REPORT ON WORK UNDERTAKEN ON THE GANDYS HILL AND INTERNATIONAL LEASES FROM 1980 TO 1993, PRIOR TO THE COMENCEMENT OF MINING.

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INTRODUCTION

Gandys Hill and International are located north along strike from the Enterprise Mine and form distinct ridges rising above the surrounding topography. The Gandys Hill anticline and the International anticline are northerly extensions of the Enterprise and Czarina anticlines, respectively.

The stratigraphy in the area consists of interbedded sequences of siltstone and greywacke, similar in appearance to that seen in the Enterprise mine. Vein style mineralisation is present in both areas.

This report summarises all work undertaken over the Gandys Hill leases from November 1980 to July 1993 when mining of Gandys Hill commenced.
1.0 A HISTORY OF EXPLORATION FROM 1980 - 1993

1.1 NOVEMBER 1980 - DECEMBER 1984

During the period from 1980 -1984 the Gandys Hill leases were subject to a joint venture agreement between Enterprise Gold Mines N.L (formerly Jingelic Minerals [N.T] Pty. Ltd.), and Renison Goldfields Consolidated. Gold Fields Exploration Pty. Ltd (a subsidiary of R.G.C.) managed the exploration activities on Gandys Hill.

The original tenements covering the Gandys Hill area were numbered as GML 163A, GML 164A, GML 165A, GML166A (Fig.1).

The work undertaken during this period was limited due to the construction and pre-production requirements of the Enterprise Mine. The surveyed baseline that had been established over the Enterprise Mine area was extended through the Gandys Hill leases by Gold Fields Exploration personnel. The baseline, which trends 318° True, was pegged with 50 metre interval crosslines which in turn were pegged at 50 metre intervals.

Colour aerial photography at 1:10,000 scale was flown over an area of 75 square kilometres, centred on Pine Creek. From these, topographic maps conforming to the local grid were produced at 1:500, 1:1,000 and 1:5,000 scale by Geospectrum.

Geological mapping of old workings was then undertaken over the leases at 1:500 scale.

1.2 DECEMBER 1984 - DECEMBER 1987

By this stage the Gandys Hill leases were renumbered as MLN 785, 786 and 787. Little work was carried during the period 1984-1985 due to the requirements of the new Enterprise Mine. In February 1985, Pine Creek Goldfields Limited was formed by the joint venture partners and further exploration activities were carried out by P.C.G. personnel.

Seven mineral claims were pegged and applied for over the Gandys Hill area in September 1985, these were MCN's 1056 - 1062. In addition, an agreement was entered into with the holders of MCN 157.

In 1986, 278 metres of percussion drilling was carried out to test the North Gandys quartz reef system on MLN 785. 1987 saw the acquisition of HLD N10, situated within MCN 157. During 1987, ten diamond drill holes were undertaken over North Gandys Hill to follow up encouraging results from the earlier percussion drilling, and a seven hole percussion programme was carried out on MCN's 157 and 969 over South Gandys.
1.3 DECEMBER 1987 - DECEMBER 1990

Evaluation of the Gandys Hill area was fast-tracked in July 1988 to enable investment decisions and negotiations to proceed. To this end 445 vertical percussion holes were planned and carried out on MLN 786 and 785, and on MCN’s 969,1056 and 157. These holes were drilled on a 20 x 8 metre grid to 30 metre depths, and on an alternate pattern of 20 x 4 metres to a depth of 12 metres. This drilling was designed to enable oxide resource estimations to be carried out.

The number of leases at this stage was fourteen and were numbered as:- MCN 969,1056,1057,1058,1059,1060,1061,1062,1230, and 157. MLN’s 785,786,787 and HLD N10.

A report of the oxide resource estimations contained within these leases was undertaken in December 1988.

Diamond drilling of fourteen holes was carried out during July to August 1988 to further delineate the anticlinal mineralisation. 170 metres of percussion drilling were placed beside some diamond holes to check for sampling bias. A similar programme involving R.C. holes and diamond holes was carried out in May 1989 to evaluate sampling and assay quality of the two drilling methods (Fawcett, 1990).

Between June 1989 and October 1989, a nine hole diamond drilling programme resulted in 845 metres being drilled, and 5000 metres of R.C. drilling. 1169 metres of percussion drilling were also undertaken on MCN 1058 at North International and to the south of Gandys Hill on MCN 1230.

Five costeans were placed over North Gandys and north International during November 1990.

