TENEMENTS: EL1254 & EL1278

ANNUAL REPORT

TANAMI REGION, NORTHERN TERRITORY

OTTER EXPLORATION NL

and

BILLITON AUSTRALIA

DECEMBER 1991

AUTHOR : M.R. GRIFFITHS

DISTRIBUTION

Original : Central Land Council
Copy 1 : Northern Territory Department of Mines & Energy
Copy 2 : Otter Exploration NL, Sydney (2)
Copy 3 : Billiton, Darwin
Copy 4 : Billiton, Melbourne (2)

TANAMI REPORT

CONTENTS

FIGURES

SUMMARY

The main aim of exploration during the 1991 field season was to confirm the work completed during the 1990 season and to discover further anomolous gold occurrences.

Exploration confirmed the presence of a relatively broad anomolous zone at the Crusade Prospect and a second anomolous area known as Kokoda has been discovered.

Regional reconnaissance has confirmed mapping completed during the previous season. Exploration methods used has been shown to be effective in this area.

1.0 INTRODUCTION

The Shell Company of Australia Ltd and Otter Exploration NL, (Central Desert Joint Venture - C.D.J.V.) hold 5 Exploration Licence in the Tanami Desert Region of the Northern Territory. This report covers two of these Exploration Licence - EL1254 and EL1278.

1.1 Location

The Exploration Licences are situated approximately 100km south west of Lajamanu (Hooker Creek) and approximately 100km north of the Tanami Mine (Figure 1). The Tanami Mine is about 650km north west of Alice Springs.

Access to the area is via the Alice Springs - Halls Creek road and the Tanami - Lajamanu roads. The southern part of EL1254 has good access due to tracks made and maintained by Suplejack Station. EL1278 has no formal access.

An airstrip is located at Suplejack Station Homestead which is situated approximately 20km from the southern end of the tenements.

1.2 Tenure

Exploration Licence 1254 and 1278 were granted to Otter Exploration on the 17 April 1989 for a period of 6 years.

On 1 September 1990 Otter Exploration entered into a Joint Venture with The Shell Company of Australia Limited covering all the Otter Exploration Licences in the Tanami Region. Shell can earn 50% of the "project" by spending $5 million on exploration.

Billiton Australia (the Metals Division of the Shell Company of Australia Limited) are the managers of the project. The joint venture is known as the Central Desert Joint Venture (CDJV).

Project status was granted covering EL1254 and EL1278 on the 13 March 1991. An application for deferral of tenement reduction was applied for on 23 November 1990 and was granted 13 March 1991 covering the 1991 field season. A compulsory 50% reduction of the project area will be made on 17 April 1992.

Table I

Exploration Licence	Area (blocks)	Expenditure ($)
EL1254	100	24,750
EL1278	75	24,750
	TOTAL	$49,500

1.3 Physiography

The landscape varies from flat dark brown soil predominantly covered by grasses to red sandy soil covered with varieties of spinifex and other desert foliage. There is thick eucalypt growth in ephemeral watercourses. The landscape is dominated by a rocky range called the Ware Range covering the entire western side of the project area. This outcrop is dominated by stunted eucalypt and spinifex grasses.

Two main watercourses shed from the Ware Range: Winnecke Creek and Nanny Goat Creek and the area appears to have a higher rainfall compared to the southern project area.

The main landuses are cattle grazing and traditional aboriginal use.

1.4 History

The Tanami Desert Region was first explored by European explorers in early 1900. A prospector named John Byrne (on Expedition with A.A. Davidson) discovered gold at Tanami during August 1900.

There is no history of any mining or mineral discovery in the exploration area. The area has been dominated by cattle grazing for the last 30 years.

1.5 Previous Exploration

There is no record of any previous exploration for gold mineralisation. Some of the area may have been investigated for Uranium during the early 1970's. There has been no exploration since the declaration of Land Rights in 1976.

2.0 GEOLOGY

2.1 Regional

The Exploration Licences are located in the north eastern sector of The Geology of the Granites - Tanami Region, Northern Territory and Western Australia map sheet (1:1,000,000) contained in the BMR Bulletin 197 by Blake, D.H.; Hodgson, I.M.; and Muhling, P.C., 1979.

All mapping and stratigraphic interpretation are based on this publication which provides a very good basis for more specific local geological interpretation.

