

HARMONY GOLD MINING CO LTD

Form 6-K

August 19, 2003





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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

**Form 6-K**

REPORT OF FOREIGN PRIVATE ISSUER PURSUANT TO

RULE 13a-16 OR 15d-16 UNDER THE SECURITIES

EXCHANGE ACT OF 1934

For August 19, 2003

**Harmony Gold Mining Company**

**Limited**

**Suite No. 1**

**Private Bag X1**

**Melrose Arch, 2076**

**South Africa**

(Address of principal executive offices)

(Indicate by check mark whether the registrant files or will file annual reports under cover of F  
F or Form 40-F.)

Form 20-F  Form 40-F

(Indicate by check mark whether the registrant by  
furnishing the information contained in this form  
is also thereby furnishing the information to the  
Commission pursuant to Rule 12g3-2(b) under the  
Securities Exchange Act of 1934.)

Yes No

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"This Report on Form 6-K is incorporated by reference into the registration statement on Form F-3

(file no. 333-13516) for Harmony Gold Mining Company Limited, filed on December 23, 2002, and into the prospectus that forms a part of that registration statement."





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**THIS CIRCULAR IS IMPORTANT AND REQUIRES YOUR IMMEDIATE ATTENTION**

### **Action required**

1. If you are in any doubt as to the action that you should take, please consult your stockbroker immediately.

2. If you have sold or otherwise disposed of all your shares in Harmony Gold Mining Company Limited, the form of proxy (blue), should be handed to the purchaser of such shares, or to the stockbroker, based on the

3. Certificated shareholders and shareholders who hold dematerialised shares and have elected "own name" registration, must not

Securities Depository Participant ("CSDP") who are unable to attend the general meeting of shareholders on 2003 at the corporate office of Harmony, Randfontein Office Park, Corner Main Reef Road and Ward 17, Johannesburg, should complete and return the attached form of proxy (blue) in accordance with the instructions on the form. The form of proxy (blue) should be sent to the Registrar, Harmony, Ultra Registrars (Pty) Limited, 11 Diagonal Street, Johannesburg, 2001 (PO Box 4844, Johannesburg) or to the Registrar, Beckenham Road, Beckenham, Kent BR3 4TU, England, so as to be received by not later than 09:00 on the day of the meeting.

4. Shareholders who hold dematerialised shares through a CSDP or broker, other than those who have elected "own name" registration, must not

attend the general meeting. Shareholders who hold dematerialised shares through a CSDP or broker, other than those who have elected "own name" registration, must request their CSDP or broker to provide them with a Letter of Representation in order to attend the general meeting. This must be done in terms of the agreement entered into between them and the CSDP or broker. Shareholders who hold dematerialised their shares, other than those who have elected "own name" registration, must not

### **Harmony Gold Mining Company Limited**

(Incorporated in the Republic of South Africa)

(Registration number 1950/038232/06)

Share code: HAR ISIN: ZAE000015228

("Harmony" or the "company")

### **CIRCULAR TO SHAREHOLDERS**

relating to an authority for

- the increase of Harmony's authorised ordinary share capital from 250 000 000 ordinary shares

50 cents each to 350 000 000 ordinary shares with a par value of 50 cents each ("Harmony shares")

- the approval of the merger between Harmony and African Rainbow Minerals Gold Limited ("ARMgold")

consideration for which will be discharged by the issue of up to 64 000 000 Harmony shares to ARMgold. The merger will be implemented by way of a scheme arrangement proposed between ARMgold and its shareholders, in terms of section 311 of the Companies Act, 1973 (Act 61 of 1973)

and incorporating

- information relating to Harmony as required for inclusion in a pre-listing statement in compliance with the

Requirements of the JSE Securities Exchange South Africa;

- a notice of a general meeting of shareholders; and

- a form of proxy for certificated and own name dematerialised shareholders.



**TM**

**Financial adviser**

**Sponsor**

**Reporting accountants**

**Technical adviser**

**Attorneys**

Date of issue of this circular: 7 August 2003





This circular contains "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, and 21E of the Securities Exchange Act of 1934, as amended, that are intended to be covered by the safe harbor created by such sections. All statements other than those of historical facts included in this presentation are forward-looking statements, including, without limitation, (i) estimates of future earnings, and the sensitivity of earnings to the gold and other metals prices; (ii) estimates of future gold and other metals production and sales, (iii) estimates of future cash costs; (iv) estimates of future cash flows, and the sensitivity of cash flows to the gold and other metals prices; (v) statements regarding future debt repayments; (vi) estimates of future capital expenditures; (vii) estimates of reserves, and statements regarding future exploration results and the replacement of reserves; and (viii) statements regarding modifications to the Company's hedge position. Where the Company expresses or implies an expectation or belief as to future events or results, such expectation or belief is expressed in good faith and believed to have a reasonable basis. However, forward-looking statements are subject to risks, uncertainties and other factors, which could cause actual results to differ materially from future results expressed, projected or implied by such forward-looking statements. Such risks include, but are not limited to, gold and other metals price volatility, currency fluctuations, increased production costs and variances in ore grade or recovery rates from those assumed in mining plans, as well as political and operational risks in the countries in which we operate and governmental regulation and judicial outcomes. For a more detailed discussion of such risks and other factors, see the Company's Annual Report on Form 20-F for the year ended June 30, 2002, which is on file with the Securities and Exchange Commission, as well as the Company's other SEC filings. The Company does not undertake any obligation to release publicly any revisions to any "forward-looking statement" to reflect events or circumstances after the date of this presentation, or to reflect the occurrence of unanticipated events, except as may be required under applicable securities laws.





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Attached







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### Important dates and times

#### 2003

Last day to lodge forms of proxy for the general meeting to be received by 09:00 on

28 August 2003

Forms of proxy for the scheme meeting to be received by

29 August 2003

General meeting to be held at Harmony's corporate office, Randfontein Office Park, Corner of Main Reef Road and Ward Avenue, Randfontein, P.O. Box 2, Randfontein, 1760, South Africa, at 09:00 on

1 September 2003

Announcement regarding results of general meeting of shareholders released on SENS and other relevant exchanges on

1 September 2003

Scheme meeting to be held at 10:00 on

1 September 2003

Announcement regarding results of scheme meeting and declaration of ARMgold dividend released on SENS and other relevant exchanges on

1 September 2003

Announcement regarding results of general meeting published in the South African press on

2 September 2003

Court hearing to sanction the scheme on

9 September 2003

Expected announcement regarding results of scheme released on SENS and other relevant exchanges on

9 September 2003

Expected announcement regarding results of scheme published in the South African press on

10 September 2003

Last day to trade for ARMgold shareholders wishing to receive the consideration shares and the ARMgold dividend on

12 September 2003

Suspension of listing of ARMgold shares at commencement of trading on

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15 September 2003

Consideration record date, being the date on which shareholders must be recorded in the register of ARMgold by 17:00 to receive the consideration shares on

19 September 2003

Operative date of the scheme at commencement of trading on

22 September 2003

Termination of listing of the ARMgold shares on the JSE at commencement of trading on

23 September 2003

### **Notes:**

1.

The definitions set out on pages 4 to 6 apply to the information on this page.

2.

All times shown in this circular are South African local times.

3.

Any change to the above dates and times will be advised by notification in the South African press and released on SENS and other relevant exchanges.

4.

Copies of this circular may be obtained from:

- Harmony;
- Ultra Registrars (Pty) Limited; and
- St James's Corporate Services Limited,

at the addresses set out on the inside front cover.

