The Geophysical Response of the Tusker Gold Deposit, Lake Victoria Goldfields, Tanzania

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Archaen greenstone belt

+65 Moz known gold, mainly in the south

Bulyanhulu and Geita gold deposits contain +10Moz each

Tusker 4.54Moz @ 1.5g/t
Aeromagnetic Data

2004 Magnetics/ Radiometrics
75m line spacing
40m flight height

RTP/ 1VD
The bottom image shows the location of drill traces for the down hole geophysical logs to be shown in next slides.

Plan image is magnetics RTP 2VD

- Location of geological section
- Drill hole traces
- Approx. mineralisation outline
Azimuth: 270
Dip: 60

Coincident Au & density highs. Also conductive.

Au, Conductive & magnetic
Azimuth: 90
Dip: 60

Drill hole NYZRCDD028

GEOLOGY LOG

Sandstone
Mudstone
Conglomerate
## Petrophysics – Down Hole Log

**Azimuth:** 90  
**Dip:** 60

<table>
<thead>
<tr>
<th>Au ppm</th>
<th>Density g/cc</th>
<th>Mag Sus DH SL 10-5</th>
<th>Mag Sus Core SL 10-3</th>
<th>Conductivity mS</th>
<th>Gamma cps</th>
</tr>
</thead>
</table>

### GEOLOGY LOG

- **Conglomerate**: Au, dense & conductive
- **Chert**: Magnetic & conductive
- **Sandstone**: Au, magnetic & conductive
- **Mudstone**: Dense, magnetic & conductive
Azimuth: 90
Dip: 60

Magnetic mudstone mapped by magnetics
Azimuth: 270
Dip: 60
Au, dense & conductive.
# Petrophysics – Laboratory

<table>
<thead>
<tr>
<th>#</th>
<th>Drillhole</th>
<th>Gold ppm</th>
<th>Depth m</th>
<th>Lithology</th>
<th>Mag Sus Slx10^5</th>
<th>WBD g/cm³</th>
<th>apparent EM cond. S/m</th>
<th>Galvanic Res. ohm m</th>
<th>IP ms</th>
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<tbody>
<tr>
<td>16</td>
<td>32</td>
<td>0.005</td>
<td>189.75</td>
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<td>89</td>
<td>2.90</td>
<td>0</td>
<td>68323</td>
<td>66</td>
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<td>17</td>
<td>32</td>
<td>0.75</td>
<td>290.0</td>
<td>Sandstone</td>
<td>2229</td>
<td>2.93</td>
<td>23 - 200</td>
<td>2.3</td>
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<td>569.9</td>
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<td>2.77</td>
<td>0</td>
<td>12770</td>
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</tr>
</tbody>
</table>

**Diagram:**
- **Gold ppm**
- **Mag Sus Slx10^5**
- **WBD g/cm³**
- **apparent EM cond. S/m**
- **Galvanic Res. ohm m**
- **IP ms**

**Lithology:**
- mudstone
- sandstone
- siltstone
Hole 18: 188.5m. Mottled carbonate breccia cut by crustiform carbonate vein with later cut by silica vein with vg. Arsenopyrite disseminations throughout - 21.3g/t Au.
Dipole-dipole IP and Resistivity data

- IP and resistivity inverted sections through Tusker.
- Response of sulphide associated mineralisation is chargeable & conductive.
Dipole-dipole IP and Resistivity data
- Helicopter time domain VTEM surveys flown in October 2006
- Late time channel data (8900us) shown to the left draped over aeromagnetic data (RTP 1VD)
VTEM data: Line 1630

Aeromagnetics: Analytic Signal

VTEM: Last 7 time channels (pV/Am4).

Plan view: late time channel VTEM data & drill traces

Section showing sulphides, gold, arsenic and mag sus down hole

8900 us (Ch 30) pV/Am4
Killimani test: 7m of 25% pyrrhotite @ 262m depth. No gold 😞
Conclusions

- A range of geophysical data have been acquired over the Tusker deposit, including petrophysical measurements, magnetics, dipole-dipole IP and resistivity, and airborne EM (VTEM).

- Airborne magnetic data map the magnetic mudstone package, show that stratigraphy has been deformed, and suggest the Tusker deposit lies at the intersection of a SE stratigraphic discontinuity, NS fault and NE fold and fault axis.

- Down hole petrophysical data show conductive highs and elevated densities (suggestive of sulphides) coincident with anomalous gold values.
Conclusions

- Petrophysical measurements on core show elevated conductivity, density, and chargeability readings on a mineralised sample.
- Dipole-dipole IP data map the mineralisation as chargeable and conductive, consistent with petrophysical measurements on core.
- VTEM data show a conductive anomaly coincident with the Tusker deposit. VTEM data also effectively identified the presence of massive sulphides (7m @ 25% po) adjacent to mineralisation at the Killimani prospect.
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