

# ASX ANNOUNCEMENT

## Koka Gold Project Robust and Viable: Feasibility Study

Commencement of Mine Development Targeted for 2011 at East African Project



Chalice Gold Mines Limited ABN 47 116 648 956

13 July 2010

### Highlights

- Average life-of-mine total cash operating costs of US\$338 per oz of gold
- After-tax NPV<sub>5%</sub> of US\$196 million, life-of-mine EBITDA of US\$589 million and an after-tax IRR of 35% at current gold price of ~US\$1,200/oz
- After-tax NPV<sub>5%</sub> of US\$99 million, life-of-mine EBITDA of US\$381 million and an after-tax IRR of 22% at base case gold price of US\$900/oz
- Average annual gold production of approximately 104,000oz per year with gold production totalling 731,000oz
- Forecast mine life of seven years at a mill throughput of 600,000 tonnes per annum, rising to 700,000 tonnes per annum from year 5
- Open pit Ore Reserves of 4.63Mt grading 5.1g/t for 760,000oz contained gold with a waste to ore ratio of ~10:1
- Estimated start-up capital cost of US\$122M



### INVESTMENT HIGHLIGHTS

High grade gold resource  
(840,000 oz @ 5.3 g/t)

Feasibility Study completed:

- Low cash costs of \$338/oz
- 7 year mine life at >100,000 oz average production per year

Drilling at near mine Konate Prospect in progress

Large unexplored ground position in the Arabian Nubian Shield

[www.chalicegold.com](http://www.chalicegold.com)

Chalice Gold Mines Limited (ASX: CHN) ("Chalice" or "the Company") is pleased to report positive results from the independent Feasibility Study for a proposed open pit mine at its 100%-owned\* **Koka Gold Deposit**, part of its Zara Project in northern Eritrea, East Africa.

The key financial outcomes of the Feasibility Study, which was undertaken by Lycopodium Minerals Limited ("Lycopodium") with inputs from prominent industry consultants AMC Consultants Pty Ltd ("AMC") and Knight Piésold Pty Ltd ("KP"), are shown below. All figures are in US dollars except where noted.

### 1. Feasibility Study – Key Financial Outcomes

100% Project Financial Outcomes* (Unleveraged)	Gold Price		
	\$900	\$1,200	\$1,500
Life-of-mine EBITDA	\$381M	\$589M	\$797M
Average annual EBITDA	\$54M	\$84M	\$114M
NPV <sub>5%</sub> after-tax cash flows	\$99M	\$196M	\$293M
IRR after-tax	22%	35%	45%
Payback period (years)	2.8	2.1	1.8

\* The Eritrean government has a statutory 10% non-contributing interest with their share of pre-production and capital expenditure being repaid from production cash flows

Dr Doug Jones, Managing Director and CEO of Chalice said:

*"The completion of the Koka Feasibility Study is a major accomplishment for the Company. The positive results have confirmed the Koka deposit as a potentially robust gold producer with an average annual gold production of 104,000 ounces over a mine life of 7 years. The significant exploration potential of our extensive 100%-owned tenement package surrounding Koka also provides an opportunity to expand our resource base and extend the mine life."*

*"Chalice is currently working on delivering the remaining key recommendations from the Feasibility Study to allow the mine permitting process and negotiation of a mining agreement with the Government of Eritrea to commence. We are optimistic that mine development may get the green light in early 2011."*

## 2. Feasibility Study Assumptions and Parameters

Base Case Assumptions		
Gold price base case	US\$/oz	900
Foreign exchange rate	AUD/US\$	0.85
Foreign exchange rate	Eritrean Nakfa/US\$	15.00
Fuel price	\$/litre	1.00
Fiscal Parameters		
Corporate tax rate	%	38
Royalty *	%	5.0
Base Case Mine Parameters		
Ore milled (Mt)	Mt	4.6
Waste mined (Mt)	Mt	48.3
Strip ratio	T:t	10.4
Average gold grade	g/t	5.10
Total contained gold	Oz	760,000
Estimated gold recovery	%	96.3
Total recovered gold	Oz	730,780
Life of Mine	Years	7
Average annual gold production	Oz	104,000
Base Case Cost Parameters		
Pre-production capital	\$M	122
Sustaining capital and mine closure	\$M	9
Average total cash costs (\$/oz)	\$/oz	338

### Eritrean Government Project Participation Rights

The Government of Eritrea has a 10% non-contributing interest in any mining operation but may acquire, on the basis of an independently determined valuation, an additional 20% contributing interest.