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**Definitions**

In this circular and its annexures, unless otherwise indicated:

- the words in the first column have the meanings stated opposite them in the second column, w  
include the plural and *vice versa*, words signifying one gender include the other genders, and ref  
include references to juristic persons and associations of persons and *vice versa*;
- all monetary values are in South African rands and cents unless otherwise stated; and
- all times indicated are South African local times.

"Act"

the Companies Act, 1973 (Act 61 of 1973), as amended;

"ADRs"

American Depository Receipts;

"ARMgold"

African Rainbow Minerals Gold Limited (registration number 1997/015869/06),  
incorporated in South Africa and listed on the JSE;

"ARMI"

African Rainbow Minerals and Exploration Investment (Proprietary) Limited  
(registration number 1997/020158/07), incorporated in South Africa;

"ARMgold shares"

ordinary shares having a par value of 0.1 cents each in the issued share capital of  
ARMgold;

"ARMgold shareholders"

holders of ARMgold shares;

"Articles"

the articles of association of Harmony;

"Avmin"

Anglovaal Mining Limited (registration number 1933/004580/06), incorporated  
in South Africa and listed on the JSE;

"board of directors" or "directors"

the board of directors of Harmony;

or "board"

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"business day"

any day, excluding Saturday and Sunday, on which banking institutions are generally open for normal banking business in Johannesburg;

"certificated shares"

Harmony shares which have not yet been dematerialised in terms of STRATE, title to which is represented by a share certificate or other document of title;

"certificated shareholders"

holders of certificated shares;

"circular"

this bound document, dated 7 August 2003, including the annexures, the attached notice of general meeting and form of proxy;

"completion date"

the date upon which the merger becomes effective;

"conditions"

the conditions precedent to which the merger is subject as reflected in paragraph 7;

"consideration shares"

up to 64 000 000 new Harmony shares, to be issued in the ratio of 2 Harmony shares for every 3 ARMgold shares as consideration for the merger, it being recorded that as at the last practicable date, based on the current number of ARMgold shares in issue and the agreed ratio, consideration shares shall mean 63 666 667 Harmony shares;







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"CSDP"

a Central Securities Depository Participant as defined in section 91A of the Act;

"dematerialised shares"

Harmony shares which have been dematerialised through a CSDP or broker;

"dematerialised shareholders"

holders of dematerialised shares;

"Employee Share Schemes"

collectively, The Harmony (1994) Share Option Scheme, as amended, and The Harmony (2001) Share Purchase Scheme;

"Free Gold"

ARMgold/Harmony Freegold Joint Venture Company (Proprietary) Limited, the 50/50 incorporated joint venture with ARMgold, which has acquired the Tshepong, Matjhabeng, Bambanani, Joel and St. Helena mines as well as certain other surface operations;

"general meeting"

the general meeting of shareholders to be held at 09:00 on 1 September 2003 at Harmony's corporate office, Randfontein Office Park, Corner of Main Reef Road and Ward Avenue, Randfontein, PO Box 2, Randfontein, 1760;

"Harmony"

Harmony Gold Mining Company Limited (registration number 1950/038232/06), incorporated in South Africa and listed on the JSE, the LSE, Euronext Paris, Euronext Brussels, in the form of International Depository Receipts, and the NYSE in the form of ADRs;

"Harmony Group"

Harmony and its subsidiaries;

"Harmony shares"

ordinary shares with a par value of 50 cents each in the issued ordinary share capital of Harmony;

"Harmony shareholders" or

holders of Harmony shares from time to time;

"shareholders"

"IDC"

Industrial Development Corporation of South Africa Limited;

"JSE"

the JSE Securities Exchange South Africa;

"Kalgold"

Kalahari Goldridge Mining Company Limited (registration number 1982/002818/07), incorporated in South Africa;

"last practicable date"

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the last practicable date prior to finalisation of this circular, being 1 August 2003;

"LSE"

the London Stock Exchange plc;

"merger"

the acquisition by Harmony of the entire issued share capital of ARMgold, the consideration for which will be discharged by the issue of the consideration shares, which is to be implemented by means of the scheme or the substitute offer;

"merger agreement"

the agreement dated 22 July 2003 entered into between Harmony, ARMgold and ARMI in relation to the merger;

"NYSE"

the New York Stock Exchange;

"scheme"

the scheme of arrangement proposed by Harmony between ARMgold and the ARMgold shareholders in terms of section 311 of the Act;

"scheme meeting"

the scheme meeting convened by order of the High Court for purposes of considering and voting on the scheme which is expected to be held on 1 September 2003;

5





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"SENS"

the Securities Exchange News Service;

"Simane"

Simane Security Investments (Pty) Limited;

"South Africa"

the Republic of South Africa;

"SRK"

Steffen, Robertson and Kirsten (South Africa) (Pty) Limited (registration number 1995/012890/07), incorporated in South Africa;

"SRP"

the Securities Regulation Panel;

"St. Helena"

the St. Helena Mine located in the south-western rim of the Witwatersrand Basin;

"STRATE"

STRATE Limited (registration number 1998/022248/06), incorporated in South Africa, and is the electronic clearing and share settlement system used by the JSE;

"substitute offer"

the implementation of the merger by means of an offer to ARMgold shareholders, which will be deemed to be made if the scheme fails as a result of the non- fulfilment of the conditions which specifically relate to the scheme; and

"transfer secretaries"

Ultra Registrars (Pty) Limited (registration number 2000/007239/07) in South Africa and Capita Registrars in England.







**Harmony Gold Mining Company Limited**

(Incorporated in the Republic of South Africa)  
(Registration number 1950/038232/06)

**Directors**

Adam Fleming\*#  
Bernard Swanepoel  
Ferdinand Dippenaar  
Frank Abbott  
Ted Grobicki  
John Smithies\*#  
Mike Fleming\*#  
Nolitha Fakude\*#  
Lord Renwick of Clifton KCMG\*#  
Simo Lushaba\*#

\* Independent  
# Non-executive

**Circular to shareholders**

**PART I**

**1.**

**INTRODUCTION**

On Friday, 2 May 2003, Harmony and ARMgold announced that they had reached agreement, in terms of a memorandum of understanding, regarding their proposed merger. It is intended that the merger will be implemented by means of a scheme of arrangement to be proposed by Harmony between ARMgold and ARMgold shareholders, in terms of section 311 of the Act, which will be subject to the fulfilment of the conditions.

Harmony will issue up to 64 000 000 new Harmony shares in consideration for the merger in the ratio of 2 Harmony shares for every 3 ARMgold shares held.

This circular sets out the details of the special resolution and ordinary resolutions that are required to be approved by Harmony shareholders to enable the merger to be implemented, including an increase in the authorised share capital of Harmony.

**2.**

**INCREASE IN AUTHORISED ORDINARY SHARE CAPITAL**

In order to ensure that a sufficient number of Harmony shares are available for issue for the purposes of implementation of the merger and future share issuances, the board of directors propose that the authorised ordinary share capital of Harmony be increased to 350 000 000 Harmony shares from the current authorised ordinary share capital of 250 000 000 Harmony shares. The special resolution providing for such increase is contained in the attached notice of general meeting. The effect of the special resolution is to increase the authorised ordinary share capital of Harmony from R125 million to R175 million.

7

**TM**





8

**PART II**

3.

