

**Burnside Operations P/L**

**ANNUAL EXPLORATION REPORT**

***HOWLEY TENEMENT GROUP***

**MLN 809, 884-892, 993, 1000, 1027, 1053, 1062,  
MCN 1014-1015, 1231-1232, 3422, 4299, 4860-4861**

**YEAR ENDING 31<sup>st</sup> December 2004**

**Burnside (14/2-II) 1:50,000  
Fenton (14/5-I) 1:50,000**

**Title Holder:- Territory Goldfields N.L.**

**Distribution**

**DBIRD Darwin NT**

**Northern Gold N.L. Perth Office WA**

**Burnside Operations P/L Brocks Creek**

**Burnside Operations P/L Perth WA**

**Compiled by:**

**John Shaw**

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## **SUMMARY**

The Howley report group is located approximately 140km SSE of Darwin, NT.

The group comprises tenements that cover the southern sector of the Howley Anticline, an economically important fold structure that hosts numerous historic gold mines and prospects. These include the important Cosmopolitan Howley mine and its satellites including the Phantom, Chinese No. 1, Chinese No. 2, Chinese South and Big Howley. Most have been the subject of historic underground and more recently, open pit mining.

From the late 1980's the project was owned by Dominion Mining Limited. They conducted exploration and open pit mining work centred on the main pit at Cosmo Howley. Due to adverse economic circumstances mining was suspended in 1995 and the gold treatment plant and other infrastructure was prepared for sale and mothballed.

Territory Goldfields N.L. purchased the Howley group tenements from Dominion in late 1994 and independently conducted exploration programs along the Howley Line until April 2002.

On April 4th 2002 the "Burnside Joint Venture" was formed between Territory Goldfields NL and Buffalo Creek Mines. It merged the tenements and local infrastructure assets of the two companies, and included the Howley group tenements, those surrounding the Brocks Creek treatment facility, and the facility itself. The joint venture is managed and operated by Burnside Operations P/L.

The joint venture initially refurbished the camp and office infrastructure at Cosmo and Brocks Creek to form the support base for exploration in the region. Resource definition drilling was carried out at advanced stage properties; initially Princess Louise and North Point on the Yam Creek trend. Then Mottrams and Chinese South Extension within the Howley trend were also RC drill tested..

Decline access was installed at the Zapopan deposit near the Brocks Creek facility in 2003 and a parcel of development ore was toll treated at the Union Reefs mill with pleasing results. Extensive underground diamond drilling confirmed the presence of a significant gold resource.

Also during 2003, the joint venture conducted computer geological and resource modeling of the Cosmo Howley deposit. This model led to a two stage resource definition diamond drilling program to enable evaluation of the 'Cosmo Deeps' target beneath the existing open pit. The first stage of this work commenced in late 2003 and was completed in 2004, comprising a program total of RC and precollared diamond drilling comprising 12 holes for an advance of 6,213.56m.

Detailed stratigraphic logging and computer geological modelling followed on from the work and new mineral resource estimates were created from a block model. By year's end the new resource estimate for the Cosmo Deeps totalled 7.5 million tonnes @ 4.30g/t Au.

Pre feasibility work was in progress on the potential for the resource to be mined as an underground gold operation.

Resource remodeling and technical review was also undertaken at the Mottrams and Chinese South Extension deposits towards the end of 2004.

**Expenditure for 2004 totalled \$1,307,978.32.**

## **TABLE OF CONTENTS**

<b>SUMMARY</b>	<b>PAGE 2</b>
<b>1.0 INTRODUCTION</b>	<b>PAGE 5</b>
<b>2.0 TENEMENT DETAILS</b>	<b>PAGE 5</b>
<b>3.0 GEOLOGICAL SETTING</b>	<b>PAGE 6</b>
<b>3.1 Regional Geology</b>	<b>PAGE 6</b>
<b>3.2 Local Geology</b>	<b>PAGE 7</b>
<b>3.3 Gold Mineralisation</b>	<b>PAGE 8</b>
<b>4.0 PREVIOUS EXPLORATION</b>	<b>PAGE 9</b>
<b>5.0 EXPLORATION COMPLETED 2004</b>	<b>PAGE 12</b>
<b>5.1 Diamond Core Drilling and RC Drilling 2004</b>	<b>PAGE 13</b>
<b>5.2 Core and Sample Processing</b>	<b>PAGE 13</b>
<b>5.3 Wireframing and Resource Reviews/Modelling</b>	<b>PAGE 14</b>
<b>5.4 Technical Reviews of Open Pit Resources</b>	<b>PAGE 15</b>
<b>6.0 EXPENDITURE STATEMENT 2004</b>	<b>PAGE 15</b>
<b>7.0 PROPOSED WORK PROGRAM 2005</b>	<b>PAGE 16</b>
<b>8.0 REFERENCES</b>	<b>PAGE 15</b>

