EL7701 – WESTERN HOWLEY
ANNUAL REPORT TO 30 MARCH 1993
YEAR ONE OF TENURE

by
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1. GROUND MAGNETICS
1. SUMMARY

This report details the 1992/93 exploration activities completed in EL7701 during Year 1 of Tenure, ending 30 March 1993.

The licence, comprising four (4) graticular blocks, was granted to Dominion Gold Operations Pty Ltd ("Dominion") on 31 March 1992 for a period of four (4) years.

Exploration activities during Year 1 consisted of literature review, interpretation of Aerodata multiclient geophysical survey, stream sediment sampling, rock chip sampling, reconnaissance mapping at 1:25000 scale and RC drilling.

Results from the stream sediment sampling returned peak responses of 34 ppb Au, 62 ppm Cu, 39 ppm Pb, 69 ppm Zn and 60 ppm As. RC drilling of a bullseye magnetic 'high' intercepted carbonaceous mudstones/siltstones of the Wildman Siltstone with minor quartz veining. All composite assay results were below detection limits (<0.01 ppm Au).

Exploration proposals for Year 2 of Tenure, including soil and rock chip geochemistry, will expend approximately $6,000.
2. LOCATION AND TENURE

EL7701 is located 170km south of Darwin, approx. 5km southwest of the Cosmo Howley Mine and is located on the Fenton 1:50,000 (14/5–1) sheet. The tenement lies between latitudes 13°33'S and 13°35'S and longitudes 131°18'E and 131°22'E. See Fig 1 for tenement location.

Access is via the Stuart Highway, sealed Dorat and Ooloo roads and Douglas Station tracks.

3. PHYSIOGRAPHY AND CLIMATE

Climatically EL7701 experiences a wet season (November to April) and a dry season (May to October). Average annual rainfall is 1249mm and the mean temperature is approximately 28°C.

Local relief consists of low undulating hills ranging in elevation from 110 to 160m above sea level, with Mt. Shoobridge approximately 5km to the north west. Two physiographic units are observed:

(i) Early Proterozoic sediments that form dissected uplands with steep, rocky ridges and poor soil development supporting low, open woodland,

(ii) Granitic plains with black soils in low, wide drainages and supporting open to dense woodland.

The licence was granted to Dominion Gold Operations Pty Ltd on 31 March 1992 for four (4) years.
4. GEOLOGY

4.1 Regional Geology

4.1.1 Regional History

The Pine Creek Inlier is a roughly triangular area of about 66,000km$^2$ south and east of Darwin, which contain Early Proterozoic metasedimentary rocks resting on a gneissic and granitic Archaean basement. The metasediments represent fluvialite, shallow water and intertidal basinal sequence up to 14km thick within an intracratonic basinal setting (Needham et al, 1980).

During the Top End Orogeny (1870–1780Ma) rocks within the Pine Creek Inlier were metamorphosed to mainly greenschist facies, however, amphibolite facies metamorphic mineral assemblages dominate in the Alligator Rivers region. Known Archaean rocks are restricted to granite–gneiss of the Rum Jungle, Waterhouse and Nanambu complexes which form mantled gneiss domes near the exposed eastern and western margins of the inlier. (Page et al, 1980).

The sedimentary rocks are mainly shale, siltstone, sandstone, conglomerate, carbonate rocks and iron formations. Felsic to mafic volcanism and associated tuffaceous sediments are also present. The sedimentary sequence is intruded by transitional igneous rocks including pre–tectonic dolerite sills and syn to post tectonic granitoid plutons and dolerite lopoliths and dykes. Largely undeformed platform covers of Middle Proterozoic to Mesozoic strata rest on these with marked unconformity.

Since the Cretaceous the area has generally remained above sea level. The dominant forces which moulded today's landscape were chemical weathering to produce laterite and "cut and fill" modification of the land surface by repeated erosional and aggradational cycles.
4.1.2 Structure

During the Top End Orogeny, the Early Proterozoic sediments, volcanics and dolerite were intensely deformed and regionally metamorphosed, resulting in tight to isoclinal folding and extensive faulting. Two phases of folding have been recognised. The older F₁ folds are tight to isoclinal folds with northwest to northeast trending axial planes. A penetrative slatey cleavage is present in pelitic rocks and a less prominent spaced fracture cleavage in sandstone. The younger F₂ folds are widely spaced, open types with east to west trending axial planes. Both folding events pre date granitoid intrusions.