**BACKGROUND AND RATIONALE FOR THE MERGER**

In November 2001, Harmony and ARMgold formed a 50/50 joint venture, Free Gold, that acquired certain gold mines and related surface operations and assets from AngloGold Limited, with effect from 1 January 2002. At the same time, Harmony and ARMgold entered into a co-operation agreement for a period of twelve months, to jointly explore opportunities for the acquisition and establishment of gold mining and related businesses and the acquisition and exploitation of mineral rights within South Africa.

Since that time, Harmony and ARMgold have worked together pursuing various opportunities, including the acquisition of the St Helena mine, through Free Gold, and the acquisition of 34,5% of the issued shares in Avmin through a newly formed joint venture company. The investment in Avmin was primarily to obtain a foothold in Avgold Limited, a company with significant growth opportunities.

The two companies have similar management structures with reduced management and decision-making levels. Both the companies have proven skills and expertise to turn loss-making and marginal mines into highly profitable operations.

The two large joint ventures the companies have entered into, coupled with their similar management styles and their proven ability to work together, as evidenced by the successes achieved in Free Gold, contributed to the decision to merge the two companies.

It is intended that the merged company will trade under the name Harmony, with conspicuous and distinctive emphasis on the letters "ARM" to include ARMgold's identity in the merged company. Following the merger, the enlarged Harmony will become the fifth largest gold producer in the world and the largest unhedged South African gold producer. It will also be truly representative of the new South Africa with historically disadvantaged South Africans holding in excess of 19% of its issued share capital and participating in excess of 26% of the operations. The new Harmony will own operating mines in all the major gold producing regions of South Africa. It is also expected to realise synergies in the Free State in the short term, by consolidating the region into one operating unit, thereby optimising the use of infrastructure and exploitation of the ore bodies, which should deliver enhanced return for shareholders.

The merger will result in the best practices developed by both companies being incorporated in the current operations, and will create exciting opportunities for growth that will be to the benefit of the shareholders of both Harmony and ARMgold.

To date the proposed merger has been well received by the market and institutional shareholders of both companies and the merged company should be in an even better position to raise funds and to explore and exploit further growth opportunities in the industry.

4.

**BACKGROUND INFORMATION ON ARMGOLD**

4.1

**Introduction**

ARMgold was incorporated in 1997 and was listed on the JSE in May 2002. Its registered address is ARM House, 29 Impala Road, Chislehurst, Johannesburg, 2196.

4.2

**Nature of business**

ARMgold has become South Africa's fourth largest gold producer and the tenth largest gold producer worldwide. ARMgold has achieved its stated objective of producing in excess of one million attributable ounces of gold in 2003. ARMgold has been involved in a successful joint venture, Free Gold, with Harmony since January 2002. In addition to Free Gold, ARMgold operates mines in the Orkney and Welkom areas.

4.3

**Strategy and prospects**

ARMgold has developed a "We Do It Better" philosophy that has enabled ARMgold to establish a successful track record of turning around previously loss-making and under-performing shafts, making them profitable and competitive.





Since its successful listing on the JSE in May 2002, ARMgold has been a model company for black economic empowerment in the mining sector.

4.4

**Litigation statement**

There are no legal or arbitration proceedings (including any such proceeding that are pending or threatened of which ARMgold is aware) that may have or have had in the recent past (being the 12 month period immediately prior to the date of this circular) a material effect on the financial position of ARMgold or any of its subsidiaries.

4.5

**Financial information on ARMgold**

All financial information on ARMgold is set out in Annexure 5.

4.6

**Details of any significant contracts**

ARMgold's significant contracts are reflected in Annexure 6.

4.7

**Material changes**

Apart from the acquisition, jointly with Harmony, of a 34,5% interest in Avmin, there have been no material changes in the financial or trading position of ARMgold and its subsidiaries since the last annual financial statements were published.

5.

**THE MERGER CONSIDERATION AND SALIENT TERMS**

**The merger consideration**

As consideration for the merger, Harmony will issue the consideration shares to ARMgold shareholders

The merger ratio is 2 Harmony shares for every 3 ordinary ARMgold shares held. The ratio of Harmony shares to ARMgold shares was calculated with reference to the 30-day volume weighted average traded ordinary share prices of Harmony and ARMgold prior to the final negotiation of the terms of the merger.

In addition:

- prior to the completion date, ARMgold has the right to declare and pay a cash dividend of 50

share to ARMgold shareholders recorded as such on a date prior to the completion date, provided that ARMgold is entitled to increase the amount of such dividend if the circumstances envisaged below arise;

- Harmony shall be entitled, at any time prior to the date which is not less than 7 days prior to the

scheme meeting, to declare and pay any cash dividend to Harmony shareholders recorded as such on a date prior to the completion date, provided that, upon declaration of such dividend, ARMgold shall be entitled to increase the amount of the dividend it is obliged to declare and pay as aforesaid by an amount equal to the amount of the dividend declared per Harmony share or 100 cents per ARMgold share, whichever is the greater.

Harmony has undertaken in favour of ARMgold as follows:



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- it will not declare and pay any dividend during the period reckoned from 7 days prior to the completion date; and
- insofar as it is lawfully able, its next dividend following the completion date will be:
- not less than 150 cents per Harmony share, so as to ensure that each ARMgold shareholder who considers shares pursuant to the merger will, together with the dividend which ARMgold is obliged to declare, receive a minimum dividend of 600 cents per ARMgold share acquired from him;
- declared and paid as soon as possible after the completion date.

The aggregate number of Harmony shares to be issued in terms of the merger is expected to represent approximately 35% of the issued ordinary share capital of Harmony. The Harmony consideration shares will rank *pari passu* in all respects with the existing issued Harmony shares.

The resolution in terms of which this authority will be granted (ORDINARY RESOLUTION NUMBER 1) is contained in the attached notice of general meeting.





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**Salient terms**

Harmony and ARMgold have further agreed that, following implementation of the merger, it is their intention to give effect to the following regarding Harmony's board and executive management:

- ARMgold and Harmony intend to integrate their respective boards and executive teams in an effort to retain their respective strengths and attributes, particularly ARMgold's strong empowerment and Harmony's international profile and global reach;
- with that objective in mind, ARMgold and Harmony intend to reorganise the board of directors as soon as possible after the completion date the board will conform with the following requirements:
  - it will consist of not more than 19 (nineteen) directors, of whom not more than 8 (eight) will be executive directors;
  - it will include 10 (ten) directors who will be nominated by ARMgold, of whom not more than 4 will be executive directors;
  - any resignations from the present board which are necessary to permit the appointment of ARMgold nominees will be obtained; and
  - Mr Patrice Motsepe will be appointed non-executive chairman of the board for a period of at least 3 years from the completion date.

- In order to retain in Harmony the significant empowerment credentials present in and identified in the following the completion date, Mr Patrice Motsepe's functions and responsibilities as the non-executive chairman of Harmony will be broader and more extensive than those normally allocated to a non-executive chairman.

The identities of the directors nominated to the board of directors by ARMgold are as follows:

**Executive directors**

A J Wilkens  
P Taljaard  
W M Gule  
D V Simelane

**Non-executive directors**

P T Motsepe  
Dr M M M M Bakane-Tuoane  
M W King  
C M L Savage  
Dr R V Simelane  
Dr S P Sibisi

Subject to Harmony having procured the appointment of ARMgold's nominees to the board of directors as aforesaid, ARMI has undertaken to exercise the votes attaching to its ARMgold shares in favour of the scheme at the scheme

meeting or to accept the substitute offer as the case may be.

ARMI has undertaken to Harmony that it will not dispose of any of the consideration shares received by it pursuant to the implementation of the merger for a period of 6 months reckoned from the completion date.