## **LIST OF FIGURES**

<b>Figure 1</b>	<b>Howley Group Tenement Location</b>	<b>A4 1:250,000</b>
<b>Figure 2</b>	<b>Howley Group Tenements</b>	<b>A4 1:50,000</b>
<b>Figure 3</b>	<b>Oblique View of Cosmo Deeps 3D Model</b>	<b>A4</b>
<b>Figure 4</b>	<b>Drill Hole Location Cosmo Deeps 2004</b>	<b>A4 1:2,500</b>

## **LIST OF TABLES**

<b>Howley Group Tenement Details</b>	<b>PAGE 5</b>
<b>Drilling Details 2004</b>	<b>PAGE 13</b>

## **LIST OF APPENDICES**

<b>Appendix One</b>	<b>Lithocodes and Stratcodes used in Logging</b>
<b>Appendix Two</b>	<b>Resource Report Cosmo Deeps.</b>
<b>Appendix Three</b>	<b>Digital Copy of this report and figures pdf.</b>

## 1.0 INTRODUCTION

This report covers exploration work on the Howley Group tenements carried out during the report year ending 31<sup>st</sup> December 2004.

This work principally comprised resource definition diamond core drilling that targeted the 'Cosmo Deeps' lodes beneath the Cosmo Howley pit to a vertical depth up to 500m. The work is a continuation of resource modelling and drilling program initiated in late 2003.

Resource reviews were also conducted on the Mottrams and Chinese South Extension deposits to assess suitability to open pit mining.

As a result of the drilling and modelling to date, the Cosmo Deeps mineral resource has been estimated to contain over 1 million ounces of gold. It is presently being subjected to pre feasibility work as a potential underground gold operation.

The deposit constitutes Phase 2 of a planned mining schedule using the recently purchased Union Reefs treatment facility. The latter is well located to handle ores from Pine Creek as well as the Burnside Region.

Proposed work for the following year is also discussed together with expenditure details.

## 2.0 TENEMENT DETAILS

Territory Goldfields N.L., which is a subsidiary of Northern Gold N.L., purchased the Howley (Burnside) tenements in late 1994 from Dominion Mining Limited. Following the finalisation of the Burnside Joint Venture, the management of the tenements passed to Burnside Operations P/L on April 4th 2002.

The tenements that comprise the Howley (formerly Burnside) report group are listed below in Table 1 and total 1,507.25ha. MLNA1149, a contiguous application covering Cosmo Village was withdrawn during the year.

**Table 1 Howley Reporting Group**

Tenement	Grant Date	Expiry Date	Renewal Application	Area (ha)
MLN 809	01/11/74	31/12/11		8.09
MLN 884	13/03/80	31/12/10		8
MLN 885	13/03/80	31/12/10		8
MLN 886	13/03/80	31/12/10		8
MLN 887	13/03/80	31/12/10		8
MLN 888	13/03/80	31/12/10		8
MLN 889	13/03/80	31/12/10		8
MLN 890	13/03/80	31/12/10		8

MLN 891	13/03/80	31/12/10		8
MLN 892	13/03/80	31/12/10		8
MLN 993	04/11/86	03/11/11		567
MLN 1000	02/03/89	01/03/14		242.3
MLN 1027	02/11/88	03/11/11		47.27
MLN 1053	27/06/89	26/06/09		365.2
MLN 1062	02/11/88	01/11/13		55.43
MCN 1014	25/06/86	31/12/08		15.5
MCN 1015	25/06/86	31/12/08		15.5
MCN 1231	20/11/86	19/11/06		12
MCN 1232	20/11/86	19/11/06		11.61
MCN 3422	09/10/89	31/12/08		3.68
MCN 4299	05/08/92	05/08/07		20.2
MCN 4860	25/11/94	31/12/04	Renewal Lodged	34.62
MCN 4861	25/11/94	31/12/04	Renewal Lodged	36.85

The tenements are located on the Burnside (14/2-11) and Fenton (14/5-I) 1:50,000 map sheets.

The tenements lie between latitudes 13°29' south and 13°33' south and longitudes 131°20' east and 131°23'30" east (Figures 1 and 2).

The report area is situated within Pastoral Lease No. 903, Douglas, held by Tovehead Pty. Ltd.

Access to the ground is via the old Stuart Highway (Dorat Road), which passes to the south of the tenements, thence along existing access and haul roads leading north from the Cosmo Howley mine area.

## **3.0 GEOLOGICAL SETTING**

### **3.1 Regional Geology**

The Howley Group tenements are situated within the Pine Creek Geosyncline, a tightly folded sequence of Lower Proterozoic rocks, 10km to 14km in thickness, laid down on a rifted granitic Archaean basement during the interval ~2.2-1.87Ga. The sequence is dominated by pelitic and psammitic (continental shelf shallow marine) sediments with locally significant inter-layered cherty tuff units. Pre-orogenic mafic sills of the Zamu Dolerite event (~1.87Ga) intruded the lower formations of the South Alligator Group.

During the Top End Orogeny (Nimbuwah Event ~1.87-1.85Ga) the sequence was tightly folded, faulted and pervasively altered with metamorphic grade averaging greenschist facies with phyllite in sheared zones

The Cullen intrusive event introduced a suite of fractionated calc-alkaline granitic batholiths into the sequence in the period ~1.84-1.80Ga. These high temperature I-type intrusives induced strong contact metamorphic aureoles ranging up to (garnet) amphibolite facies, and created regionally extensive biotite and andalusite hornfels facies.