Regional folding is locally modified by the major SE trending Noonamah – Katherine lineament zone, which consists of a 20 to 25km wide zone of shearing and folding with coincident gravity and magnetic anomalies. In the Pine Creek area the lineament is represented by the Pine Creek shear zone, which contains numerous aligned tight folds and shears and which hosts a concentration of gold occurrences.

4.1.3 Metamorphism

All the Early Proterozoic rocks have been both regionally metamorphosed to greenschist facies and contact metamorphosed by the syn orogenic to post orogenic granitoids. The regional metamorphic grade ranges from predominantly lower greenschist to amphibolite facies in the NE of Pine Creek Inlier. Table 2 shows the characteristic metamorphic mineral assemblages for various rock types. Regional metamorphism is contemporaneous with regional deformation of the sedimentary pile during the Top End Orogeny. Throughout most of the area, regional metamorphism of pelitic rocks produced fine grained sericite and quartz. Sandstones usually exhibited fractured and/or strained quartz grains and minor sericite, chlorite and muscovite.
4.1.3 Metamorphism (Cont'd)

Contact metamorphism largely overprints regional metamorphism indicating syn-post deformation. The contact metamorphic aureole is primarily albite–epidote hornfels with a narrower inner continuous zone of hornblende hornfels. K-feldspar–cordierite hornfels is present immediately adjacent to the granitoids. The contact metamorphic aureole varies in width from a minimum distance of 500m to up to 15km – 20km. In general, granitoids with steeply dipping margins will produce a narrower contact aureole whilst relatively shallow, flat lying granitoids will produce a more extensive contact aureole, although the extent of a contact aureole can be significantly wider or narrower under different temperature – pressure regimes.

4.2 Local Geology

Previous mapping has defined a major anticlinal structure west of Cosmo Howley and within South Alligator Group sediments. This anticline was found to be faulted off by a N–S trending fault zone, the original anticlinal structure being offset northwards or bifucating into a second anticline which trends south easterly beneath the Cambrian/laterite cover.

Interpretations for the major structural thickening of the South Alligator Group sediments flanking the Fenton Granite SW of Cosmo Howley include (i) the presence of a major decollement structure within the Koolpin Formation or (ii) the combination of folding of F1 axes by F2 crossfolds, coupled with the draping effect of the sediments over the granite margin.
5.0 PREVIOUS EXPLORATION

Previous work has been completed in the licence area by the following companies:

1978 – Nord Resources – commodities sought uranium, gold and base metals. Work completed, aerial photograph interpretation, geological mapping, ground magnetics and rock chip sampling.


1980 – Mine Administration Pty Ltd EL2101 – commodities sought U, and base metals, work completed geochemical sampling.

1982 – Greenex EL3027 – commodities sought Sn, Ta and Wo work completed, heavy mineral sampling selected streams.

1988 – Northern Gold NL BLEG Stream sampling, soil sampling and aerial geophysics.

Eupene Exploration Enterprises Pty Ltd ("Eupene") completed soil sampling in the most southerly graticular blocks of EL7701, previously held under EL6318 during 1989–90. Initial exploration consisted of three broad soil traverses approximately 500m apart with hand auger soil samples taken every 100m. Peak values of 6.4 ppb Au, 135 ppm Cu, 24 ppm Pb and 39 ppm Zn were received. See Figure 4.

Follow up infill sampling of three anomalous Au values failed to detect significant results. See Figures 5–7.
LEGEND

- photo linear

10.07, 4, 5, II BLEG Au,Cu,Pb,Zn

- creek

EL 6318

BROAD SPACED SOIL TRAVERSSES

Figure 4
LEGEND

- alluvium
- Cz - silt, laterite Pistons
- gw - greywacke
- (silt) - silicified
- ch - chlorite
- Q - quartz veining
- Arrows - slope direction
- (1,4), (2,5) - Au, Cu, Zn, Pb

 Traverse T2

- 583002
- gw (silt)
- gw (ch)
- 1300
- 1200
- 1100
- 100

EL 6318
T2 - 1200 Anomaly
Soil Sampling
6.0 DOMINION EXPLORATION

6.1 Aerial Photography

During April 1991, Airsearch Mapping of Darwin flew the Shoobridge–Fenton tenements held by Dominion and produced sets of 1:25,000 scale colour air photos.