6.

**FINANCIAL EFFECTS OF THE MERGER ON HARMONY AND ARMGOLD**

The table below sets out the illustrative financial effects of the merger based on the unaudited financial information of Harmony for the nine months ended 31 March 2003. The effect of the Avmin acquisition or the acquisition of 11,5% of the issued share capital of Avgold Limited is not included in the table below. These financial effects are for illustrative purposes only and may not give a true picture of Harmony's financial position and future results.





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Harmony before

Harmony after %

merger

1

merger

Change

Basic earnings per share (cents)<sup>2</sup>

635

645

1,6

Headline earnings per share (cents)<sup>2</sup>

622

657

5,6

Net asset value per share (cents)<sup>3</sup>

4 850

5 858

20,8

Net tangible asset value per share (cents)<sup>3</sup>

4 850

5 274

8,7

Weighted average number of shares in issue

175 850 256



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239 516 923

### Number of shares in issue

184 163 265

247 829 932

### Notes:

1. The Harmony before merger financial information was extracted from Harmony's published quarterly financial information for the period ended 31 March 2003.

2. The basic and headline earnings per share effects are based on the assumption that the merger was completed on 31 March 2003.

3. The net asset and net tangible asset value per share effects are based on the assumption that the merger was completed on 31 March 2003.

4. Earnings and headline earnings per share after the merger are after the following adjustments:

(a) the consolidation of ARMgold's earnings and headline earnings for the nine months ended 31 March 2003, after adjustment for the tax effect of the lower interest earned during the period as the result of the payment of a special dividend, which is assumed to have been paid at the beginning of the period;

(b) the fair value adjustment, arising on the merger, is amortised over the lives of the mines over the nine months period (after tax);

(c) goodwill, arising from the merger, is amortised over a period of 17 years and results in a reduction of earnings per share over the period; and

(d) amortisation of the goodwill arising on the merger is reversed for determination of headline earnings per share.

5. Net asset and tangible asset values per share after the merger are after the following adjustments:

(a) the consolidation of ARMgold's assets and liabilities, at fair value, as at 31 March 2003, after adjustment for the dividend of 500 cents per ARMgold share;

(b) the issue of 63 666 667 shares at R87,75 per share as consideration.

7.

### CONDITIONS PRECEDENT

#### 7.1

The implementation of the scheme is conditional, *inter alia*, upon:

-

the passing of the special resolution and ordinary resolutions set out in the notice of general meeting attached to this circular by the Harmony shareholders at the general meeting, to enable Harmony to propose and implement the scheme;

-

the approval of the scheme by ARMgold shareholders at the scheme meeting;

-

the sanctioning of the scheme by the High Court of South Africa in accordance with the requirements of the Act;

-

the registration of the High Court's Order sanctioning the scheme by the Registrar of Companies in accordance with the requirements of the Act;

-

the obtaining of all rulings and approvals required from any regulatory authorities and from the SRP;

-

the JSE approving the listing of the consideration shares on the JSE; and

-

the completion date occurring by no later than 31 December 2003

## 7.2

The implementation of the substitute offer, which will be deemed to be made if the scheme fails and the non-fulfilment of the conditions which specifically relate to the scheme, is conditional upon

-

the passing of the special resolution and ordinary resolutions set out in the notice of general meeting attached to this circular by the Harmony shareholders at the general meeting, to enable Harmony to propose and implement the substitute offer;

-

offerors holding at least 90% (or such lesser percentage as Harmony may determine) of the ARMgold shares accepting the substitute offer;

-

the registration of the Harmony shares comprising the substitute offer consideration in the United States of America if and to the extent required by the Securities Exchange Commission; and

-

the substitute offer becoming unconditional by 31 December 2003.

The condition that the completion date of the scheme occurs by no later than 31 December 2003, or the substitute offer becomes unconditional by no later than 31 December 2003, as the case may be, is capable of waiver or extension by agreement between Harmony and ARMgold.





12

8.

**GENERAL MEETING AND SHAREHOLDER APPROVAL**

8.1

**General meeting**

Attached to this circular is a notice of a general meeting of Harmony shareholders to be held at Harmony's corporate office, Randfontein Office Park, Corner Main Reef Road and Ward Avenue, Randfontein, at 09:00 on 1 September 2003. The general meeting will be held for the purposes of considering the special resolution required to increase Harmony's authorised share capital and the ordinary resolutions required to approve the merger. Certificated shareholders and dematerialised shareholders who have "own name" registration and who are unable to attend the general meeting and who wish to be represented thereat are requested to complete and return the attached form of proxy (blue) to the transfer secretaries, by not later than 09:00 on 28 August 2003.

Dematerialised shareholders who do not have "own name" registrations and who wish to attend the general meeting must request their CSDP or broker to provide them with a Letter of Representation or must instruct their CSDP or broker to vote by proxy on their behalf in terms of the agreement entered into between the shareholder and their CSDP or broker.

8.2

**Shareholder approvals**

In accordance with the JSE Listings Requirements, the merger is subject to approval by ordinary resolution passed by a majority of Harmony shareholders present or represented by proxy and entitled to vote at the general meeting. The increase in authorised ordinary share capital is subject to approval by special resolution passed by at least 75% of Harmony shareholders, present or represented by proxy and entitled to vote at the general meeting of which not less than 21 clear days' notice will be given and at which not less than 25% of the total votes of all Harmony shareholders entitled to attend and vote are present or represented.

9.

**EXCHANGE CONTROL REGULATIONS**

In terms of the Exchange Control Regulations of the Republic of South Africa:

- the share certificates of non-resident shareholders issued by the transfer secretaries in South Africa shall be endorsed "Non-Resident";

- new share certificates, dividend and residual cash payments based on emigrants' shares controlled by the emigrants shall be issued to the emigrants.

Exchange Control Regulations will be forwarded to the Authorised Dealer in foreign exchange control in South Africa to unblock blocked assets. The election by emigrants for the above purpose must be made through the Authorised Dealer in foreign exchange controlling their blocked assets; and

- dividend and residual cash payments due to non-residents are freely transferable from South Africa.

**PART III**

**10. INFORMATION ON HARMONY**

**10.1 Introduction**

Harmony was incorporated in South Africa on 25 August 1950. The names, dates and places of incorporation of Harmony's operating subsidiaries are reflected in Annexure 13. Brief particulars of alterations of Harmony's capital over the last 3 years are reflected in paragraph 12.3. The primary listing of Harmony's shares is on the JSE. The Harmony shares are also listed on the LSE and Euronext Paris and are quoted on Euronext Brussels in the form of International Depository Receipts and on the NYSE in the form of ADRs.

**10.2 Nature of business**

Harmony is a gold miner and producer with an international diversified portfolio of gold mining projects in South Africa, Canada, Australia, and Russia. Harmony adopts focused operational and management philosophies throughout the organisation. Its growth strategy is focused on building a leading international gold mining company through acquisitions, organic growth, and focused exploration. The bulk of its assets are located in the Witwatersrand basin of South Africa. The deep level gold mines located in this basin include







the Free State operations and the operations of Free Gold in the Free State Province, the Evander gold mine in Mpumalanga Province and the Randfontein and Elandsdraal mines on the West Rand goldfields in Gauteng Province. In addition, Harmony and ARMgold have recently jointly acquired a 34,5% shareholding in Avmin and Harmony has acquired an 11,5% shareholding in Avgold Limited.

