular clasts of fine grained sediment, andesite, dacite, pyrite and quartz, with highly variable hydrothermal alteration. On one occasional an epidote altered juvenile porphyry clast was observed and is interpreted to be derived from the causative mineralising porphyry (see Photo 9). A silicified pebble dyke seen in N62DDH002 at 75m indicates that locally the alteration system continued after the emplacement of these pebble dykes (see Photo 10). Figure 7 shows the pebble dykes predominantly occur on the eastern and western portions of the Junction Prospect chargeability zone. Where recorded in other porphyry Cu-Au systems, pebble dykes have also been reported on the margins of the mineralising system (e.g Wafi-Golpu, Menzies per obs 2012; El Tenniente, Cannell, 2006), and typically occur late in the paragenetic sequence (Gustafson and Hunt, 1975) as precursors to quartz-sulphide Au $\pm$ Cu veins (Bilimoia, PNG in Corbett and Leach, 1998).

An analysis of surface soil geochemical data identified an 800m N-S and 1200m E-W zone of elevated Cu (>85ppm), Mo (>3ppm up to 24ppm), As (>6ppm), Hg (>7 ppm), Pb (>9ppm), Fe (>7%), and to a lesser extent Zn (>105ppm) within the Tripela prospect area. While this anomalism is appreciably less than some reported porphyry Cu-Au deposits, it is of a similar spatial extent. The lower tenor of metal values may be indicative of a deeper level of emplacement of the mineralising system to surface compared to other examples.

A model for mineralisation observed at Nakru project area is shown in Figure 13.

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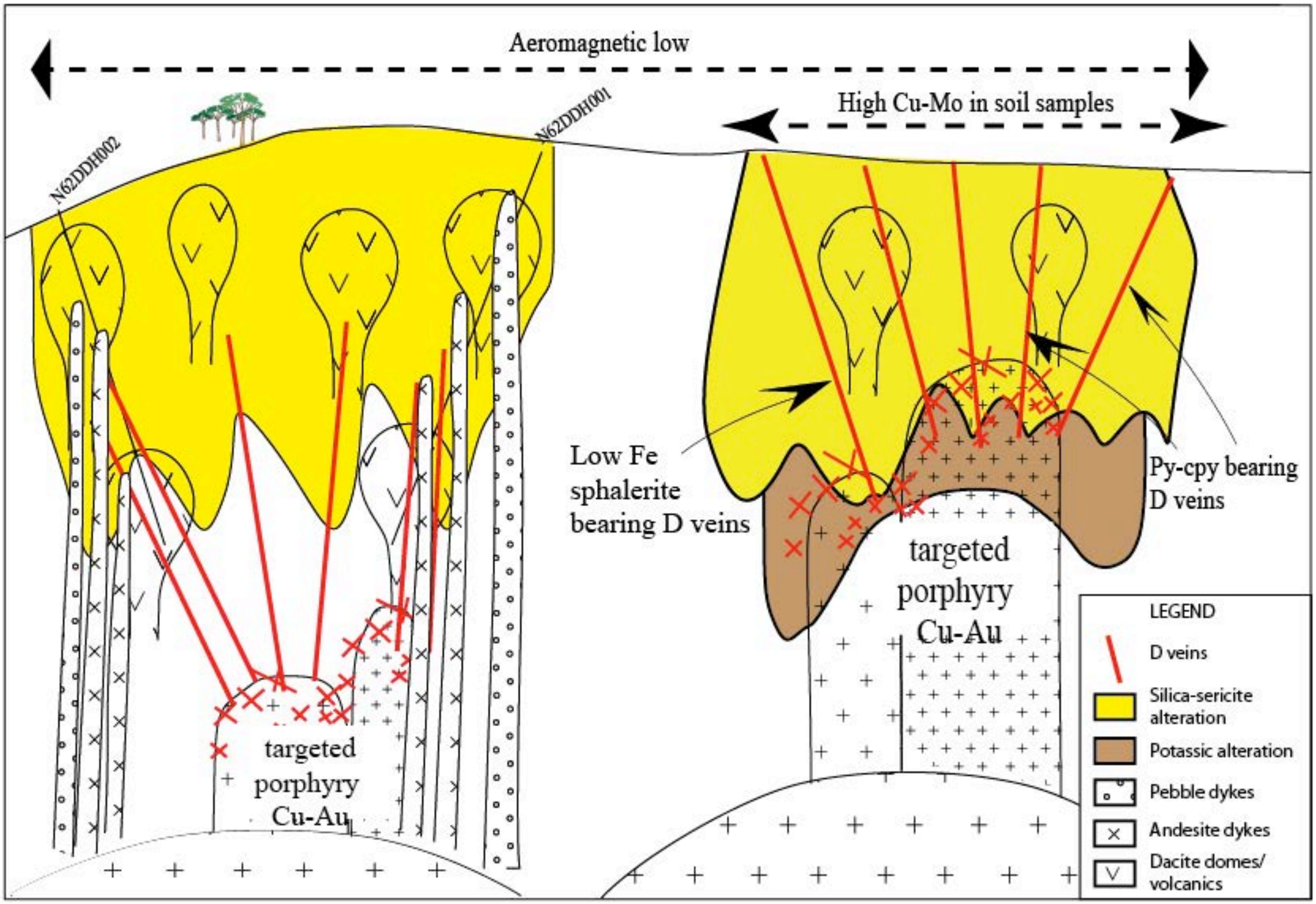
Aeromagnetic low
High Cu-Mo in soil samples
N62DDH002
N62DDH001
Low Fe sphalerite bearing D veins
Py-cpy bearing D veins
targeted porphyry Cu-Au
targeted porphyry Cu-Au
LEGEND
D veins
Silica-sericite alteration
Potassic alteration
Pebble dykes
Andesite dykes
Dacite domes/ volcanics