2.2 Local Geology

Within the project area, 4 stratigraphic units have been recognised; Nanny Goat Creek Beds; Suplejack Downs Sandstone; Gardiner Sandstone; and Antrim Plateau Volcanics.

Nanny Goat Creek Beds

These rocks are Archaean (?) to Lower Proterozoic rocks stratigraphically equivalent to the Mount Charles Beds outcropping near the Tanami Mine to the south. Both of these rock units form part of the Tanami Complex.

The Nanny Goat Creek Beds are described as predominantly volcanic rocks consisting of ignimbritic acid porphyry, amygdaloidal non-porphyritic basaltic lavas with intrusive patchy porphyritic basalt and tuff.

The subordinate rocks are metasedimentary greywacke, shale and siltstone.

The structural interpretation of the Nanny Goat creek Beds is very difficult with pre-Carpentarian structures not appearing self evident. It has been noted by Blake D.H.; Hodgson, I.M.; and Muhling, P.C., (1979) that superimposition of Carpentarian and Adelaidean deformations that affect the Nanny Goat Creek Beds (Tanami Complex) add to the difficulty of interpretation.

However, structures evident in the Gardiner sandstone (Carpentarian) can be easily recognised on a regional basis and transfered to the Nanny Goat Creek Beds. With this in mine, two structural trends are evident:

north-south and
north-west / south-east (figures 2,3 & 4)

The south-east section of the project area contains most of the outcropping Nanny Goat Creek Beds. This area shows the rocks to be generally steeply dipping with cleavage often parallel to bedding adding to the structural complexity. Complex folding and faulting is evident and detailed mapping is required to more fully understand this area.

Suplejack Downs Sandstone

This unit consists of sublithic arenite and quartz arenite with some locally exposed shale and siltstone. It appears to unconformably overlie the Nanny Goat Creek Beds and is intern unconformably overlain by Gardiner Sandstone. Mapping shows this unit to have moderate dips (25-45°) with a considerable amount of open and tight folds (figure 4).

Gardiner Sandstone

The rocks of this unit form part of the Birrindudu Group and consist of sublithic arenite, subordinate quartz arenite, conglomerate, shale siltstone and glauconitic sandstone.

The Ware Range is a very good example of typical Gardiner Sandstone. The range is basically a strike ridge with generally shallow to flat dipping structures. The whole of the Ware Range appears to form a elongate synclinal structure. Folding, jointing, bedding trends, joint patterns and cross-cut faulting are easily distinguished in outcrop.

Antrim Plateau Volcanics

This rock unit is considered to be the oldest Palaeozoic rock in the area and is probably of early Cambrian age. The unit is dominated by tholeiitic basalt lavas with subordinate intercalated sandstone and chert. Exposure within the licence area is minimal. There is very little outcrop and most of the unit appears lateratised.

2.3 Cainozoic

The remainder of the project area is covered by alluvial and aeolian sand, silt and gravels with extensive laterite development.

Mineralisation

No economic gold or base metal mineralisation has been discovered in the project area. There were some minor radioactive anomalies and rare earths anomalies discovered in association with the north-south trending structural/unconformity contact on the eastern side of the Ware Range. These elements are excluded from the current exploration effort.

Work by the CDJV has discovered anomolous gold values in two separate areas associated with the Nanny Goat Creek Beds (see later).

3.0 EXPLORATION

3.1 Regional Reconnaissance

After the 1990 field season good base maps were drafted. As the area has not previously been recognised as a gold or base metals area it was considered essential to check the geological mapping to determine prospective areas. With this in mind, numerous traversers covering all the existing outcrops were completed. As a result, the maps have been up dated (figure 2, 3 and 4).

3.2 Soil Sampling

After the success of the 1990 field season further soil sampling was completed in the "Crusade" area. A total of 34 samples were collected.

The method of sampling was slightly modified from the previous years method. A composite sample consisting of grab samples every 20m (with 5 grab samples making up the composite), has been found by Billiton to be very effective. This allows for greater coverage and a better chance of locating an auriferous source. The sample preparation which includes the routine rejection of -1mm size and +10mm size material was continued due to the success of this method.