1.4 DECEMBER 1990 - JULY 1993

August 1991 saw the acquisition and transfer of eleven leases in the north-east of the Gandys Hill area, from Australian Energy and Gold N.L to Pine Creek Goldfields. Eight costeans were placed on these leases to investigate the northern extension of the Enterprise anticline. P.C.G swapped part of MCN 1058 for the northern part of Arimco’s Mining Lease No.39 for the relocation of the Stuart Highway during the period August - December 1991.

October 1991 saw ten additional costeans placed at Gandys North and South.

Negotiation and final acquisition of all Arimco leases over Gandys Hill and International occurred during July-August 1992. This enabled line clearing and drilling of vertical R.C
holes to be undertaken on International to infill original drilling to 25 metre lines. Holes were drilled to 30 metre depths on a 50 x 20 metre spacing. This was carried out during October 1992 - January 1993. At the same time 21 holes of vertical R.C. drilling were undertaken for sterilisation of a waste dump area to the north of International. Resource assessment of Gandys Hill and International has been ongoing from January to May 1993.
2.0 GEOLOGY AND MINERALOGY

2.1 Regional and Local Geology

The Pine Creek Geosyncline is an elongated belt of Lower Proterozoic sediments up to 14,000m thick. It consists of a succession of mainly siltstones and sandstones, with some interlayered volcanics, intruded by granitic complexes. The depositional environment ranges from shallow marine to supratidal and fluviatile for the majority of the sequence. These sedimentary rocks are deformed and metamorphosed. The metasediments are intruded by numerous granite plutons (the largest of which is the Cullen Granite) which have a minimum age of about 1,740 million years (figure 2).

The Mesozoic sandstone capping (Petrel Formation) of the granite plutons forms an elevated tableland to the west of Pine Creek.

Gold mineralisation at Pine Creek is contained within the Lower Proterozoic sediments of the Burrell Creek Formation, and is related to early Carpentarian (early Middle Proterozoic) granites.

The Pine Creek gold deposits are typical of the local vein type gold deposits which occur in the Burrell Creek Formation within a major NNW-SSE trending lineament (the Pine Creek Shear Zone) which extends from Katherine in the south to Noonamah in the north. Several gold and base metal deposits are located along this lineament, which is characterised by tightly folded and faulted metasediments and some strike slip faulting. The host rocks are greywacke, slate and siltstone.

Locally, a well bedded succession of metamorphosed rocks (shale, siltstone, greywacke, quartzite, spotted hornfels sediments and minor pebble conglomerate) are folded into a southerly pitching anticline which can be traced for over 3km from Gandys Hill to Jensens Adit. The beds strike approximately 310 to 320 magnetic, and the limbs of the anticline dip approximately 60 to 80. The rocks are siliceous, chloritic, generally light to dark grey, and are usually very fine to medium grained. Within the sediments, and generally parallel to the bedding, are a number of massive mineralised quartz reefs. The anticlinal saddle reefs are
generally concordant with the bedding and have the same plunge as the sediments.

The sulphide minerals which have been recognised at Pine Creek include pyrite, arsenopyrite, galena, sphalerite, chalcopyrite, bismuthinite, tetrahedrite, covellite and marcasite. Gold occurs in places as discrete accumulations, but also as inclusions in arsenopyrite and pyrrhotite, and as intergrowths with bismuthinite in massive pyrrhotite. Some pyrrhotite is recrystallised to pyrite and can contain gold.

Generally, gold is associated with quartz and/or sulphide mineralisation. Some of the massive reefs can contain up to 80% sulphides, although the sulphide content is more generally of the order of 10% to 30%. Much of the sediment contains disseminated sulphide as fine crystals. However, gold and sulphide mineralisation is not confined to quartz, and high gold values can occur in samples completely devoid of quartz. Also, some quartz is totally barren of gold and sulphides.
2.2 Project Geology

The Gandys Hill Project covers the northerly extension of two anticlinal structures identified in, and adjacent to the Enterprise Mine. These are the Enterprise Anticline (to the west) and the Czarina Anticline (also known as the International Anticline) adjacent to the Stuart Highway. The stratigraphy consists of a sequence of Lower Proterozoic greywacke and cordierite spotted siltstones, with subordinate shales and minor chert horizons (figure 3).

The Enterprise Anticline at Gandys Hill is an upright moderately tight fold plunging to the south at 10-15°, with limbs dipping 60-80°. Mineralisation is closely related to two saddle reefs. The closure of one, the Gandys Hill reef, outcrops near Gandys Hill trig., the other, the North Gandys Hill reef, outcrops 500m to the north on MLN786. Both reefs are contained within well bedded, cordierite spotted siltstone horizons.