Recommendations
At Tripela prospect in-fill soil sampling should be completed at 100 x 50m centres over the prospect area as a priority A to close-off and provide more definition to Cu-Mo in soil anomalies. The zone of anomalous Cu-Mo in soil samples should then be bored using a program of 10 x 300m deep diamond-cored drill holes to provide geological and geochemical vectors for deeper drilling with a priority A. The geological mapping of trenches in the area should also be completed as a priority A.

At Junction Prospect the surface expression of pebble dykes seen in N6DDH001 and N6DDH002 should be mapped as a priority B. A vertical 1500m drillhole might be bore between the two existing drill holes into the Junction prospect, with a priority B. once funds become available.

At Flying Fox prospect a drill test of the 1.6km long chargeability anomaly which lies 1.5km east of a zone of high anomalous Cu-Pb-Hg-As in soil sample should be completed as a priority B. Further work, with a priority B, could prospect for intense silica-sericite alteration within this prospect area coincident with high concentrations of Au, Mo, Pb, Zn, to define hypogene mineralisation (D Veins) that could have produced the supergene Cu.

The collection of samples for spectrometer (ASD) or XRD clay studies, will assist in vectoring towards areas of higher temperature alteration across the Nakru project area. The occurrence of Mn wad, as reported by Duckworth (2013) in the project area, should be further prospected for Au-targets. Rhodochrosite, the precursor for Mn-wad, is often associated with Au deposited by the mixing of metal-bearing magmatic fluid with bicarbonate-bearing ground waters. The use of strip logs displaying the multi-element geochemistry against the lithological boundaries will assist in identify intra-mineral intrusive phases.

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Photographs

Photo 1. Intense silica-sericite (illite) alteration in outcrop from the Junction prospect

Photo 2. Massive chalcopyrite-pyrite rich lode in outcrop from Tripela prospect

Photo 3. Cut massive chalcopyrite-pyrite rich lode in outcrop from Tripela prospect