Less deformed Middle and Late Proterozoic clastic rocks and volcanics have an unconformable relationship to the older sequences. Flat lying Palaeozoic and Mesozoic strata along with Cainozoic sediments and proto-laterite cementation overlie parts of the Pine Creek Geosyncline lithologies. Recent scree deposits sometimes with lateritic cement occupy the lower hill slopes while fluvial sands, gravels and black soil deposits mask the river/creek flats areas.

There is a tendency for gold mineralisation to be focused in anticlinal settings within strata of the South Alligator Group and lower parts of the Finnis River Group. This sequence evolved from initial low energy shallow basinal sedimentation to higher energy deeper water flysch facies. Dated at ~1740Ma (Sener 2004) the gold events post dated the Pine Creek Orogeny and Cullen intrusive events and has favoured suitable litho-structural sites in the biotite-hornfels contact metamorphic facies.

### **3.2 Local Geology**

The tenements straddle the NW striking and plunging axis of the Howley anticline that is comprised of members of the South Alligator Group and semi concordant pre orogenic sills of Zamu Dolerite.

The Howley Anticline is a macroscopic, west convex arcuate, asymmetric fold structure that has been mapped over a distance of 30km from the Cosmo Howley gold mine in the south to Mount Paqualin in the north. Within the Howley area the fold has a moderate NW plunge (50 degrees, locally up to 75 degrees). This plunge reverses to southerly in the Bridge Creek area. Parallel fold axes lie east and west of the Howley structure, and there is evidence of strike-extensive SW dipping thrust faulting affecting the tenement area. At the Cosmo mine the west limb of the fold dips moderately west while the east limb dips steep east at surface and passes through vertical to steep overturned at depth.

The principal mineralisation at Cosmo Howley is hosted by Koolpin Formation which is divided into Lower, Middle and Upper Members. The Lower Member is up to 250m thick and consists of carbonaceous and micaceous mudstone and siltstone. The prospective Middle Member consists mainly of interbedded, carbonaceous mudstone, mudstone and iron formation (10-15% Fe including iron sulphide), and attains a thickness of up to 100m. The Upper Member consists of carbonaceous mudstone and varies in thickness from 50m-150m.

Gold is found at various horizons within the Middle Koolpin but significant economic mineralisation has so far been confined to the uppermost ironstone and mudstone units known locally as I5, M4 and I4. To the south of Cosmo Howley, the fold has a core of Wildman Siltstone, the upper unit of the Mt Partridge Group that has been domed and intruded by the Fenton Granite.

Biotite alteration, andalusite spotting, tourmalinisation and garnet are associated with the thermal aureole of the local granites, a few of which are believed to be non outcropping, their presence suggested only by their thermal or geophysical signatures. The late stage granites have had the effect of warping the fold axes and refracting the later phases of faulting.

### **3.3 Gold Mineralisation**

The Cosmopolitan Howley mine has produced gold since 1879, and was the largest producer in the Katherine-Darwin region during the period 1893-1904. Historic recorded production was 33,780oz from about 50,800t. (Crohn 1968)

Gold mineralisation is preferentially hosted by members of the South Alligator Group that comprise the Koolpin Formation, Gerowie Tuff and the Mount Bonnie Formation. Subordinate mineralisation is hosted by the margins of Zamu Dolerite sills.

Locally as well as regionally, the bulk of the mineralisation is focused on the Middle Koolpin, in particular in the vicinity of magnetic iron formation facies sediments and dark pyritic mudstones with chert nodules. The folding and faulting evident at the Cosmopolitan Howley pit is locally complex and convoluted, particularly near the axial zone of the Howley Anticline and fold repetitions of the stratigraphy occur on both limbs.

At the Cosmopolitan Howley Mine, both limbs of the Howley Anticline, particularly the higher grade sub vertical northeast limb, and the axis of the fold have been mined by shallow underground methods and recently by open pit. Mineralised shoots plunge north westerly within the favoured litho-structural setting, sub parallel to the local plunge of the Howley Anticline. There is a high degree of stratabound control on gold distribution and recent detailed core logging has allowed a stratigraphic subdivision of the lodes into 100, 200, 220 and 230 components. Further breakdown into hangingwall and footwall positions within the lodes have been recognised. (The upper most productive horizons within the Middle Koolpin had been designated I4 and I5 Iron Formations and the M4 mudstone by previous workers).

**The I5 Unit** comprises an upper and lower member separated by a pelletal mudstone. The lower member (6-12m) has at its base a siliceous unit usually recrystallised into oval shaped chert nodules, overlain by a silicate facies banded iron formation. The latter is a greenschist metamorphic assemblage of chlorite-actinolite with lesser amounts of mica, quartz, garnet, graphite and fine grained pyrite. The silicate facies



BIF is overlain by interbedded and intermixed mudstone and silicate BIF with actinolite content decreasing with an increase in micaceous minerals.

