Partial Relinquishment Report
EL 9978 Wonarah
For the Period ending 29th August 2004
Frew River SF53-03, Avon Downs SE53-04,
Alroy SE53-15, Ranken SE53-16
Northern Territory

Tenement Holder: AKD Limited
Date: December 2004
Author: Z A Sas
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1. SUMMARY

This final report summarises exploration activities completed on relinquished portions of EL 9978 during the period 30th September 2002 to 29th September 2004. The tenement forms part of a project area held by AKD Limited being explored for large tonnage phosphate deposits. Since March 1999, Rio Tinto was AKD’s joint venture partner and spent AUD$2.4 million in exploration over the JV tenements. However, no drilling was completed by Rio Tinto over EL 9978. Rio Tinto withdrew from the JV in December 2002.

Interpretation of the available data on open file suggests deep low grade phosphorite and excessive overburden. Poor drill grades encountered in the 1970’s by previous explorer, IMC, rules out any potential for economic phosphate resources in these areas.
2. INTRODUCTION

EL 9978 Wonarah is located ~250 km east southeast of Tennant Creek in Northern Territory, Australia (see Location Plan). This tenement (and EL’s 22168, 9976, 9977, and 9979) is the subject of an exploration effort for large tonnage phosphorite deposits suitable for production of DAP fertiliser.

AKD Limited is the registered 100% owner of EL 9978 following the transfer of the tenement by the original holders, Rare Earths & Minerals Pty Ltd and Pilbara Chemical Corporation NL. The tenement was originally held beneficially for and on behalf of AKD Limited through an agreement between the parties which was registered with the Department in the Northern Territory.

The underlying land tenure for the Wonarah phosphate project is NT freehold and is held by the Arruwurra Aboriginal Corporation for which Rio Tinto, on behalf of the AKD joint venture, negotiated an exploration agreement in August 2000. Exploration licence 9978 was granted on the 30 September 2002 for a period of 6 years. The area of the EL 9978 totalled 259km² (81 blocks) and the total exploration commitment for 2002/2003 as designated by the NT Government was AUD$10,000. On the 20 August 2004, the Company relinquished 69 blocks and made an application to the NT Government to reduce the size of the exploration licence to 12 blocks. This report summarises exploration activities completed on relinquished portions of EL 22168 during the period 4th August 2000 to 3rd August 2004.
3. GEOLOGY

The tenements cover Middle Cambrian sediments of the Georgina Basin, a large late Proterozoic to early Palaeozoic basin extending across the eastern Northern Territory and northwestern Queensland.

Basement in this part of the Georgina Basin are Mesoproterozoic sediments and volcanics overlain by the Early Cambrian Peaker Piker Volcanics. The volcanics are tholeiitic and comprise amygdaloidal and porphyritic basalts, and dolerite. The volcanics form an east-northeast trending basement high, part of the northeast-southwest trending Alexandria-Wonarah Basement High. Lower Middle Cambrian (late Templetonian) phosphorite deposits occur along the basement high. These are hosted by marginal transgressive sediments of the Burton Beds (Alroy, Alexandria) and the Upper Gum Ridge Formation (Wonarah), which are equivalent to the Beetle Creek Formation (Phosphate Hill, Ardmore, and Lady Annie–D-Tree) on the eastern margin of the basin (Southgate & Shergold, 1991; Gravestock & Shergold, 2001).

The lower Middle Cambrian sequence at Wonarah has been divided into distinct units based on logged geology, geochemistry, and stratigraphic relationships (Figure 1; Lilley & Andrews, 2001). The basement high is flanked by onlapping dolomitic rocks equivalent to the lower Middle Cambrian Thorntonia Limestone (Figure 2). Overlying basement is dolostone, mudstone, and phosphorite of the lower Middle Cambrian Upper Gum Ridge Formation, and mudstone, siltstone, and dolostone of the Middle Cambrian Wonarah Beds.
Hangingwall dolostone HDO
Grey and brown dolomitic siltstone. Interdigitates with mudstone away from flanks of the basement high.

Hangingwall mudstone HMU
White to light grey micaceous mudstone with trace siltstone and nodular chert. Rare marine fossils; <10% crandallite beds and trace dolostone; illite- and kaolinite-rich; locally ferruginised.

Convolute mudstone CMU
White, light grey, and yellow clay-rich convolute mudstone. Trace chert, minor siltstone and fine sandstone interbeds; 0-45% crandallite; >10% illite; high TiO2 and Zr; locally ferruginised.