\* The gross royalty is negotiable to a maximum of 5%.

### 3. Operating Cost Estimates

Operating cash costs over the life of the project are projected to average \$338/oz, with the operating cost components summarised below:

	\$/t milled	\$/t mined	\$/recoverable oz
Average mining costs	20.46	1.92	129.80
Processing cost	24.78	2.33	157.20
General and administration	7.36	0.69	46.70
Refining charges	0.63	0.06	4.00
<b>Operating cash costs (LOM)</b>	<b>53.23</b>	<b>5.00</b>	<b>337.70</b>

### 4. Capital Costs Estimates

The Feasibility Study is based on capital pricing as of the second quarter of 2010. The level of accuracy of the capital costs estimates is within  $\pm 15\%$ .

The pre-production capital costs are estimated at \$122 million, including contingency and escalation, but excluding 2010 sunk costs that will be funded from existing cash resources. Sustaining capital expenditures over the operation's mine life is estimated at \$9 million, including closure costs of \$1.3 million, with the balance met by the salvage value of the plant and equipment.

The cost breakdown for pre-production capital expenditures, assuming an owner operator scenario, is shown below:

Estimate $\pm 15\%$	\$M	\$M	\$M	\$M
Description	Cost Estimate	Contingency	Escalation	Total Cost
Mining equipment	18.8	0.9	0.3	20.0
Mine pre-strip	11.3	0.0	0.4	11.7
Process plant	18.3	2.2	1.6	22.1
Reagents and plant services	4.9	0.6	0.4	5.9
Infrastructure	22.9	3.2	2.0	28.1
Construction indirect	10.5	1.4	0.3	12.2
Management costs	7.1	0.7	0.7	8.5
Owners' costs	12.1	0.4	1.0	13.5
<b>Total</b>	<b>105.9</b>	<b>9.4</b>	<b>6.7</b>	<b>122.0</b>

### 5. Next Steps

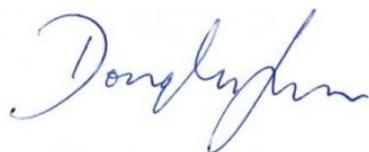
Now that the Feasibility Study is complete, the Company will apply to the Eritrean Government for a Mining Lease in respect of the Koka deposit. In parallel with this application, the Company will assess its various options in relation to financing of Koka.

The Company recognises the potential to further improve the project economics through expanding the resource base. Drilling has now commenced at the Konate prospect, located 4.5 km south of Koka, where extensive artisanal workings have been developed on Koka-style quartz stockwork mineralisation over a zone some 600 metres long and up to 30 metres wide. Konate is within easy trucking distance of Koka and

any additional ore reserves identified here would have an immediate positive impact on the economics of the project.

In addition to the drilling at Konate, the 6 kilometre long Koka-Konate corridor will be covered by a deep-penetration 3D Induced Polarization (IP) survey during the coming months, designed to map the structural and alteration architecture of this highly prospective zone.

Additional opportunities also exist in the numerous but largely unexplored artisanal workings and drainage geochemical anomalies within the Company's 615 km<sup>2</sup> tenement package surrounding Koka and these opportunities are being followed up.



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**Competent Persons' Statement**

The information in this report that relates to Exploration Results is based on information compiled by Dr Doug Jones, a full-time employee and Director of Chalice Gold Mines Limited, who is a Member of the Australasian Institute of Mining and Metallurgy and is a Chartered Professional Geologist. Dr Jones has sufficient experience in the field of activity being reported to qualify as a Competent Person as defined in the 2004 edition of the Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves, and consents to the release of information in the form and context in which it appears here.

The Mineral Resource estimate was prepared by Mr. John Tyrrell who is a Member of the Australasian Institute of Mining and Metallurgy. Mr. Tyrrell is a full time employee of AMC and has sufficient experience in gold resource estimation to act as Competent Person as defined in the 2004 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code)'. Mr. Tyrrell consents to the inclusion of this information in the form and context in which it appears.