The “pellet marker” is a one metre thick carbonaceous mudstone and is characterised by randomly oriented ellipsoidal pellets about 5mm long. The upper I5 member varies in thickness from 8-12m and comprises a silicate facies BIF which is overlain by an intermixed iron formation-mudstone unit which in turn is overlain by silicate facies BIF with a siliceous top.

The **M4 Unit** is 20m thick and is predominantly a mudstone assemblage with several intercalated ‘iron formation’ beds up to 2m thick. The mudstone varies from micaceous to chloritic to carbonaceous. The interbedded iron formations range in composition from almost pure chert to silicate facies BIF dominated by actinolite.

The **I4 Unit** immediately underlies the M4 mudstone and is usually 4-6m thick. It consists of silicate facies BIF comprising laminated chlorite-actinolite with minor chert nodules.

The gold is associated with quartz-sulphide veining in bedding-parallel or cross fracture and Reidal sites, complex dilational stockwork style settings and as saddle reef style bodies. Pyrite and or pyrrhotite with arsenopyrite are the most common introduced sulphides and minor chalcopyrite has been reported. Fine grained pyrite is dispersed through the whole sequence and generally aligned with the cleavage. The BIFs contain about 5-15% pyrite, mudstone to 10% and carbonaceous mudstone 5-30%. Thin “beds” of fine prismatic arsenopyrite occur within the BIFs. Silicification and chlorite alteration are in close association with the gold event which is considered to be epigenetic and superimposed on pre existing, reactivated structures.

Lesser, but significant amounts of gold are associated with structures hosted by the Middle Member of the Gerowie Tuff (Chinese Howley, Big Howley). Lesser occurrences are hosted by Mt Bonnie Formation silt-greywacke settings. Structural features are considered to be the primary controls, with interactive lithology a close second.

#### **4.0 PREVIOUS EXPLORATION**

Gold was discovered at Cosmo Howley in 1873, during the construction of the Adelaide to Darwin overland telegraph. The mine was worked under tribute by Chinese from 1892 to 1903 with an approximate production of 34,000oz from ore averaging 22.0g/t Au.

In **1936-37**, Anglo Queensland Mines undertook a program of underground sampling. During the **1950’s** the BMR drilled several deep core holes to evaluate the underground potential of the mine.

The first major assessment of the property was undertaken by Homestake-Damco (BHP) from **1975-79**. Some 38 diamond holes totaling 6,000m were completed.

In **1982**, the Golden Dyke Joint Venture (GDJV) partners, Geopeko-Anaconda, optioned the property from Homestake-Damco and drilled a further 21 diamond holes totaling 6,500m. They tested the main deposit to depths between 300m and 600m.

The GDJV partners sold on their option on the property to Regent-Southern Goldfields joint venture, in **1984**.

Dominion Mining Ltd. acquired 50% interest in **1985** by exercising the option to purchase from Homestake-Damco. The Regent-Southern-Dominion joint venture drilled a further 60 diamond holes for 6,000m.

To 1988 the open pit and underground potential of the deposit had been tested by a total of 164 diamond holes for 17,500m.

In late **1987** Dominion Mining Ltd. started heap leach production from oxide open pits at Cosmo Howley. CIL treatment of open pit ores from Cosmo, Phantom, Chinese South, Chinese Howley, and Big Howley commenced in November 1988.

Between **1986-1990** alluvial gold mining was conducted in the Chinese Howley East area by Metana Mining under agreement with the tenement holders, Northern Gold N.L.

Territory Goldfields N.L., which is managed by Northern Gold N.L., acquired the operations in late **1994**. Mining and milling was suspended in **April 1995** after production of 6.94Mt @ 2.14g/t Au.

During **1996** Northern Gold N.L. re-established grids and conducted RAB drilling and RC drilling.

RAB drilling (397 holes for 2,690m) was undertaken in order to identify areas of bedrock mineralisation away from the existing pits which showed anomalous soil results.

The grid conversion for Cosmo grid was reported as follows:-

LOCAL GRID	AMG
7289.16E	759270E
705.71N	8503040N with a bearing of 44° 05' 34" from true north.

A total of 284 RC drill holes were completed for 22,972m. The drilling was undertaken in order to determine the extent and style of bedrock mineralisation around the existing open cuts. Bulk density determinations were completed on 146 RC samples. These samples were a representative sample of the drilling completed (Glassock, 1997a).

Several resource estimates were also completed using RC and diamond core data.

During **1997** Northern Gold N.L. completed an RC drilling program over MLN 884, MLN 885, MLN 993, MLN 1000 and MCN 3422. A total of 33 holes were drilled for 2,585m.

A block model was constructed of the Cosmo Howley mineralised zone using a three dimensional geological solid to constrain the block modelling process. A top cut of 15 g/t Au was used.