Similar stratigraphy is seen at International. The main mineralisation on International is related to at least two sets of veins which dip to the west and to the east and southeast. Both are known to carry gold. These vein sets appear to predominate in a greywacke sequence (the Lower Mine Greywacke) on the west limb of the International Anticline.

At least one major strike-parallel fault has been identified in the area. This occurs partly along the axis of the Enterprise syncline, between the two anticlines.

A stratigraphic column showing the relationship of the units is given in figure 4. Following is a description of those units intersected at Gandys Hill and International.

2.2.1 Lower Gandys Silt

This is the basal unit intersected at Gandys Hill on the Enterprise anticline, approximately 2km north of the Enterprise Mine. The unit consists predominately of fine grained well bedded siltstones with numerous chert bands and nodules. Minor greywacke and mudstone are present where 1-2m cyclical fining upward sequences occur. Fine to medium cordierite pseudomorph 'spotting' is present throughout the siltstones. The cordierite, which developed
during contact metamorphism due to the emplacement of the Cullen Batholith, has since been altered to pale green phlogopite, sericite and quartz or brown biotite. Disseminated sulphides and minor garnets are also present in a chloritic matrix. The Lower Gandys Silt is host to the North Gandys saddle reef which is situated near the top of this unit.

2.2.2 Gandys Hill Greywacke

The Gandys Hill Greywacke immediately overlies the Lower Gandys Silt on the Enterprise anticline. This unit contains 60-75m of fine to medium grained greywacke with minor interbedded, graded silt bands. The greywackes are characterised by their highly micaceous and massive nature. Cordierite pseudomorphs and quartzite bands occur at intervals throughout the unit. A highly siliceous, fine to medium grained greywacke zone occurs near the top of the unit, and appears to be partly bedding transgressive. This has been suggested to be the result of selective silica alteration of more permeable beds, probably by fluids responsible for the auriferous quartz mineralisation in the area.

2.2.3 Gandys Silt Horizon

The Gandys Silt Horizon is a similar unit to the Lower Gandys Silt. It consists of fine grained, well bedded siltstones with minor greywacke beds. Chert bands and nodules are present, however less numerous than in the Lower Gandys Silt. This horizon hosts the South Gandys saddle reef at Gandys Hill, and is the basal unit intersected at the International prospect.

2.2.4 Lower Mine Greywacke

The Lower Mine Greywacke overlies the Gandys Silt Horizon and is the basal unit observed within the Enterprise Mine. This unit consists of fine to medium grained greywacke which varies greatly in exposed thickness from 55 to 110 metres. It is similar to the Gandys Hill Greywacke as it contains abundant mica flakes, however, it contains more common siltstone interbeds than the former.
2.2.5 Spotted Silt Horizon

This unit is a 70 metre thick predominantly silt sequence overlying the Lower Mine Greywacke. The siltstones are fine grained, well bedded and contain bedding concordant chert bands and nodules. Cordierite spotting is common throughout. At the base is an 18m thick unit termed the Nodular Chert Unit. This is treated as part of the Spotted Silt Horizon, however it contains abundant chert bands and is host to the Enterprise saddle reef. The base of this unit is marked by a distinct 1.5-2.0 metre thick, coarse cordierite spotted and bleached silt bed.

2.2.6 Upper Mine Greywacke

The Upper Mine Greywacke is 130 metres thick and is a medium grained, massive greywacke dominant unit. Several silt horizons have been mapped within this unit within the Enterprise Mine. This unit is present in the Enterprise Mine and at the southern end of International but is unlikely to be present within any of the designed pits of the Gandys Hill Project.
3.0 Mineralisation and Ore Characterisation

3.1 Gandys Hill Mineralisation

Several styles of mineralisation in both the oxidised and primary rock are present at Gandys Hill, with the bulk of the mineralisation contained within siltstone units. These styles include:

1. Saddle reef style quartz veining.
2. Stockwork veining across the anticlinal axis.
3. Narrow quartz veins peripheral to the fold axis.
4. Fault related mineralisation.

Two saddle reefs are present in outcrop at Gandys Hill. The Gandys Hill reef is situated near the Gandys Hill trig., and the North Gandys reef is located 500 metres further to the north.