All samples were sent to Classic Laboratories Ltd in Darwin for analysis using the low-level fire assay (for gold). A further 36 soil samples using the above method were collected from another area located 3km from the Crusade Prospect. (Appendix I).

3.3 Rock Chip Sampling

A total of 7 rock chip samples were collected during the reconnaissance traverses.

All samples were sent to Classic Laboratories Ltd in Darwin for analysis. Samples were analysed for Au, Cu, Pb, Zn, and As. (Appendix I).

3.4 Mineralogy

Selected rock chip samples were sent to Pontifex and Associates (Appendix II). These samples were used in outcrop identification.

4.0 RESULTS AND DISCUSSION

The results of work done this year have been very encouraging. The Crusade anomaly discovered last season has been better defined and an anomolous zone approximately 2km long by 500m wide has been delineated. Samples have shown the anomaly to be discrete body that is now ready for more intense exploration (figure 5).

A second highly anomolous area has been located approximately 3km north of the Crusade. This area has been called Kokoda. The highest soil sample result is 500ppb which is highly anomolous. Further sampling will be completed next field season (figure 4).

During regional reconnaissance was found that the suite of rocks that constitute the Nanny Goat Creek Beds are a lot less weathered and consist of more intermediate to acidic rocks than the Mt Charles Beds situated near the Tanami Mine. Both andesitic and rhyolitic assemblages are fairly common.

Reconnaissance and magnetic data suggest that the anomolous gold values discovered are most likely fault related with evidence of a regional north-south trending fault considered to be the dominant linearment trend.

5.0 CONCLUSION AND RECOMMENDATION

The licence area has undergone a full first pass regional reconnaissance. Two areas are outstanding with anomolous gold results in rocks of the appropriate assemblage. Further detail mapping is required to delineate the host rock and/or shear zone to better understand the possible origins of the anomalies.

Considering that no previous economic gold has been located in the area suggests that the method of investigation has been successful and further exploration is highly recommended.

It is recommended that the two areas (Crusade and Kokoda) should be systematically grid sampled and covered by close spaced ground magnetics. If results are favourable, RAB drilling of the most prospective targets should be completed. The southern section should also be mapped in detail.

6.0 REFERENCES

1. Blake, D.H.; Hodgson, I.M. and Muhling, P.C. (1979)
   Geology of the Granites - Tanami Region
   B.M.R. Bulletin 197
   Australian Government Publishing Service, Canberra

2. Griffiths, M.R., Creagh, C.J. and Maxlon, J. (1990)
   Annual Report, Tanami Region, NT
   Otter Exploration NL and Billiton Australia (unpublished)
   EL1271, EL1276, EL1277, EL1278, EL1254

C.D.J.V. EXPENDITURE STATEMENT

EXPLORATION LICENCES - 1254 and 1278
Total expenditure for the period 1.4.91 - 31.3.92

	EL 1254	EL 1278
	$	$
Staffing - Regional Office	8,106	3,592
Support - Regional Office	5,066	2,150
Tenement Costs	1,491	498
Geochemical Surveys	--	--
Geophysical Surveys	--	--
Analyses	506	227
Drilling	--	--
Geological, Environment, Drafting, Computing Costs	7346	3,760
Aerial Survey	506	425
Overheads	2,309	1,058
TOTAL	**$25,330**	**$11,710**