The information in this statement of Ore Reserves is based on information compiled by Mr David Lee who is a Member of the Australasian Institute of Mining and Metallurgy and a full time employee of AMC. Mr Lee has sufficient relevant experience to be a Competent Person as defined in the JORC Code. Mr Lee consents to the inclusion of this information in the form and context in which it appears.

**Attachments:**

Appendix A – Koka Mineral Resources and Ore Reserves

Appendix B – Mining and Processing

## APPENDIX A – Koka Mineral Resources and Ore Reserves

The Mineral Resource estimate, classified and reported in accordance with the JORC Code<sup>1</sup> is listed in Table 1. Mineral Resources are reported inclusive of Ore Reserves.

Category	Tonnes (Mt)	Grade (g/t gold)	Contained Gold (oz)
Indicated Resource	5.0	5.3	840,000

Table 1: Koka Gold Deposit Mineral Resource Estimate as at 1 June 2010 reported at a 1.2 g/t gold cut-off

The microgranite outside the mineralisation domain is classified as Inferred Resource although none of this estimate reports above a 1.2 g/t Au cut-off.

The Mineral Resource estimate is based on 137 inclined diamond drill holes drilled on sections spaced at 40m over the strike length of the deposit and 20m over the central part. Drill hole spacing on sections is 20m to 40m. Drill holes completed to February 2010 were used for the estimate.

The Mineral Resource estimate was developed based on interpretation of the host microgranite and within that interpretation of overlapping gold and sulphide-bearing domains. A probability model was used to assist with the interpretation of mineralisation continuity. The probability model was created by assigning an indicator to sample intervals where gold grade was above 0.3 g/t Au and total sulphide content exceeded 1%. The indicator values were estimated into a model within the microgranite envelope. The gold and sulphide domains were combined into one mineralization domain for grade estimation.

Assays within the domains were selected and composited to 2m. A topcut of 200 g/t Au was applied to the composites within mineralisation domains.

Gold grade was estimated using ordinary kriging (OK) with parameters based on a study of variography. The block model parent cell dimensions were 10m in easting and northing directions and 5m in RL. Grades were estimated into parent cells, with all subcells receiving the same grade as its parent. The maximum number of composites allowed for each estimate was 30, with estimation of most cells within the mineralisation domain completed with 30 composites.

The Koka Gold Deposit Ore Reserve estimate, classified and reported in accordance with the JORC Code, is listed in Table 2. The open pit Ore Reserves, which are included within the mineral resources, were estimated within a detailed engineered pit design by using the indicated resources at a cut-off grade of 1.26 g/t. The optimized pit shell was generated using the Whittle Four-X implementation of the Lerchs Grossman algorithm using cost and economic parameters estimated by AMC. In the pit design, overall pit slopes vary from 45 to 48 degrees based on information collected from exploration and geotechnical diamond drillholes as well as material property data collected from laboratory tests. Gold grade was estimated using ordinary kriging with parameters based on a study of variography. The block model parent cell dimensions were 10m in easting and northing directions and 5m in RL.

A dry bulk density of 2.74 t/m<sup>3</sup> was applied to the model based on averaging of bulk density measurements from drill-core. The Probable Reserves are estimated to contain a total of 760,000 ounces of gold, after using a 95% mining recovery rate and an additional mining dilution of 15%.

<sup>1</sup> Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, The JORC Code 2004 Edition, Effective December 2004, Prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC).

Category	Tonnes (Mt)	Grade (g/t gold)	Contained Gold (oz)
Probable Reserve	4.6	5.1	760,000

**Table 2: Koka Gold Deposit Ore Reserve Estimate as at 1 June 2010**

The feasibility study database included drilling data from both pre-Chalice programs and Chalice's 2009 and 2010 drilling campaigns. It includes a total of 20,839m of diamond drilling in 137 holes. Diamond drill core was sampled on one metre intervals over intersections of the microgranite that hosts gold mineralisation. Sample preparation was carried out by a contract laboratory in Asmara, Eritrea, and assays completed by Genalysis Laboratories in Perth, Western Australia. The assay data are supported by an assay quality control program that includes certified reference materials, blanks and repeat assays.