The relevant air photo run is AM529 Run 7, (No. 59–63).

6.2 Stream Sediment Sampling

A regional stream sediment sampling programme was conducted over the Shoobridge–Fenton tenements held by Dominion.

Stream sediment samples were collected from selected sites within drainages averaging 4km². Two sample sizes were collected;

i) $-20\#$ silt fraction, 2–3kg, sieved to $-200\#$ in the laboratory.

ii) pan concentrate, approx. 100g.

Samples were despatched to Classics Laboratories, Darwin where they were analysed by the following methods;

Au: solvent extraction, graphite furnace AAS
Cu, Pb, Zn, As, Ag, Ni, Mn, Fe: low detection flame AAS
U, Th: ICP–MS

Further infill stream sediment sampling of anomalous drainages and secondary drainages to increase sample density was completed in 1992.

Samples were dispatched to Analabs Darwin where they were analysed by the following methods:–

Au: aqua regia digest, carbon rod finish (GG336)
Cu,Pb,Zn,Mn,Fe,Pb,As: low detection limit aqua regia digest, AAS finish (GA140)

Sample locations are shown on Fig. 8 with assay results tabulated in Appendix 1.
6.3 Geophysics

1. Airborne

Acquisition of Aerodata (1987–88) multiclient data by Dominion was completed in late 1988. Continued interpretation of this data has been used to identify favourable lithological/structural settings for Au mineralization. A further airborne magnetic/radiometric survey was completed by Aerodata (Oct 1992) for Dominion, covering the area south and southwest of Cosmo Howley. See Fig. 9 for total field magnetic contours.

2. Ground

A ground magnetic survey was completed over a bullseye magnetic 'high' located near AMG co-ordinates 8497510mN, 754600mE as shown on Figure 5.

Readings were taken every 10m along grid E–W lines (bearing 045°T) spaced 50m apart using a G816/826 Portable Proton Magnetometer. A total of 2.0 line km were completed with magnetic contours shown on Plate 1.

6.4 RC Drilling

In October 1991, a scout RC drill programme was undertaken in Dominion's Shoobridge – Western Howley tenements testing bullseye magnetic 'highs'.

Within EL7701 one vertical RC drill hole (WH02) totalling 36m tested the magnetic anomaly centred at AMG co-ordinates 8497510mN, 754600mE. See Figure 10 for the drill section.

Drilling was completed by Gomes Drilling of Tennant Creek using a truck-mounted RCD–2 rig with a 5½" face sampling bit. See Appendix 2 for RC drill logs and assay results.
7. CONCLUSIONS/RECOMMENDATIONS

Exploration activities conducted during 1992 within EL7701 included re-interpretation of airborne magnetic/radiometric data, reconnaissance mapping at 1:25,000 scale, stream sediment geochemistry and a ground magnetic survey.

Stream sediment sampling returned peak values of 34 ppb Au, 62 ppm Cu, 39 ppm Pb, 69 ppm Zn and 60 ppm As. Further evaluation by soil sand rock chip geochemistry of the elevated Au drainage is recommended.

A ground magnetic survey was completed over the bullseye magnetic 'high' for drillhole location. Drilling of the magnetic anomaly intersected carbonaceous mudstones/siltstones of the Wildman Siltstone beneath a thin Cambrian cover. No significant results were received.

 Exploration proposals for Year 2 of Tenure include follow up soil and rock chip geochemistry to locate the source of the elevated Au value. A Year 2 exploration budget of approximately $6,000 is proposed for EL7701 with a breakdown as listed below.

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<td>TOTAL</td>
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8.0 EXPENDITURE

Expenditure covenant for Year 1 (31 March 1992 – 30 March 1993) was $7,500.

Expenditure for EL7701 for the 12 months ending 31 March 1993, as given below, is $17,700.

**EL 7701 EXPENDITURE YEAR 1 OF TENURE**

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**TOTAL** $18,743
9.0 REFERENCES

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