APPENDIX I

SAMPLE RESULTS

CLASSIC LABORATORIES LTD

Job: 1DN0558A
O/N: 10081/HL10,13

Final

ANALYTICAL REPORT

SAMPLE	Cu	Pb	Zn	Ag	Au	Au Dpl	As
164001	12	14	40	<1	2	--	24
164002	14	21	43	<1	2	--	48
164003	14	7	44	<1	21	22	65
164004	21	7	57	<1	39	59	115
164005	17	6	45	<1	9	16	230
164006	8	14	36	<1	6	7	150
164007	3	8	19	<1	7	7	105
164008	2	4	18	<1	3	--	65
164009	12	10	30	<1	1	--	42
164010	22	11	54	<1	2	--	62
164011	9	9	49	<1	3	--	60
164012	11	12	72	<1	1	--	120
164013	21	10	73	<1	56	40	130
164014	28	11	58	<1	2	<1	60
164015	<2	12	20	<1	<1	--	105
164016	3	9	20	<1	27	27	64
164017	12	9	38	<1	1	--	17
164018	19	14	63	<1	1	<1	42
164019	23	18	89	<1	1	--	75
164020	18	13	63	<1	1	--	135
164021	15	15	10	<1	<1	<1	
164022	12	10	6	<1	<1	--	
164023	11	10	6	<1	<1	--	
164024	10	6	6	<1	<1	--	
164025	10	8	7	<1	2	--	
164026	12	19	23	<1	<1	--	
164027	14	15	21	<1	<1	--	
164028	18	19	23	<1	<1	--	
164029	11	26	8	<1	<1	--	
164030	18	31	12	<1	<1	--	
164031	24	42	15	<1	2	--	
164032	19	39	13	<1	1	--	
164033	16	32	13	<1	<1	--	
164034	16	23	11	<1	<1	<1	
164051	30	27	17	<1	1	--	
164052	37	27	16	<1	<1	--	
164053	62	28	21	<1	<1	--	
164054	16	5	4	<1	5	6	
164055	43	28	18	<1	<1	--	
164056	66	35	23	<1	<1	<1	
164057	11	10	3	<1	5	8	
164058	43	28	24	<1	<1	--	
164059	12	6	3	<1	4	5	
UNITS	ppm	ppm	ppm	ppm	ppb	ppb	ppm
DET.LIM	2	4	2	1	1	1	2
SCHEME	AAS2	AAS2	AAS2	AAS2	AAS9	AAS9	XRF1

CLASSIC LABORATORIES LTD

Job: 1DN1412
O/N: 10093/HL10

Final

ANALYTICAL REPORT

SAMPLE	Au	AuDpl
164060	<0.001	--
164061	0.001	--
164062	<0.001	--
164063	<0.001	--
164064	<0.001	--
164065	<0.001	--
164066	<0.001	--
164067	<0.001	--
164068	0.001	--
164069	<0.001	--
164070	<0.001	--
164071	<0.001	--
164072	<0.001	<0.001
164073	0.002	--
164074	<0.001	--
164075	0.011	0.007
164076	0.51	0.41
164077	0.002	0.001
164078	<0.001	--
164079	<0.001	--
164080	<0.001	<0.001
164081	<0.001	--
164082	<0.001	--
164083	<0.001	--
164084	<0.001	--
164085	<0.001	--
164086	<0.001	--
164087	<0.001	--
164088	0.001	--
164089	0.001	--
164090	<0.001	--
UNITS	ppm	ppm
DET.LIM	0.001	0.001
SCHEME	FA3	FA3

APPENDIX II

MINERALOGICAL REPORT

Pontifex & Associates Pty. Ltd.

TEL. (08) 332 6744
A.H. (08) 31 3816
FAX (08) 332 5062

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 5977

May 15th 1991

TO:

Senior Geologist
Billiton Australia Ltd
(Shell Metals)
Suite 4, 55 Knuckey St
DARWIN NT 0800

Attention : Chris Creagh

YOUR REFERENCE: Order 10096/HL10/CJC

MATERIAL: Nine rock samples and five RAB Chip samples.

IDENTIFICATION: 240919 to 240334

WORK REQUESTED: Composite thin section preparation and petrographic description.

SAMPLES & SECTIONS: Returned to you with this report.

PONTIFEX & ASSOCIATES PTY. LTD.

240330

(1) Mostly laminated, very fine, quartz-silty, chloritic-uralitic and leucoxenitic, pelitic sediments.
(2) minor chips of quenched basalt, extensively altered to uralite/chlorite, dispersed leucoxene.

Twelve chips selected at random from this RAB sample were mounted in epoxy and examined in a composite thin section. Two of these chips are greenish homogeneous, holocrystalline-basaltic. The other ten chips are very fine (silty) sediments, also with greenish components (which may be detritus-derived from a basaltic source).

The basalt chips consist of abundant randomly interlocking very fine slender laths of plagioclase, to 1mm long, (approx. 30% of the rock) together with darkish green chlorite/uralite replicas after similarly small pyroxene laths (30%). The plagioclase is weakly sericitised. All of these crystals occur within a matrix of essentially the same extremely fine green chloritic/uralitic material, probably after primary intersertal glass. Extremely fine leucoxene is dispersed, microvesicles filled with uralite occur in one basaltic chip.