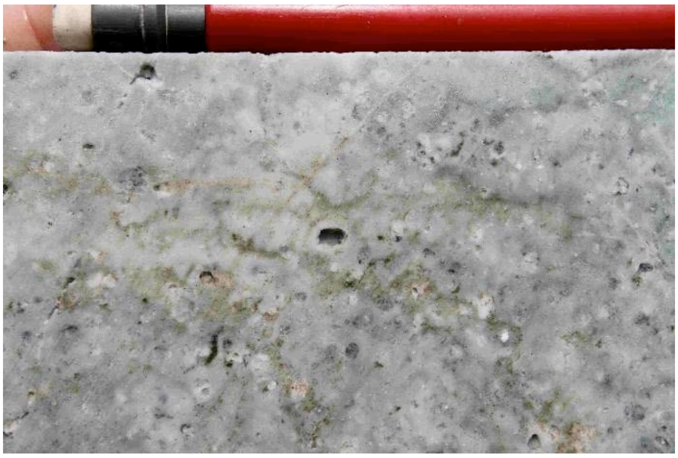

Photo 4. N6DDH001 28.5m silica-sericite altered dacite

Photo 5. N6DDH001 136.9m silicified and brecciated dacite

Photo 6. N6DDH001 133m flow-banded dacite

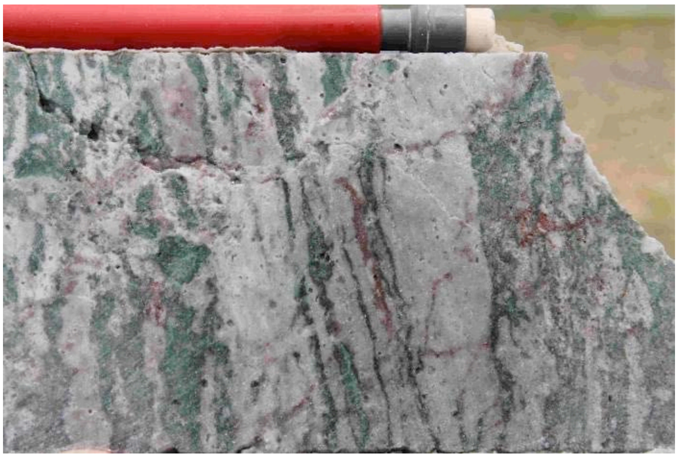

Photo 7. N6DDH001 249.4m bedded dacite tuff.

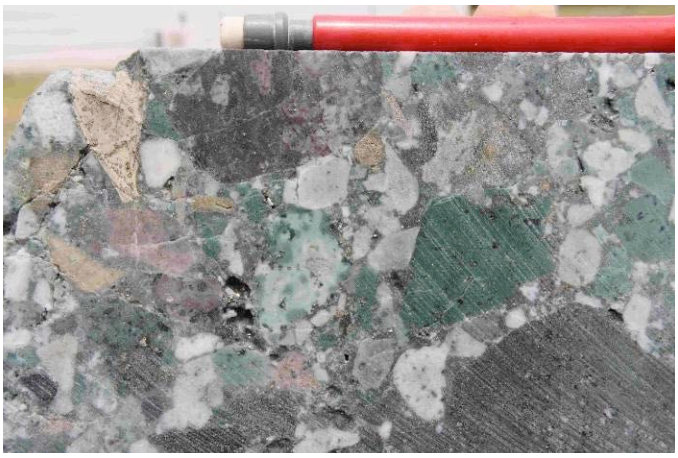

Photo 8. N6DDH001 188.3m pebble dyke

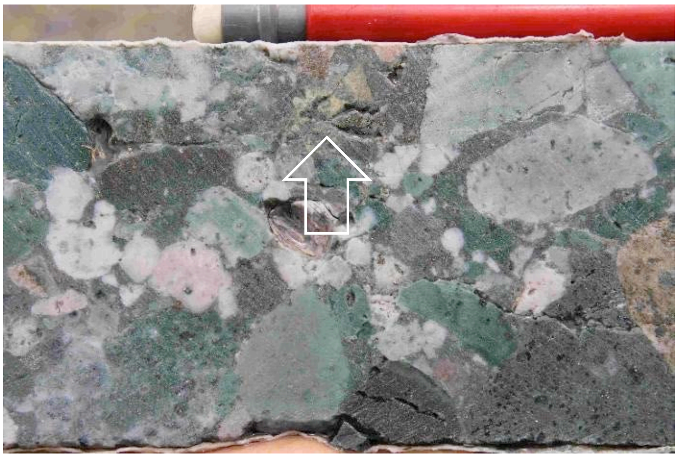

Photo 9. N6DDH001 298.7m Pebble dyke, clast-supported with epidote altered juvenile intrusion clast (see arrow).