## APPENDIX B – Mining and Processing

### Mining and Production

The pit design completed by AMC resulted in a mine plan containing 4.6 million tonnes grading 5.1 g/t gold. Total recovered gold production over a 7 year mine life is estimated to be 730,780 recovered ounces, averaging 104,000 recovered ounces per year. The life of mine waste to ore ratio is estimated at 10.4 waste to 1 ore (t:t).

The project schedule is governed by 12 months of mine establishment and pre-stripping activities followed by six months of mine production ramp-up ahead of process plant commissioning. First gold sale is expected 24 months after Project Approval.

The pit will be developed in two stages to provide sufficient ore to allow the process plant to commence operations after 18 months of pre-stripping activity. The starter pit contains 2.6 Mt of ore at a grade of 6.1 g/t Au.

Chalice will undertake its own mining operations which will be operated on a 24 hour per day, seven day per week basis.

The conventional open pit truck and excavator mining method has been adopted for Koka, with the loading fleet sized to match the schedule requirements:

- Caterpillar 777 (or equivalent), 90 tonne class haul trucks.
- 110 tonne class, diesel hydraulic excavators with 6.7 cubic metre buckets.

### Metallurgy, Processing and Infrastructure

The feasibility study assumes the use of a conventional gravity, cyanidation and carbon-in-leach (CIL) processing facility initially operating at 600,000 tpa but designed for expansion to 700,000 tpa. The plant design criteria were developed by Lycopodium from testwork conducted mainly at Australian Metallurgical and Mineral Testing Consultants (AMMTEC) Pty Ltd, Perth with additional inputs from JKTech Pty Ltd, Outotec and Knight Piésold.

The metallurgy of the Koka deposit is simple as the ore is free milling and gold is easily liberated, allowing excellent recovery from a relatively coarse grind. The ore is moderately competent and abrasive with above average comminution energy requirements. The gravity circuit is expected to recover approximately 43.9% of the gold. The remaining gold in ore is sent to cyanidation followed by carbon in leach (CIL) gold recovery. After carbon stripping, the gold will be processed through electro-winning cells prior to gold pour. The overall gold recovery is estimated at 96.3%.

The key project and ore specific criteria that the plant was designed to meet include:

- 600,000 tpa of primary ore, expandable to 700,000 tpa.
- Mechanical availability of 91.3% supported by crushed ore storage, standby equipment in critical areas and on-site diesel generator power supply.
- Sufficient automated plant control to minimise the need for continuous operator interface and allow manual override and control if and when required.
- Anticipated lime and cyanide consumption are low and are typical of operations conducted with good quality water treating clean “free milling” (non refractory) primary ores.
- The treatment plant design incorporates the following unit process operations:

- Single-stage primary crushing with a single toggle jaw crusher to produce a crushed product size of 80% passing (P80) of 121 mm.
  - Crushed ore surge bin with a nominal 50 tonne capacity. Surge bin overflow is conveyed to a dead stockpile. Ore from the dead stockpile is reclaimed by front end loader (FEL) to feed the mill during periods when the primary crusher is off-line.
  - Closed-circuit single stage SAG mill to produce a P80 grind size of 106 µm.
  - Gravity concentration and removal of coarse gold from the milling circuit recirculating load and treatment of gravity concentrate by intensive cyanidation and electrowinning to recover gold to doré.
  - Pre-leach thickener to increase slurry density to the carbon in leach (CIL) circuit, minimise CIL tankage, improve slurry mixing characteristics and reduce overall reagent consumption.
  - CIL circuit incorporating seven stages, six of which contain carbon for gold adsorption.
  - Zadra elution circuit with gold recovery to doré.
  - Cyanide recovery with a three stage counter current decantation (CCD) thickening and wash circuit to comply with the International Cyanide Management Code.
  - Tailings pumping to the secure tailings disposal facility with capacity for 4.6 million tones of tailings.
- The surface facilities include a permanent camp accommodating 240 persons, office building, site laboratory and other supporting infrastructure. The road access route to the project site will be upgraded, the work consisting primarily of straightening and levelling watercourse crossings and formation of a roadway through river beds and crossings. An airstrip will be constructed near the site for bullion and personnel transfers.

Power will be generated on site using 5 diesel-fueled 1 MW gen-sets. Water will be supplied from a borefield from the Zara valley, about 9 km from the plant site. Drilling and pump testing indicates that the field will be able to supply all the project's needs and the water is of potable quality.