The overall texture suggests that this basalt has been quenched.

The chips of sediment are generally laminated, and dominated (70%) by extremely fine grains gradational to a diffuse matrix of green chloritic/uralitic material, fine leucoxene and minor sericitic material, as in the basalts. An additional component in most of these chips is quartz silt (5-15%).

240331

Variably quenched and glassy basalt; most plagioclase (some as microphenocrysts) sericitised; pyroxene and glass commonly uralitised/oxidised, some chips with fresh clinopyroxene, rare quartz stringers.

All chips in this sample are basaltic, coarser crystalline than in 240330, and microporphyritic, but stil with apparent quench textures in the groundmass.

Minor plagioclase microphenocrysts are up to 2mm long, all are sericitised. The finer feathery (quench) textured groundmass consists of randomly interlocking slender, sericitised, plagioclase crystals, uralitised (and oxidised) pyroxene crystals, as well as altered interstitial mafic glass.

Rare chips have a groundmass dominantly of turbid glass, including dispersed leucoxene, and scattered microphenocrysts of fresh clinopyroxene.

There are rare stringers of quartz, and of trace epidote.

240332

Massive fine feathery (quenched) basalt; advanced supergene alteration to various fine clays and limonite. One apparent basaltic chip has been completely replaced by pervasive microcrystalline silicification.

Apart from two chips of vein quartz, all other chips in this sample are basaltic. These chips are extensively supergene-altered to extremely fine clays and limonite, but a distinctive fine felted to feathery texture is well preserved, indicative of quenching.

Ex-microphenocrysts of plagioclase and pyroxene occur in some chips, most however consist of randomly interlocking slender microlites of ex-plagioclase, lesser ex-clinopyroxene, all with intersertal original glass.

The ubiquitous clay alteration may be kaolinitic and/or 'chloritic'. Limonite staining is more abundant in some chips than in others.

Random veins of primary quartz, and of extremely 'chloritic'-clays cut several chips. One chip appears to have been basalt, but the original rock has been completely pervasively replaced by quartz, largely destroying relict textures.

240333 — Great majority of chips are deeply weathered, oxidised basalt. One chip ?microbrecciated volcanic (basalt) invaded and replaced by 'epithermal-style' silicification.

All of these chips are of reddish-brown, extensively supergene altered and ferruginised, basalt, except one siliceous chip.

Textures preserved within the supergene clay-sericite-limonite alteration products are essentially the same as in 240332, indicative of a massive, fine feathery (quenched) basalt, with minor, localised microphenocrysts. There may have been more original glass (?locally disrupted) than in 240332.

Several chips are cut by stringers of cryptocrystalline quartz.

The single siliceous chip is more complex. At least 50% of it consists of random very small prismatic crystals, and very fine patchy cryptocrystalline quartz indicative of high-level-hydrothermal ('epithermal') silicification. This material incorporates abundant, very fine patches and lesser individual small flakes of 'chloritic' (smectitic?) clays; also a similar amount of equally fine patchy, clouded, ultrafine ?silica-clay-sericite. Extremely small, more or less individual Fe and/or Ti oxide grains are scattered.

The interpretation of just this one chip is difficult, but it appears to represent a microbrecciated 'volcanic', (probably related to the basalt chips forming the remainder of the sample), invaded and largely replaced by 'epithermal' silicification.

240334

Weakly vesicular basalt; moderate albite/clay-sericite, and uralitic alteration; vesicles with chlorite, epidote ± quartz, carbonate; minor distinctive micro-skeletal opaque oxides.

All chips represent the same massive, fine crystalline basic rock, probably a basalt (possibly but seemingly less likely a microdolerite). Up to 60% of the rock consists of randomly interlocking plagioclase crystals to 0.1mm x 1.2mm, which are variably albitised and/or altered to clay-sericite ± turbid chlorite? Apparently subordinate random pyroxene crystals are 'uralitically' altered and clouded (?by titaniferous material).

Interstitial areas throughout the aggregate also consist of cloudy chloritic and oxide material; and minor oxide grains are disseminated and many of these are microskeletal (with microscopic snow-flake-like crystal forms).

Minor vesicles are occupied variably by chlorite, fine granular epidote; some with rims of quartz and/or carbonate.