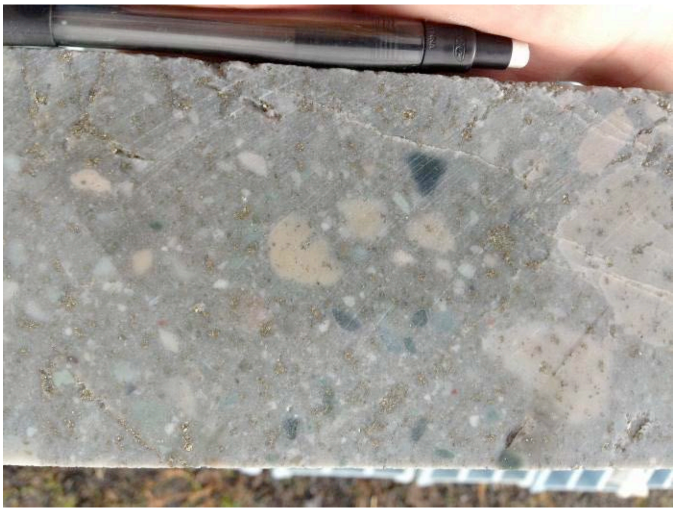

Photo 10. N6DDH002 75.3m Silica-sericite-pyrite altered pebble dyke, indicating long lived alteration system.

Photo 11. N6DDH001 209.5m clay-pyrite rich brecciated fault zone in silica-sericite altered dacite volcanic.

Photo 12 N6DDH001 206m intense silica-sericite-pyrite altered dacite volcanic.

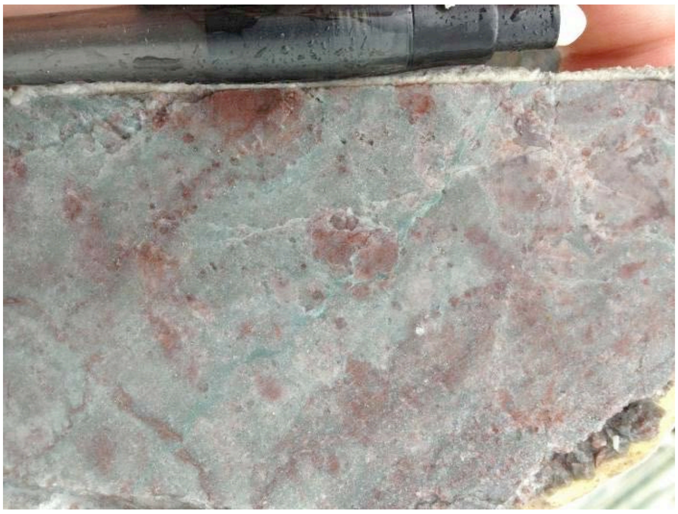

Photo 13. N6DDH001 290.5m hematite-silica+- chlorite altered dacite volcanic.

Photo 14. N6DDH001 339m vesiculated and chilled margin of andesite dyke intruding dacite volcanic.

Photo 15. N6DDH001 154.5m late min felds porphry dyke

Photo 16. N6DDH001 693m epidote altered dyke

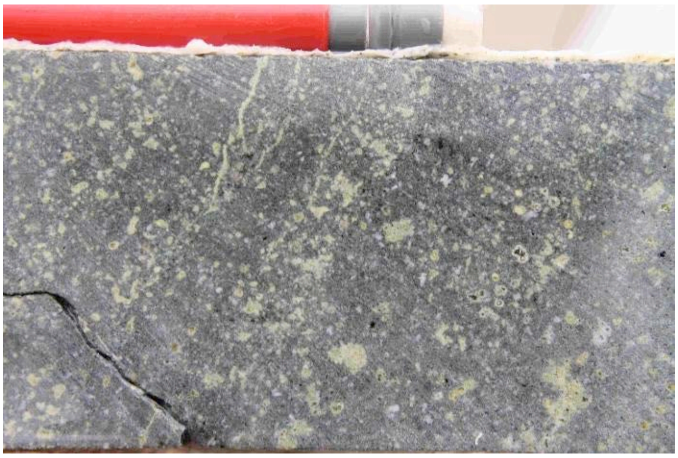

Photo 17. N6DDH001 838.2m weak chlorite and moderate epidote altered andesite dyke.