Harmony's international operations are held under Harmony Gold (Australia) (Pty) Ltd and comprise the wholly-owned New Hampton Goldfields Limited and Hill 50 Limited, a 31,8% shareholding in the Bendigo Mining NL operation, a 32,5% interest in Highland Gold Mining Limited, a 21% interest in High River Gold Mines Limited, as well as an 87% interest in Abelle Limited.

### 10.3 Strategy and prospects

Harmony is a growth oriented company in the gold production business and is distinguished by the focused operational and management philosophies which it employs throughout the organisation. Its growth strategy is focused on building a leading international gold mining company through acquisitions, organic growth, and focused exploration.

Since undergoing a change in management in 1995, Harmony has employed a successful strategy of growth through a series of acquisitions and through the evolution and implementation of a simple set of management systems and philosophies, which Harmony refers to as the "Harmony Way", and which it believes is unique in the South African gold mining industry. A significant component of the success of Harmony's strategy to date has been its ability to acquire under performing mining assets, mainly in South Africa, and within a relatively short time frame, to transform these mines into cost-effective production units.

Harmony is managed according to the philosophy that Harmony shareholders have invested in Harmony in order to hold a growth stock that will also participate in movements in the gold price. Accordingly, Harmony has consistently maintained a policy of not hedging its future gold production.

## 11. DIRECTORATE

### 11.1 Directors

The current functions, nationalities and addresses of the directors of Harmony are set out below:

**Name**

**Function**

**Address**

A R Fleming

Non-executive Chairman

Harmony Corporate Office, Randfontein Office Park,

(British)

Corner of Main Reef Road and Ward Avenue,  
Randfontein, PO. Box 2, Randfontein, 1760,  
South Africa

Z B Swanepoel

Chief Executive

Harmony Corporate Office, Randfontein Office Park,

(South African)

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Corner of Main Reef Road and Ward Avenue,  
Randfontein, PO Box 2, Randfontein, 1760,  
South Africa

F Abbott

Financial Director

Harmony Corporate Office, Randfontein Office Park,

(South African)

Corner of Main Reef Road and Ward Avenue,  
Randfontein, PO Box 2, Randfontein, 1760,  
South Africa

T S A Grobicki

Executive Director

Harmony Corporate Office, Level 1, 10 Ord Street,

(South African)

West Perth, WA, 6005

F Dippenaar

Marketing Director

Harmony Corporate Office, Randfontein Office Park,

(South African)

Corner of Main Reef Road and Ward Avenue,  
Randfontein, PO Box 2, Randfontein, 1760,  
South Africa

V N Fakude

Non-executive Director

1st Floor Block C, Sandhurst Office Park,

(South African)

Corner Katherine Street and Rivonia Road, Sandton,  
PO Box 781220, Sandton, 2146

Lord Renwick of Clifton

Non-executive Director

JPMorgan plc., 125 London Wall, London EC2Y 6A J,

KCMG

United Kingdom

(British)

13





14

**Name**

**Function**

**Address**

D S Lushaba

Non-executive Director

522 Impala Road, Glenvista, 2058, PO Box 1127,

(South African)

Johannesburg, 2000

M F Fleming

Non-executive Director

30 Hydewoods, Townshend Road, Hyde Park, 2196

(South African)

J G Smithies

Non-executive Director

Point House, Eastford, Knysna 6570, PO Box 930,

(South African)

Knysna, 6570

**Further details on the executive directors of Harmony are as follows:**

**Zacharias Bernardus Swanepoel** (42), BSc (Mining Engineering), B Com(Hons), Chief Executive and a director. Mr. Swanepoel has been a director of Harmony and its Chief Executive since February 1995. Mr. Swanepoel has approximately 20 years of experience in the mining industry. Prior to joining Harmony he was General Manager of the Beatrix Mine within the Gengold Group Limited.

**Frank Abbott** (48), BCom, CA (SA), MBL, Chief Financial Officer and a director. Mr. Abbott has been a director of Harmony since 1994 and Chief Financial Officer since October 1997. He retired by rotation and was duly re-elected at the annual general shareholders' meeting held on 16 November 2002. Mr. Abbott has approximately 22 years' experience in financial management. Prior to joining Harmony he was Financial Director of Randgold & Exploration Company Limited from 1994 to 1997.

**Ferdinand Dippenaar** (42), BCom, BProc, MBA, Marketing Director. Mr. Dippenaar has been a director of Harmony since June 1997. He retired by rotation and was duly re-elected at the annual general shareholders' meeting held on 16 November 2002. Mr. Dippenaar has approximately 16 years' commercial and financial experience. He was Managing Director of The Grootvlei Proprietary Mines Limited and East Rand Proprietary Mines Limited from 1996 to 1997. Prior to 1996, Mr. Dippenaar served as Project Leader for the East Rand companies of Randgold & Exploration Company Limited in 1995 and Financial Manager of Beatrix Gold Mines Limited in 1994.

**Thaddeus Steven Anthony Grobicki** (53), BSc (Hons) (Geology), MSc (Minerals Exploration), Executive Officer for offshore operations and a director. Mr. Grobicki has been a director of Harmony since 1994 and an Executive Director since October 1999. Mr. Grobicki has approximately 25 years' experience in the mining industry. He was a Chief Executive Officer of West Rand Consolidated Mines Limited and Kalgold until July 1999. In March 2002, he was appointed Chairman of the Board of Directors of Hill 50 Limited.

**Further details on the non-executive directors of Harmony are set out below:**

Adam Richard Fleming (54), Non-executive Chairman of the Board and an independent director. Mr. Fleming has been a director and the Chairman of Harmony since 14 October 1999. His current term will expire at Harmony's next annual general shareholders' meeting, currently scheduled for 14 November 2003, at which time he will be eligible for re-election. Mr. Fleming was the Non-executive Chairman of West Rand Consolidated Mines Limited and of Kalgold before the acquisition of these companies by Harmony.

**Victoria Nolitha Fakude** (39) BA (Hons) (Psychology, Education and English), Non-executive Director and an independent director. Ms. Fakude has been a director of Harmony since September 2002. She has completed executive training programs at the Harvard Business School and Carl Duisberg Gesellschaft, and been the Managing Director of the Black Management Forum, or BMF, since 2001. Her role as Managing Director of the BMF involves stakeholder and relationship management with BMF members, corporate members, government and other organisations.

**Lord Robin William Renwick of Clifton** (64), KCMG, Non-executive Director and an independent director. Lord Renwick has been a director of Harmony since October 1999. He retired by rotation and was duly re-elected at the annual general shareholders' meeting held on 16 November 2002. Lord Renwick was in the diplomatic service, inter alia as British ambassador to Pretoria and Washington, until his retirement in 1997. He is currently chairman of Fluor Limited and is a director of several public companies, including British Airways Plc., Compagnie Financiere Richemont AG, BHP Billiton Plc, Fluor Corporation, SABMiller Plc and Fleming Family and Partners.

**Dugmore Simosezwes Lushaba** (37) BSc (Advanced Biochemistry), MBA, Non-Executive Director and an independent director. Mr. Lushaba has been a director of Harmony since October 2002. He is Chief Executive Officer of Rand Water Limited and has completed courses in industrial marketing, strategic capability, executive development and corporate governance.







**Michael Frank Fleming** (66), Pr Eng, FIMM, Non-executive Director and an independent director. Mr. Fleming has been a director of Harmony since September 1998. He retired by rotation and was duly re-elected at the annual general shareholders' meeting held on 16 November 2001. Mr. Fleming has approximately 30 years mining and approximately 14 years' mining investment experience. He is also a director of Impala Platinum Holdings Limited.