The block model gave a resource outside the existing pit at a 2.5 g/t cutoff and to 535 RL as follows:

<b>Cosmo Howley</b>	<b>Tonnes</b>	<b>g/t Au</b>
<b>Measured</b>	1,515,850	5.03
<b>Indicated</b>	656,910	5.15
<b>Inferred</b>	449,190	5.00
<b>Total</b>	2,621,950	5.05

During **1998** exploration Northern Gold N.L. completed infill soil sampling over Chinese Howley West, drainage channel rock chip sampling at Fleur de Lys and RC drilling programs and rock chip sampling over Chinese Howley.

Soil samples [84] were collected at 50m intervals along eleven, 200m spaced lines over Chinese Howley West. One additional line was completed, approximately 600 metres north-west of the soil lines. Analysis was for Au, using FALL method, and Ag, As, Cu, Pb and Zn, using G400M method.[Assaycorp]

Rock chip samples [27] were collected from outcrop within the Chinese Howley area.

Extensive channel/costean sampling was carried out along two drainage channels south of the Fleur De Lys Prospect, to follow up encouraging rock chip sampling results. A total of 123 samples were collected over a length of 327m from the two drainage trenches. Composite samples were collected over 3 metre intervals from Trench 1, and composite 3 metre samples, with additional 1 metre composite samples from 162 metres to 183 metres, were collected from Trench 2.

Northern Gold N.L. also completed a program of RC drilling at Chinese Howley to test mineralisation in the continuing southerly extension of Chinese Howley, both in the hinge zone and in the strike extension of the No.3 pit, and to infill resource drilling at the north end of Chinese Howley. The RC drilling program consisted of 37 holes completed for a total of 2,551m.

During **2000** Northern Gold N.L. completed wire framing and resource modelling of Chinese Howley. The entire Burnside area was re-evaluated and re-interpreted, following the latter phase of RC drilling. Three dimensional models of the geology and mineralogy were wire framed using Gemcom software. This data was then passed to Scofield and Hellman for resource block modelling, using Multiple Indicator Kriging and 0.7g/t cutoff.

<b>Chinese Howley Deposit</b>	<b>Tonnes</b>	<b>g/t Au</b>
<b>Measured</b>	3,200,000	1.55
<b>Indicated</b>	2,800,000	1.42
<b>Inferred</b>	3,250,000	1.45
<b>Total</b>	9,250,000	1.48

During **2001** work was limited to care and maintenance, rehabilitation and reviews.

During **2002** reverse circulation drilling programs were completed at Chinese South Extension and Mottrams by the Burnside Joint Venture. This work totalled 110 holes for an advance of 6,656m. Computer wireframe modelling and resource reports were completed on both deposits. Work commenced on the Cosmo Deeps geological and resource models. Exploration expenditure in 2002 totalled **\$369,590**. In addition, \$536,307 was expended on mining studies and dewatering/ neutralising plant costs at Cosmo Pit.

In **2003** work on the tenement group comprised three dimensional block modelling and resource reporting (Cosmo Howley, Mottrams, Chinese South Extension), reverse circulation drilling (2 precollars at Cosmo for 266m) and one RC hole at Fortress for 78m (FOR001).

The indicated mineral resource at Cosmo Howley was calculated at 1.02Mt @ 4.76g/t Au to 885mRL. At Chinese South Extension, the indicated and inferred mineral resource totalled 506,185t @ 2.16g/t Au. The Mottrams deposit totalled an indicated and inferred mineral resource of 824,745t @ 1.60g/t Au.

Following the geologically constrained wire framing and modelling, exploratory and resource definition diamond core drilling was initiated late in the year at Cosmo Howley. A total of 2 holes for 598.3m of coring was completed by year's end. (CNT002, 136m-229.3m, CNT005, 130m-369m). Expenditure for 2003 was **\$139,596**.

## **5.0 EXPLORATION COMPLETED 2004**

During calendar 2004 the joint venture undertook precollared diamond core drilling plus wireframe and resource block modelling at Cosmo Howley, and resource reviews and modelling at Mottrams and Chinese South Extension.

The core farm infrastructure at Cosmo was upgraded to allow better handling and access. In parallel with this the coding system for logging was standardised to allow discrimination between appropriate sedimentary, vein and structural features in the modelling and interpretations. Geotechnical logging and downhole surveying was also carried out. Database verification and upgrading was attended to on a continual basis.

## 5.1 Diamond Core Drilling and RC Drilling

The first stage of the Cosmopolitan Howley “deeps” resource definition diamond drilling program was initiated in late 2003. This was completed mid year and stage two was completed in the second half of 2004. The program had the objective of advancing the state of understanding of the distribution, grade and structure of the deposit beneath the Cosmo open pit, and particularly of the higher grade, steep to overturned, east limb of the anticlinal structure.

The program was successful in its objectives by increasing the mineral resource in the indicated and inferred categories to a considerably greater depth. Understanding of the geometry and stratabound nature of the deposit was advanced through meticulous core logging and assaying protocols. Wire framing of the deposit using valid stratigraphic constraints allowed subdivision of the lodes into domains that display remarkable lateral and depth continuity.