Photo 18. N6DDH001 400.9m intensely silicified dacite volcanic.

Photo 19. N6DDH001 422m intense silica-sericite stock-work vein

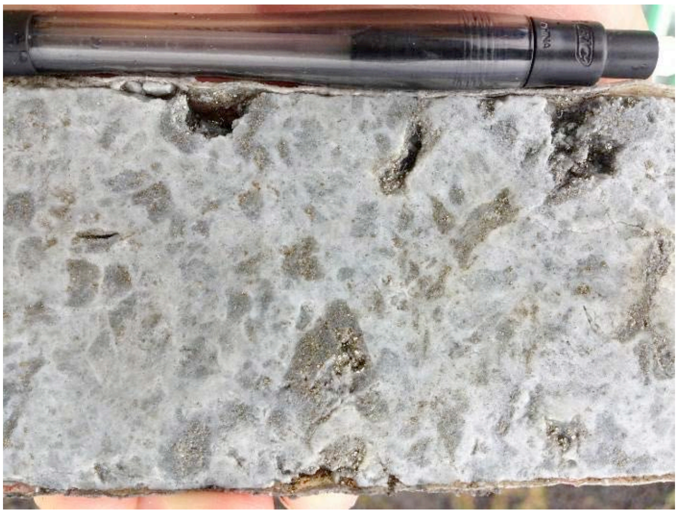

Photo 20. N6DDH001 432.5m intense silica-sericite brecciated dacite volcanic

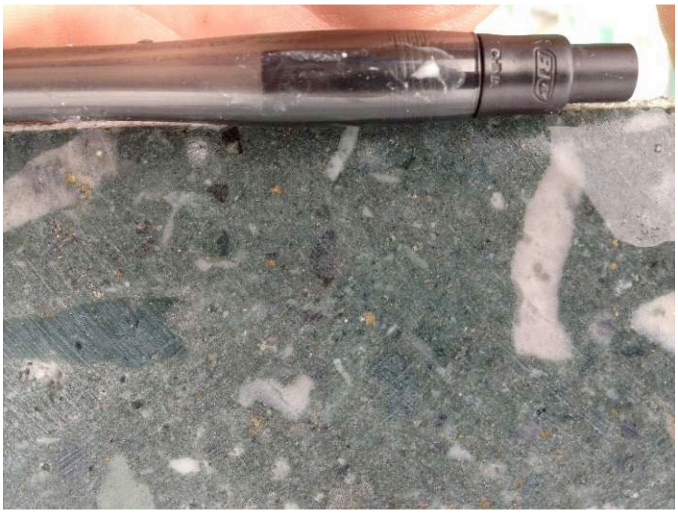

Photo 21. N6DDH001 439.4m polymict matrix supported pebble dyke

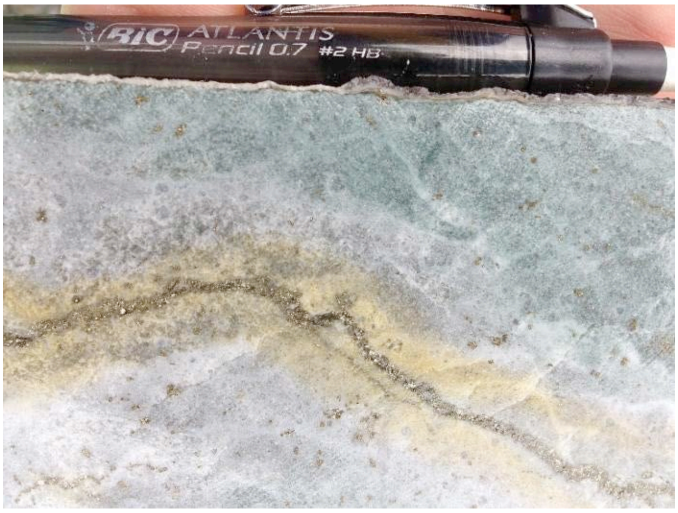

Photo 22. N6DDH001 459.3m quartz-pyrite vein with sericite margins

Photo 23. N6DDH001 481m quartz-pyrite D vein with sericite margin

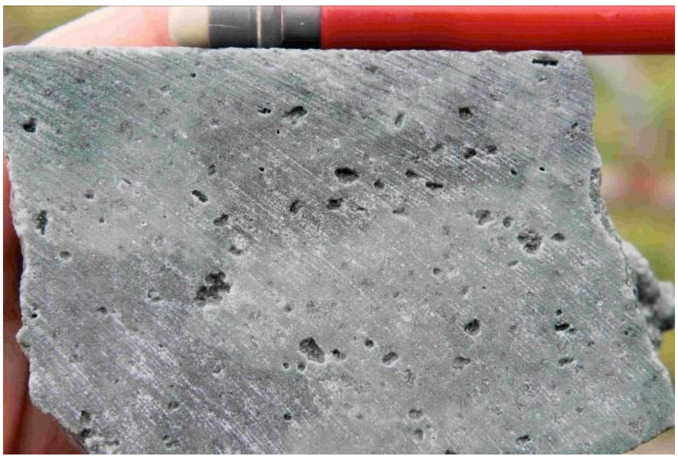

Photo 24. N6DDH002 415.8m showing intense silicification producing pits after hornblende.

Appendix 1. Tripela traverse sample descriptions

Sample	Description
DM001	Massive chalcopyrite "blebs" in fine-grained andesite (reports approx. 30%).
DM002	Quartz-chalcopyrite veined andesite.
DM003	Intense quartz-clay alteration (see photo 067).
DM004	Massive chalcopyrite-galena bearing andesite. Trending 035/85W
DM005	Quartz-clay-chalcopyrite-pyrite bearing andesite. Trending 035/85W
DM006	Intensely silica-sericite-chalcopyrite-pyrite altered volcanic (andesite)
DM007	Intensely silicified pyrite-chalcopyrite-covellite (?) bearing volcanic
DM008	Collected in trench. Silicified chalcopyrite-pyrite bearing volcanic with possible covellite (?). Near sample number 42505
DM009	Silica-pyrite-chalcopyrite-sphalerite (dark brown) bearing volcanic. Near sample 42520. Collected in trench
DM010	Intensely silica-clay altered volcanic. Near sample 42522. Collected in trench