The North Gandys reef is well developed near surface where it is up to 5 metres in width, and becomes poorly developed at depth. The reef is a banded pale greyish white quartz containing 2-5% veinlet and disseminated pyrite and arsenopyrite with minor chlorite. Gold grades are commonly in the range 1.0-12.0g/t. Both saddle reefs are hosted by cordierite spotted siltstones containing 1-2% disseminated sulphides.

The Gandys Hill reef is very similar to the North Gandys reef, and forms the top of Gandys Hill itself. Limb angles steepen considerably from 40 in the north, to 60-70 in the south and the development of the reef limbs become very restricted, particularly on the east limb. The reef is very poorly developed in the South Gandys area where mineralisation is expressed as a zone of intense stockwork veining near to or across the anticlinal axis. Quartz veins in this zone have numerous orientations and are up to 1m thick. They contain 5% veinlet and disseminated pyrite, arsenopyrite, chalcopyrite and minor pyrrhotite, galena and sphalerite. Gold grades are typically in the range 1-15g/t.

Narrow quartz veins peripheral to the fold axis, are contained within siltstones and minor greywacke and form a minor proportion of the mineralisation. The veining is either sub-
parallel to, or cross-cuts, bedding. Veins contain up to 1% disseminated sulphides and have gold grades in the range 0.9-3.0g/t.

Fault related mineralisation makes up a small proportion of the total and is located within or near major fault zones mainly in siltstones. The siltstones can become highly foliated and silicified, and contain numerous narrow fracture-fill quartz veins. These veins carry up to 1% disseminated pyrite, arsenopyrite and chalcocpyrite and typically grade 1-8g/t gold.

3.2 International Mineralisation

Three main types of mineralisation are evident at International, these are:
1. West dipping quartz veins
2. East and southeast dipping quartz veins

In gross terms the majority of the mineralisation is restricted to the greywacke on the west limb of the anticline axis and east of the synclinal fault.

The vein systems comprise quartz, and quartz-sulphide veins and microveins separated by wallrock. Veins vary in thickness from microveins of <1mm to veins up to 50cm thick, with an occasional thick macrovein of up to 1-2m. Pyrite is the dominant sulphide present with lesser amounts of arsenopyrite and pyrrhotite. Sulphides occur within quartz veins and as monomineralic sulphide veins, and also disseminated through the wallrock adjacent to veins. Chlorite alteration is pervasive particularly within the siltstones adjacent to the fault. Gold appears to be mainly associated with veining and grade of up to 50.0g/t are present but typically grade 1.0-1.5g/t in oxide material and 2.50g/t in the primary zone.
4.0 STRUCTURE

4.1 Gandys Hill Structure

The Enterprise Anticline at Gandys Hill is a moderately tight fold dipping steeply to the west at 85 degrees and plunging to the south at 10 - 15 degrees, with limbs dipping 60 - 80 degrees. Minor faulting and shearing with minimal movement evident is common throughout the area. Evidence for faulting or shearing is in the form of either; zones of brecciation with high clay and iron content in the more competent material, or as highly foliated, slickensided and chloritised material with high clay content in less competent rock.

At north Gandys a fault has been interpreted at about 13400N where it appears to have displaced the fold axis by over 5m. This fault is thought to have a north westerly dip with a reverse sense of movement.

A fault trending grid north has been identified at south Gandys, and minor displacement of the fold axis can be seen on section 12700N. No major disruption can be seen in drill core and the movement has been taken up within foliated chloritic zones. At surface the bedding in the area of the fault is very steep to slightly overturned.
4.2 International Structure

There is a concentration of quartz veining along International Hill which would appear to be responsible for this topographic feature. Veining dies out rapidly to both the east and to the west as do the gold grades.

Fold axes are not well defined and are very difficult to trace to the north and south. The International Fault located in the area of the syncline between Gandys Hill and International Hill has been inferred from both mapping and drilling. At surface the silt on the eastern side of the fault appears to be thicker and contains less greywacke interbeds than mapped on the western side of the fault. So it is proposed that the eastern side is downthrown with respect to the west. The higher percent of greywacke in the silt to the west is thought to reflect the more transitional material between the Spotted Silt Horizon and the Lower Mine Greywacke. North of approximately 12950N there has been inferred an extra anticline and syncline between the Enterprise anticline and the International Fault/syncline. The Spotted Silt Horizon to the west of the fault gives way to the underlying Lower Mine Greywacke and Gandys Silt Horizon. This picture is further complicated by the presence of at least two (and possibly three or more) north-east striking cross faults which have been inferred from mapping.

All drilling results, mapping and costean mapping and results can be seen in figures 5 to 91.