The diamond drilling program that commenced in December 2003 was completed in 2004 and comprised 11 holes and one wedge for a total of 5,056.86m of oriented coring using HQ and HQ2 gear. (CNT001-CNT012)

One RC hole was drilled to target depth for 216m (CNT004). RC drilling and precollars totalled 1,156.7m and the deposit was tested up to 650m below surface with all holes collared on the north side of the Cosmo pit and drilled southerly. Surtron Technologies P/L were commissioned to down-hole survey all holes.

Details of the program are set out in the following table:

HOLE ID	Precollar RC (m)	DIAMOND Core (m)	Total Depth (m)	Local EAST	Local NORTH	RL (m)	AZI (magnetic)	DIP	LEASE
CNT001	102	393	495	5260	1670	1156	192	55	MLN993
CNT002	136.7	173.6	310.3	5227.59	1489.87	1134.43	208	59	MLN993
CNT003	96.2	359.9	456.1	5211.58	1693.3	1156.22	198	56	MLN993
CNT004	216#	-	216#	5234	1393	1135	200	60	MLN993
CNT005	129.7	441.58	571.28	5240.23	1719.78	1156.66	187	55	MLN993
CNT006	120.2	309	429.2	5050.56	1869.98	1164.86	197	65	MLN993
CNT007	119.9	505.55	625.45	5143.94	1792.04	1160.17	185	63	MLN993
CNT007W	-	29.13	(427.17*)	-	-	-	-	-	MLN993
CNT008	90.4	533.8	624.2	5050.08	1900.04	1164.61	219	66	MLN993
CNT009	31.4	632.6	664	5082.69	1921.68	1163.54	196	71	MLN993
CNT010	30.8	651.3	682.1	5152	1840	1159.93	196	62	MLN993
CNT011	53.6	537.9	591.5	5200	1750	1157	198	63	MLN993
CNT012	29.8	489.5	519.3	5289.89	1560.03	1157.02	197	61	MLN993
TOTAL	1,156.7	5,056.86	6,213.56						

\* Total depth comprises a 29.1m wedged interval off CNT007 from 398.04m.

# CNT004 an RC hole only.

## 5.2 Core and Sample Processing

The oriented drill core was systematically photographed, geotechnically logged, geologically logged and diamond sawed to appropriate selected domain limits for assay. Details of logs may be seen in digital format (XL) on the CD attached to this report.

Samples of half core were sent to the North Australian Laboratories for standard crush, pulverise, and fire assay on a 50gm catch weight. Gold was determined to an accuracy of 0.01ppm. Au1 was the accepted value used in calculations and numerous Au2 checks were routinely carried out to support Au1. QA/QC controls employed were similar to those used at the Zapopan mine resource drilling. Five percent of the assays conducted by NAL on the drilling were selected for re assay at an independent laboratory.

Mark up, logging and sampling of the core was conducted by geologists and sampling was either done by geologist or by field assistants under direction. Geological divisions were used to determine sample length with no samples under 20cm or over 1.2m being submitted. Geological units outside the primary ore zones were sampled by the metre and within the ore zone 0.5m core samples were taken.

### **5.3 Wireframing and Resource Reviews/Modelling**

A stratigraphically constrained resource model was completed in 2003 (Gillman, Harris and Dyer) using all trustworthy historic drilling information. This model redefined and illustrated the promising scope and continuity of the Howley Deeps mineralisation and enabled a resource definition diamond core drilling program to be set out in detail and budgeted. The gold resource outlined by the existing drilling was estimated using both geostatistical and geological constraints.

As the new 2003-2004 diamond core drilling data became available, the model was incrementally updated and sophisticated logging/sampling protocols were established in recognition of the special and individual characteristics presented by the Cosmo mineralisation and related structures.

As reinterpretations were implemented to accommodate the new geological information, it was decided that the detailed stratigraphic subdivisions and structural detail available warranted a reworking of the model using the upgraded log data, stratigraphic domains and fault/fracture classification. The envelopes selected used a 2.0g/t Au lower cut off. (Harris, Dyer) This re working and interpretation was undertaken late in 2004. The use of new domains in the modelling has highlighted the need for re-logging and selected splitting and assaying of earlier holes

A geotechnical component to the logging was undertaken in recognition of the likelihood of underground mining being an outcome of the ongoing success of the program. Core photography was systematised as part of the core processing.

The November 2004 resource estimate for the Cosmo Deeps mineralisation is listed below: The full resource report that sets out the geostatistics and other constraints, is in Appendix 2 of this report.

	Resource Classification						Total		
	Indicated			Inferred			Tonnes	Grade (g/t)	Ounces
	Tonnes	Grade (g/t)	Ounces	Tonnes	Grade (g/t)	Ounces			
Eastern Lode - Primary	1,960,500	6.12	385,800	1,028,200	3.35	110,700	2,988,700	5.17	496,500
Eastern Lode - Secondary	1,338,300	3.60	154,900	2,323,300	3.48	259,900	3,661,600	3.52	414,800
Western Lodes				857,000	4.63	127,600	857,000	4.63	127,600
<b>Total</b>	<b>3,298,800</b>	<b>5.10</b>	<b>540,700</b>	<b>4,208,500</b>	<b>3.68</b>	<b>498,200</b>	<b>7,507,300</b>	<b>4.30</b>	<b>1,038,900</b>

#### 5.4 Technical Review of Open Pit Resources

A consultant geologist undertook a technical review of the Mottrams and Chinese South Extension gold deposits located to the north west of Cosmo Howley (MLN889, MCN1014, MCN1015).