**John Gabriel Smithies** (57), BSc (Mining Engineering) (Chemistry), Non-executive Director and an independent director. Mr. Smithies has been a Director of Harmony since April 2002. Mr. Smithies has approximately 29 years experience in the mining industry. From 1973-1976 he worked in the gold division of Union Corporation Limited. From 1976-2001, he held various positions at Impala Platinum Holdings Limited, including consulting engineer from 1996-1999, Operations Director from 1999-2000, and Chief Executive Officer from 2000-2001.

**11.2 Appointment and remuneration of directors**

The Articles provide that the board of directors must consist of not less than four nor more than 20 directors at any time. The board of directors currently consists of ten directors.

The Articles provide that the longest serving one-third of directors retire from office at each annual general meeting of Harmony. Retiring directors normally make themselves available for re-election and can be re-elected at the annual general meeting at which they retire. Officers of Harmony, who are also directors, retire as directors in terms of the Articles, but their service as officers is regulated by standard industry employment agreements.

The directors, under the chairmanship of Adam Fleming, meet on a quarterly basis. They are mandated to effect key decisions that ensure that they retain proper direction and full control of Harmony and monitor executive management.

Extracts from the Memorandum of Association and the Articles concerning the directors are set out in Annexure 1.

The remuneration of directors for the year ended 30 June 2002 was as follows:

**Directors'**

**Salaries**

**Retirement**

**Bonuses paid**

**fees**

**and benefits**

**Contributions**

**during the year**

**Total**

**R'000**

**R'000**

**R'000**

**R'000**

**R'000**

**Executives:**

F Abbott

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-

977

81

2 000

3 058

F Dippenaar

-

923

75

2 000

2 998

T S A Grobicki

-

1 279

115

2 000

3 394

Z B Swanepoel

-

1 597

150

3 000

4 747

Total executive

-

4 776

421

9 000

14 197

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**Non-executives:**

A R Fleming

100

-

-

-

100

A M Edwards

100

-

-

-

100

M F Fleming

100

-

-

-

100

R W Renwick

100

-

-

-

100

G S Sibiya

100

-

-

-

100

J G Smithies

**Total non-executive**

500

-

-

-

500

**Total**

500

4 776

421

9 000

14 697

Remuneration is not expected to change as a result of the transaction.

All the directors have confirmed in terms of Schedule 21 of the Listings Requirements of the JSE that they have not been:

15





16

- disqualified by any court from acting as a director of a company or from acting in the management of the affairs of any company or been the subject of any public criticisms by statutory or regulatory authorities (including recognised professional bodies);
  - convicted of an offence resulting from dishonesty, fraud or embezzlement or convicted in any other way of any criminal offence or any offence under legislation relating to the Act;
  - adjudged bankrupt or entered into any voluntary creditors' liquidation or been sequestrated in any jurisdiction or been a director of any company at the time or within the 12 months preceding any of the following events taking place: receiverships, compulsory liquidations, creditors voluntary liquidations, company voluntary arrangements or any composition or arrangement with creditors generally or any class of creditors; or
- barred from entry into any profession or occupation.

**11.3 Directors' interests in capital of Harmony**

**11.3.1 Details of Harmony shares held by directors at 31 March 2003 are set out below:**

**31 March 2003**

**Beneficial**

**Non beneficial**

<b>Share</b>	<b>Held</b>	<b>Held</b>
--------------	-------------	-------------

**schemes**

**%**

**directly**

**%**

**indirectly**

**%**

F Abbott

- 
- 
- 
- 
- 
-



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F Dippenaar

-  
-  
-  
-  
-  
-  
-

T S A Grobicki

-  
-

10 000

0,003

30 000

0,01

Z B Swanepoel

-  
-  
-  
-  
-  
-  
-

A R Fleming

-  
-  
-  
-

4 600 000

1,84

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A M Edwards

- 
- 
- 
- 
- 
- 
- 

M F Fleming

- 
- 
- 
- 
- 
- 
- 

V N Fakude

- 
- 
- 
- 
- 
- 
- 

D S Lushaba

- 
- 
- 
- 
- 
- 
-

J G Smithies

-  
-  
-  
-  
-  
-

11.3.2 *Details of share options held by directors at 31 March 2003 are set out below:*

**% of total**

**Number of**

**option in**

**Issue price**

**options**

**issue**

**Issue date**

**(Rands)**

**Expiry date**

F Abbott

73 400

0,57

20/11/2001

49,60

20/11/2011

F Dippenaar

20 000

0,16

31/01/2001

35,40

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31/01/2010

73,400

0.57

20/11/2001

49,60

20/11/2011

T S A Grobicki

98,000

0.76

21/09/1999

22,90

21/09/2009

40,000

0.31

31/01/2000

35,40

31/01/2010

131,000

1.02

20/11/2001

49,60

20/11/2011

Z B Swanepoel

13,350

0.10

31/01/2000

35,40

31/01/2010

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128 800

1,00

20/09/2001

49,60

20/09/2011

A R Fleming

-

-

-

-

-

A M Edwards

-

-

-

-

-

M F Fleming

-

-

-

-

-

J G Smithies

-

-

-

-

-

V N Fakude

-

-

-

-

-

D S Lushaba

-

-

-

-

-







None of the directors or, to the knowledge of Harmony, their families, had any interest, direct or indirect, in any transaction during the last financial year or in any proposed transaction with any company in the Harmony Group that has affected or will materially affect Harmony or its investment interests or subsidiaries.

None of the directors or any associate of such director is currently or has been at any time during the past fiscal year indebted to Harmony.

**11.4 Directors' responsibility statement**

The directors, whose names appear in paragraph 11.1 of this circular, collectively and individually, accept full responsibility for the accuracy of the information given, insofar as it relates to Harmony, and certify that to the best of their knowledge and belief there are no other facts the omission of which would make any statement in this circular false or misleading, and that they have made all reasonable enquiries to ascertain such facts.

**12. SHARE CAPITAL**

**12.1 Capitalisation**

All the Harmony shares in issue rank pari passu with each other and are fully paid. Any variation of rights attaching to such shares will require a special resolution of shareholders in general meeting in accordance with the Articles. Details of Harmony's shareholders' equity before and after giving effect to the issue of consideration shares are detailed as follows:

**At 31 March 2003**

**Actual**

***Pro forma***

**Authorised ordinary share capital**

Ordinary shares

(millions)

250

350

R millions

125

175

**Issued ordinary share capital**

Ordinary shares

(millions)

184

248

R millions

92

124

Share premium (additional paid-in capital)

R millions

6 760

12 314

Retained earnings

R millions

2 480

2 480

Other

R millions

(400)

(400)

**Total shareholders' equity**

R millions

8 932

14 518

The authorised, but unissued Harmony shares have been placed under the control of the directors of Harmony until the next annual general meeting of shareholders, subject to the provision of section 221 of the Act. The new authorised but unissued Harmony shares will be placed under the control of the directors.

**12.2 Voting rights and rights to dividends**

At a general meeting of Harmony, subject to any restrictions as to voting to which any Harmony shareholder or Harmony share may be subject, every Harmony shareholder who is present in person or in a representative capacity shall, on a show of hands, have one vote, irrespective of the number of Harmony shares the shareholder holds or represents. On a poll, every Harmony shareholder shall have one vote for every Harmony share held. Harmony in general meeting or the board of directors may from time to time declare a dividend to be paid in proportion to the number of Harmony shares held. No dividend shall be declared except out of the profits of Harmony. Dividends are declared payable to Harmony shareholders recorded in the register as such at a date subsequent to the date of the declaration of the dividend or the date of confirmation of the dividend, whichever is the later, as determined by the board of directors. Any dividend declared may be paid and satisfied, either in whole or in part, by the distribution of specific assets as the board of directors may at the time of declaring the dividends determine and direct.