Mudstone phosphorite MPH
Yellow and pink mudstone phosphorite with trace dark-grey chert. Dominated by carbonate-fluorapatite, trace crandallite; <5% illite; low TiO2 and K2O; low quartz; locally ferruginised; some intersects partially weathered. Anomalous trace element geochemistry.

Chert breccia phosphorite CBX
Yellow, grey, and rarely pink mudstone phosphorite with abundant dark-grey chert. Laterally continuous horizon; carbonate-fluorapatite-rich, weakly dolomitic organic mudstone precursor. Trace crandallite; weakly ferruginous; <10% illite, low TIO2; quartz average 80%.

Transitional sediments (undifferentiated) TUN
Clay-rich mudstone and siltstone; occasional dolomite, sandstone, and epiclastic on basement; >10% illite and generally >10% kaolinite.

Transitional phosphorite TUP
Porcellinous phosphorite; high P2O5; variable clay.

Dolomitic siltstone DOL
Thortonia Limestone equivalent.

Mafic volcanics BAS
Peaker Piker Volcanics. Intensely weathered amygdaloidal and porphyritic tholeitic basalt and dolerite.

Figure 1: Wonarah Stratigraphy

Figure 2: Diagrammatic Regional Cross Section
The Upper Gum Ridge Formation is divided into four main units (from the base; Figure 1): undifferentiated transitional sediments (TUN), chert breccia phosphorite (CBX), mudstone phosphorite (MPH), and convolute mudstone (CMU). Where the stratigraphic relationships are poorly understood, the phosphorite horizon has been modelled as undifferentiated phosphorite (PUN). The chert breccia phosphorite and mudstone phosphorite are collectively termed the phosphorite horizon, and locally contain ore-grade (>15% P₂O₅) intervals. The phosphorite horizon is overlain by clay-rich light grey and yellow convolute mudstone, with minor interbeds of siltstone and fine sandstone (CMU). The convolute mudstone typically contains an average 2% P₂O₅ as crandallite.

The Wonarah Beds, comprising mudstone and siltstone with minor nodular chert overlie the convolute mudstone. In the tenement area these rocks are grouped as hangingwall mudstone (HMU). Laterally equivalent dolomitic mudstone facies are assigned to hangingwall dolostone (HDO).

Intensely weathered Peaker Piker Volcanics subcrop and occur beneath thin transported cover in the relinquished portions of EL9978. In this area the phosphorite horizon is interpreted not to be present, due either to erosional stripping, or because it was stratigraphically above the limit of phosphorite deposition.

In parts of EL9978, the Upper Gum Ridge Formation and Wonarah Beds overlie the Thorntonia Limestone (DOL), which is capped by a karst weathering surface. Dolomitic rocks outcrop in the relinquished portions of EL 9978 and may represent an up-faulted block of Thorntonia Limestone or a carbonate facies that laterally interdigitates with the Wonarah Beds.

3.1 Regolith

An interpretation of Landsat 5 Thematic Mapper (TM) multispectral data mapped the distribution of regolith types including silcrete, ferricrete, calcrete, and a range of colluvial, alluvial, and aeolian deposits. The lower Middle Cambrian rocks are intensely weathered and covered by stabilised Cenozoic aeolian sand sheets and longitudinal dunes trending 310° - 320° across the region. Silcrete and ferricrete duricrust underlies much of the sand cover and outcrops sporadically as low rises. Calcrete and black soil overlie dolomitic rocks. The distribution of duricrust outcrops is structurally controlled along linear trends, possibly implying minor Cenozoic reactivation of basement fault structures.
4. DRILLING

No drilling programs were undertaken on EL 9978 by former JV partner, Rio Tinto. However, 24 RC holes drilled by IMC in the 1970’s suggest deep phosphorite with low grades and excessive overburden. The drill hole data is available on open file and is not reproduced here.
5. ENVIRONMENT

All access tracks within EL 9978 have been rehabilitated.

A Rehabilitation Report for the Wonarah project has been separately submitted to the DBIRD by former JV partner Rio Tinto and is not reproduced here.
6. CONCLUSIONS AND RECOMMENDATIONS

Interpretation of the available data on open file suggests deep low grade phosphorite and excessive overburden. Poor drill grades encountered by previous explorer, IMC, rules out any potential for economic phosphate resources in these areas.
REFERENCES


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KEYWORDS