The consultant observed for **Mottrams** that it was in the Chinese Howley area, along strike from the Chinese No2 ore zone, and south of the Big Howley pit. He thought that more drilling would be required to close off the design pit along strike and down dip and that there was good potential to increase open pit reserves if it remains open along strike. The resource needs re optimising with Union Reef mill and haulage factors.

The **Chinese South Extension** deposit is in the Chinese Howley area. The south end of the design pit is 100m north of the mined out and back filled Chinese South pit. It was thought that definition drilling was required to confirm and close off the design pit along strike and down dip. Infill drilling would improve confidence on blocks open at depth but within the pit shell. The deposit needs re optimising with Union Reef mill and haulage factors. It has good potential to increase ore reserves if it remains open along strike. Also the east fold limb could host more tonnes. The west limb dips moderately north west while the axial zone contains blocks with steeper orientations and/or saddle reef types.

**Geological modelling** of both Mottrams and Chinese South Extension was in progress at the end of the year. They are being modelled together as they are along strike from each other, however Mottrams has steep NW dipping ore controls while Chinese South Extension is more typically more moderately NW dipping and interacting with anticlinal axial zone controls.

#### 6.0 EXPENDITURE STATEMENT 2004 (EXPLORATION)

Salaries and wages, on costs	\$250,603
Consultant support geology	\$ 45,931
Consultant support geotechnical	\$ 12,139
Diamond drilling	\$863,729
Assays	\$ 50,679

Downhole surveying	\$ 55,730
Field Consumables and hire	\$ 29,168
	-----
<b>Total Exploration</b>	<b>\$1,307,979</b>

## **7.0 PROPOSED WORK PROGRAM 2005**

The acquisition of the Union Reefs mill and tenements in August 2004 has imposed a different set of economic parameters on the gold deposits of the Burnside Joint Venture. The modelling, mining studies and design as well as additional diamond drilling are planned to continue through 2005.

If a decision is made to re-start the mill at Union Reefs there will be an escalation of activity in preparing all viable deposits in the region for production. The scheduling and decision to mine at Cosmo Howley, which currently is nominally earmarked for Phase Two mining, depends on the outcome of the latest economic studies that are still in progress. The expected minimum program that is planned for 2005 is listed as follows:

Geological and drilling support	\$ 90,000
Diamond core drilling and precollars, Cosmo deeps	\$200,000
Downhole surveys	\$ 15,000
	-----
	\$305,000



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**BURNSIDE OPERATIONS P/L LITHOCODES**

Colour	Description	Weathering	Description
bb	black brown	o	oxidised
bk	Black	t	transitional
bl	Blue	f	fresh
br	Brown		
cb	cream brown		
cm	Cream		
cr	Crimson		
cy	cream yellow		
db	dark brown		
dg	dark green		
dk	dark khaki		
do	dark orange		
dp	dark purple		
dr	dark red		
db	darl blue		
dx	dark grey		
dy	dark yellow		
gb	green brown		
gg	green grey		
gk	green khaki		
gn	Green		
gw	green yellow		
gy	Grey		
kb	khaki brown		
kc	khaki cream		
kg	khaki green		
kh	Khaki		
kr	khaki red		
ky	khaki yellow		
lb	light brown		
lc	light cream		
lg	light green		
lk	light khaki		
lb	light blue		
lo	light orange		
lp	light pink		
lr	light red		
lu	light purple		
ly	light yellow		
nb	pink brown		
nc	pink cream		
na	pink grey		
ng	pink green		
nk	pink khaki		
ob	orange brown		
oc	orange cream		
oe	orange grey		
og	orange green		
ok	orange khaki		
or	Orange		
pb	purple brown		
pc	purple cream		
pe	purple grey		
pg	purple green		
pi	Pink		
pk	purple khaki		
pu	Purple		
rb	red brown		
rc	red cream		
rd	Red		
re	red grey		
rk	red khaki		
ub	blue brown		
uc	blue cream		

  

Lithocode	Description
Alu	Alluvium
BIF	Banded Iron Fm
BX	Breccia
Pshc	Carbonaceous shale
Pca	Carbonate
Pc	Chert
Cla	Clay
Pdz	Dolerite
Fault	Fault
Fill	Fill
Pgr	Granite
Pis	Ironstone
Lat	Laterite
Pgt	Greywacke
Pm	Mudstone
Pph	Phyllite
Qtz	Quartz
Pst	Sandstone
Sap	Saprolite
Pcl	Schist
Psh	Shale
Psl	Siltstone
Shear	Shear
Sol	Soil
Stope	Stope
Pvt	Tuff

  