DM011	Intensely veined and pyrite bearing volcanic (?). Epithermal looking textures to silica/quartz. See photo. Trends 115/85 S. Near sample 42527. Collected in trench
DM012	Intensely clay-silica-pyrite +/- chalcocite altered volcanic. Near sample 42530. Collected in trench
DM013	Intrusive. Near sample 42554. Collected in trench
DM014	Silica-pyrite altered volcanic. Near sample 42568. Collected in trench
DM015	Silica boxworks +/- pyrite bearing breccia – possibly float. Near sample 42574. Collected in trench
DM016	Massive silica-pyrite bearing vein, 2m wide trending 015 degrees. Near sample 42578. Collected in trench
DM017	Intense silica-pyrite altered volcanic. Near sample 42601. Collected in trench
DM018	Intense clay +/- alunite (?).Near sample 42611. Collected in trench
DM019	Intense clay-silica-pyrite altered volcanic with strong Mn oxide stain. Near sample 42694. Collected in trench
DM020	Silica-pyrite+/- chalcopyrite altered porphyry.
DM021	Silica-clay-pyrite altered volcanic, collected in creek
DM022	Intense silica pyrite altered quartz-eye bearing porphyry.
DM023	Intense s, silica-sericite-pyrite altered, quartz-eye bearing, coarse grained intrusive possibly diorite.
DM024	Intense silica-sericite-pyrite altered diorite (/). Pyrite is coarse and cubic. Possibly part of the "quartz-sulphide" style epithermal classification.
DM025	Intense clay (dickite)-pyrite altered diorite
DM026	Native Cu in fine-grained weakly feldspar porphyritic andesite. Very weak epidote alteration. Otherwise feldspars and rest of rock is unaltered.
DM027	Zeolite or dickite (??) altered andesite.
DM028	Silica-clay (possibly alunite) altered volcaniclastic. Collected in quarry near Flying Fox project.