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All unclaimed dividends may be retained by Harmony and may be invested or otherwise utilised by the board of directors for the benefit of the Company until claimed. Any dividend unclaimed after a period of twelve years may be declared forfeited to Harmony.

### **12.3 Share issues, consolidation, and sub-division of shares**

On 31 April 2000, Harmony had 106 708 609 ordinary shares in issue. Since that date, the following changes have occurred in Harmony's issued share capital:

#### **12.3.1**

between 17 March 2000 and 30 June 2000, 14 909 631 Harmony shares were issued to the holders of ordinary shares, Share Warrants to Bearer and options in respect of ordinary shares issued by Randfontein Estates Limited, or Randfontein, at an imputed issue price of R37,77 per Harmony share, in accordance with the offer made to Randfontein shareholders;

#### **12.3.2**

1 000 000 Harmony shares were placed with certain institutional shareholders at a market-related cash subscription price of R38,00 per Harmony share on 16 August 2000 under a general authority to issue shares for cash;

#### **12.3.3**

1 189 700 Harmony shares were placed with certain institutional shareholders at a market-related cash subscription price of R37,00 per Harmony share on 4 September 2000 under a general authority to issue shares for cash;

#### **12.3.4**

1 012 000 Harmony shares were placed with certain institutional shareholders at a market-related cash subscription price of R35,31 per Harmony share on 8 February 2001 under a general authority to issue shares for cash;

#### **12.3.5**

500 000 Harmony shares were placed with certain institutional shareholders on 5 April 2001 at a market-related subscription price of R40,03 under a general authority to issue shares for cash;

#### **12.3.6**

800 000 Harmony shares were placed with certain institutional shareholders on 26 April 2001 and a further 200 000 Harmony shares were placed with certain institutional shareholders on 30 April 2001 at market-related subscription prices of R38,19 and R38,06 per share, respectively, both under a general authority to issue shares for cash;

#### **12.3.7**

8 500 000 Harmony shares were issued to international investors on 30 April 2002 for a subscription (including premium) of R139,65 (US\$13,20) per Harmony share;

#### **12.3.8**

Harmony entered into an agreement with Simane and the IDC on behalf of Simane, pursuant to which Simane and the IDC subscribed for, respectively, 222 222 Harmony shares and 10 736 682 Harmony shares at R36,00 per Harmony share.

#### **12.3.9**

10 958 904 Harmony shares were issued on 4 February 2002, pursuant to the conversion of 10 958 904 convertible redeemable preference shares, at a conversion price of R41,50 per preference share, held by the IDC on behalf of Simane;

**12.3.10** 8 000 000 Harmony shares were issued on 29 January 2003 for a subscription price (including premium) of R136,00 per Harmony share, in terms of a general authority to issue shares for cash; and

**12.3.11** 6 960 964 Harmony shares were issued on 21 January 2003 for a subscription price of R92,75 per Harmony share,  
in exchange for a 11,5% stake in Avgold Limited

The issues in 12.3.1 to 12.3.11 were all made at a price above the par value of 50 cents per Harmony share. The premium in all cases was allocated to additional paid-in capital account of the shareholders' equity of Harmony.

**12.4 Preferential rights over Harmony shares**

**12.4.1 Employee Share Schemes**

Harmony has a share option scheme for its employees that, as at 31 March 2003, had a total of 4 887 700 (1994) and 8 000 000 (2001) Harmony shares reserved for issuance thereunder. The maximum number of share options that may be outstanding at any time under the employee share option scheme is equal to 10% of the outstanding Harmony shares then in issue. The exercise price of







each option granted under the scheme is set at the closing market price of Harmony's ordinary shares on the JSE on the day prior to the date of grant. Each option remains open for acceptance for 10 years after the date of grant, subject to the terms of the employee share option scheme.

**12.4.2 Listed warrants in respect of Harmony shares**

All of the warrants previously issued by Harmony have been exercised. The warrants entitled the holder to purchase, on any business day on or before 29 June 2003, one ordinary share at the rand public offering price per ordinary share or the U.S. dollar equivalent. The price paid for the warrant was R43,00 per warrant.

**12.5 Major shareholders**

At the date of issue of this circular, the following shareholders beneficially held more than 5% of the issued ordinary share capital of Harmony.

**Number of shares**

**Percentage**

**Name of shareholder**

**(million)**

**shareholding**

Bank of New York

78,4

42,6

JP Morgan Chase Bank

11,3

6,13

JP Morgan (Pty) Limited

10,9

5,97

Simane Security Investments (Pty) Limited

10,9

5,95

Harmony has no controlling shareholder, as the shares held by Bank of New York are held on behalf of shareholders who participate in Harmony's ADR program.

**13. FINANCIAL INFORMATION ON HARMONY**

**13.1 Information relating to Harmony**

**13.1.1** Financial information relating to Harmony is set out in Annexure 4.

**13.1.2** Annexure 2 contains the accountant's report on Harmony

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- 13.1.3** Annexure 7 sets out the trading history of Harmony shares on the JSE since 1 June 2000.
- 13.1.4** There have been no material changes with regards to the financial or trading position on the quarter ended 31 March 2003.
- 13.1.5** Pro forma financial effects are set out in Annexure 3.
- 13.1.6** A competent person's report on the mining assets of Harmony is reflected in Annexure 8.

### **13.2 Working capital**

The directors are of the opinion that the working capital available to the Harmony Group, including ARMgold, is sufficient for its present requirements, that is for the next 12 months from date of issue of this circular.

### **13.3 Borrowings and material loans**

The board of directors may raise, borrow or secure the payment of any sums of money for the purposes of Harmony as they see fit. However, the aggregate principal amount outstanding in respect of monies raised, borrowed or secured by Harmony and any of its subsidiaries may not exceed R40 million or the aggregate from time to time of the issued and paid-up capital of Harmony, together with the aggregate of the amount standing to the credit of all distributable and non-distributable reserves, the share premium account and the share premium accounts of Harmony's subsidiaries, whichever is the greater, except with the consent of the Harmony shareholders in general meeting.

The borrowing powers of Harmony have never been exceeded. The details of material loans to Harmony are reflected in Annexure 10.

No loan capital is outstanding.





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**13.4 Material inter-company finance**

All details regarding inter-company finance are set out in Annexure 14.

**13.5 Contingent liabilities and capital commitments**

Details of contingent liabilities and capital commitments are reflected in Annexure 12.

**13.6 Details of material loans by Harmony Group**

Details of material loans made by Harmony Group are reflected in Annexure 11.

**PART V**

**14. GENERAL**

**14.1 Litigation statement**

Save as indicated in Annexure 15, the Harmony Group is not a party to any legal or arbitration proceedings (including any pending or threatened proceedings of which Harmony is aware) that may have or have had in the recent past, a material effect on the Harmony Group's financial position.

**14.2 Expenses**

The costs and expenses of the merger payable by Harmony are currently estimated at approximately R20 million.

**14.3 Experts consent**

PricewaterhouseCoopers Inc. and SRK Consulting have given, and have not withdrawn, their consent to the inclusion of their names and reports in this circular in the form and context in which they appear.