Alteration	Description
ab	albite
am	amphibole
at	actinolite
au	gold
bi	biotite
ct	carbonate
cy	clay
ep	epidote
fd	feldspar
fe	ferruginous
fu	fuchsite
gb	gibbsite
gh	goethite
gn	garnet
gy	gypsum
hm	haematite
js	jaspilite
ka	kaolinite
kf	K-feldspar
lm	limonite
mg	magnesite
mh	maghemite
mi	mica
mm	montmorillonite
mn	manganese
mt	magnetite
mu	muscovite
my	molybdenite
no	nontronite
ov	olivine

Alteration	Description
qz	quartz
se	sericite
si	silica
sm	smectite
sp	serpentine
su	sulphide
ta	tantalite
tc	talc
tm	tremolite
to	tourmaline

Vein Type	Description
Va	Talc rich zone in ultramafic
Vb	Quartz carbonate boudinaged
Vc	carbonate +/- quartz late stage
Vcb	carbonate vein
Vch	chlorite vein
Ve	dark brown non magnetic veins in chert
Vt	quartz chlorite carbonate vein in chert
Vn	chlorite-pyrite thin wispy black veins
Vk	carbonate +/-chlorite in ultramafic
Vm	quartz-carbonate chlorite/sulphides
Vp	sulphides+/-chlorite, quartz, chert
Vqb	quartz-carbonate
Vqc	quartz-chlorite
Vqm	quartz-molybdenite
Vqp	quartz-pyrite
Vqt	quartz-tourmaline
Vqz	quartz vein
Ve	late stage grey quartz
Vt	magnetite-chlorite in chert
Vy	quartz-carbonate-molybdenite-pyrite
Vz	quartz and tourmaline
Xc	breccia, carbonate matrix
Xm	breccia, chlorite +/- magnetite matrix
Xo	breccia, with 0 alteration matrix
Xq	breccia, with qtz matrix
Xt	breccia, with tourmaline matrix

Code	Sulphides
as	arsenopyrite
bn	bornite
cc	chalcocite
cp	chalcopyrite
ga	galena
sp	sphalerite
mo	molybdenite
po	pyrrhotite
py	pyrite

Texture	Description
bx	brecciated
gf	fine grained
ig	igneous
ma	massive
mf	moderately foliated
ph	porphyritic
sf	strong foliation
sp	spotty
vs	vesicular
wf	weakly foliated

ue	blue grey	pg	plagioclase
ug	blue green	ph	phlogopite
bk	blue khaki	po	pyrrhotite
wo	White	px	pyroxene
wb	white brown	py	pyrite
wc	white cream		
we	white grey		
wg	white green		
wh	White		
wk	white khaki		
yb	yellow brown		
yc	yellow cream		
ye	Yellow		
yg	yellow green		
yk	yellow khaki		
yo	yellow orange		

**APPENDIX ONE**  
**Lithocodes and Stratcodes**  
**Used in Core and RC logging**

**APPENDIX TWO**  
**RESOURCE REPORT COSMO HOWLEY DEPOSIT**  
**P.HARRIS, F. DYER**  
**OCTOBER 2004**

Sequence	Formation	Description	Thickness		Name	Code
Way Outer	Gerowie Tuff	Chert, mudstone, Siltstone	200-400m		Chert	GC
					Mudstone	GM
					Siltstone	GS
Outer	Upper Koolpin	Silts & graphitic mudstones with minor greywacke "ironstone"	~50m	15m	Outer Mudstone	OM
				15m	Outer Graphitic Mudstone	OCM
				5-10m	Outer Phyllite	OP
				16m	Outer Dolerite	OD
Middle	Upper Koolpin	Mudstone grading to graphitic mudstone with a phyllitic basal unit	60m	20m	Middle Mudstone	MM
				20m	Middle Graphitic Mudstone	MCM
				5-10m	Middle Phyllite	MP
				10m	Middle Dolerite	MD
Hanging Wall		Mainly dark graphitic mudstone with abundant py & po. Sits immediately above the I5 unit, strong contact	50m	~25m	Hanging Wall Mudstone	HM
				~25m	Hanging Wall Graphitic Mudstone	HGM
I5		Hosts the 100 & 200 lodes & boudinage veining	20 to 30m	~5m	Upper Greywacke	IUG
		Middle of 100 lode		1-2m	Marker Graphitic Mudstone	IMGM
		Hosts lower 100 lode		~5m	Lower Greywacke	ILG
		Graphitic mudstone & sandstone		~16m	Dividing Graphitic Mudstone	IDGM
		Siliceous pellets +/- boudinage veining. Pale green, hosts 200 lode		~10m	Pellet Marker	IPM
Lower		Light grey to green with chlorite spots. May host mineralization within interbedded greywackes	40m	20m	Lower Mudstone	LM
				15m	Lower Phyllite	LP
				5m	Lower Greywacke	LG
Central Dolerite		Quartz carbonate vein hanging wall of dolerite	~50m	2-4m	Quartz carbonate vein	CQC
				?	Inner Dolerite	CD
Inner Mudstone	Middle Koolpin	Hosts Phantom lode	?			PM





**APPENDIX THREE**  
**DIGITAL COPY OF THIS REPORT**  
**With RC and Diamond Drill Logs 2004**