**14.4 Corporate Governance**

Harmony is committed to effective corporate governance and endorses the Code of Corporate Practices and Conduct contained in the King II Report on Corporate Governance. All the key principles underlying the King recommendations have been reflected in Harmony's corporate governance structures. These are reviewed from time to time to take into account corporate changes and international developments with regard to corporate governance. Harmony fully subscribes to the principles of fairness, integrity, accountability and transparency. Harmony is committed to an open governance process, through which its employees, shareholders and stakeholders can be assured that the organisation is managed ethically, according to sound and effective risk management and in compliance with best international practices. The underpinning principles of Harmony's corporate governance practices rest upon the three cornerstones of an effective and efficient organisation, namely: day-to-day management processes, a long-term strategic planning process and effective transformation processes.

***Board of directors and board committees***

Harmony has a unitary board structure. The board comprises 10 directors, of whom six are independent directors, one of whom is the chairman, and four are executive directors. The non-executive and independent directors are of sufficient calibre and number for their views to carry significant weight in the board's decisions. In addition, the roles of chairman and chief executive are not vested in the same person. The board of directors meets on a quarterly basis and has a fiduciary duty to act in good faith with due diligence and care, in the best interests of Harmony and all its stakeholders. It is responsible for guiding and reviewing corporate strategy, monitoring performance, and determining policies and procedures to ensure the integrity of the company's risk management and internal controls.

All directors have access to the advice and services of the company secretary. They are also entitled to seek independent professional advice regarding the affairs of Harmony at the company's expense. The company secretary is

responsible to the board for ensuring that procedures and applicable statutes and regulations are complied with. The board has established a number of committees in which non-executives play an active role and which operate within defined terms of reference laid down by the board.







The board of directors exercises control over the operations of the Company through a structured approach via the following:

***Audit Committee***

The Audit Committee comprises three independent non-executive directors, being M F Fleming (Chairman), J G Smithies and D S Lushaba. The Audit Committee meets periodically with Harmony's external and independent internal auditors and executive management to review accounting, auditing and financial reporting matters so as to ensure that an effective control environment in Harmony is maintained. The committee also monitors proposed changes in accounting policy, reviews the internal audit function and discusses the accounting implications of major transactions. The committee operates in accordance with written terms of reference confirmed by the board.

***Health Safety and Environmental Audit Committee***

The Health Safety and Environmental ("HSE") Committee comprises three independent non-executive directors, namely J G Smithies (Chairman), M F Fleming and V N Fakude. This committee meets periodically with executive management to review Harmony's policies, practices and standards. The committee monitors HSE performance and makes recommendation to the board where particular attention is required. The committee operates in accordance with specific terms of reference confirmed by the board.

***Remuneration Committee***

The Remuneration Committee comprises three independent non-executive directors, namely A R Fleming (Chairman), M F Fleming, and J G Smithies. The committee, in consultation with management where necessary, meets at least once a year and ensures that Harmony's directors and senior executives are fairly rewarded for their individual contributions to Harmony's overall performance, as well as determining the remuneration policy pertaining to all employees.

***Insider trading***

Employees and directors are prohibited from dealing in Harmony shares during price sensitive periods. In line with regulatory and governance requirements, they must furthermore disclose their own and the dealings of their concert parties in Harmony shares to the company secretary.

***Risk management and internal control***

Harmony's operations are subject to the provisions of numerous South African Acts of law and the regulations promulgated thereunder, the principal acts being the Minerals Act and the Mine Health and Safety Act. The provisions of these Acts and regulations ensure that extensive and well-managed risk control initiatives are an integral part of Harmony's operations. The Harmony board, through its Audit Committee, retains risk management control through the final review of key risk matters affecting Harmony, and is responsible for facilitating risk assessments to determine the material risks to which the company may be exposed and for evaluating the strategy for managing those risks.

The focus of risk management is on identifying, assessing, managing and monitoring all known forms of risk. Harmony endeavours to minimise operating risk by ensuring that the appropriate infrastructure, control systems and people are in place throughout its business units. Key policies and procedures employed in managing operating risk involve segregation of duties, transaction authorisation, monitoring and financial and managerial reporting. Financial risks are managed within predetermined procedures and constraints. Compliance is measured through regular reporting against these standards, internal audit checks and external audit verification. Risk control with regard to numerous potential loss exposures, such as the health and safety of Harmony's workers and third parties, the protection of assets, the prevention of business interruption losses, the safeguarding of the environment, and the minimisation of exposure to civil and criminal litigation, are integral aspects of Harmony's operations. Internal controls comprise methods and procedures adopted by management to assist in achieving the objectives of safeguarding assets, preventing and detecting errors and fraud, ensuring the accuracy and completeness of accounting records and preparing reliable financial statements. The internal audit function





has been outsourced to an independent accounting firm and serves the board and management by performing independent evaluations of the adequacy and effectiveness of the company's controls, financial reporting mechanisms and records, information systems and operations.

The board of directors, operating through its Audit Committee, oversees the financial reporting process and is satisfied that the controls systems are adequate for this purpose.

***Integrated sustainability***

The role of the stakeholders in the sustainability of Harmony is recognised. In this regard, programmes and involvement in projects have been initiated addressing areas in which meaningful contributions can be made. Stakeholder relationships are strengthened through adherence to a formal code of ethics.

**14.5 Significant contracts**

Save for the merger agreement and agreements relating to the acquisitions and disposals of companies, businesses and properties set out in Annexure 9, Harmony has not entered into any contract, other than in the ordinary course of business, within the period of two years immediately preceding the date of this circular which is or may be material to Harmony. In addition, Harmony has not entered into any contract which contains provisions, in terms of which there are any obligations or entitlements, which are material to Harmony.

**14.6 Acquisitions and disposals of property**

Details of the acquisitions and disposals of companies, businesses and properties by Harmony over the past 3 years are reflected in Annexure 9.

**15. DOCUMENTS AVAILABLE FOR INSPECTION**

Copies of the following documents will be available for inspection during normal business hours at the registered office of Harmony and at the office of St James's Corporate Services Limited:

- a signed copy of this circular;
- the Memorandum of Association and the Articles;
- the merger agreement;
- the significant contracts relating to ARMgold referred to in paragraph 4.6;
- the written consents of advisers to Harmony to the publication of their names in this circular context in which they appear;
- copies of service agreements with directors;
- the Competent Person's Report;
- the audited annual reports of Harmony for the three financial years ended 30 June 2002; and
- report of PricewaterhouseCoopers Inc. on the pro forma financial information of Harmony.

Signed by Frank Abbott and Ferdi Dippenaar on 5 August 2003 on behalf of the directors.

**Harmony Gold Mining Company Limited**





**Annexure 1**

**Extracts from the Memorandum and Articles relating to the directors of Harmony**

**APPOINTMENT, QUALIFICATION, REMUNERATION OF DIRECTORS AND BORROWING POWERS OF THE COMPANY AS THEY MAY BE EXERCISED BY THE DIRECTORS**

**Extracts from the Articles of Association of Harmony:**

1.

**Qualification of directors**

"80. Directors shall not be required to hold any shares in the Company to qualify them for appointment as directors."

2.

**Remuneration of directors**

"85. The directors shall be entitled to such remuneration as may be determined from time to time in general meeting or by a quorum of disinterested directors. In addition, the directors shall be entitled to reasonable expenses in travelling to and from meetings of the directors."

"86. If any director be called upon to perform extra services or to make any special exertion abroad, or otherwise, for any of the purposes of the Company, the Company in general meeting or a quorum of disinterested directors may determine the remuneration to be paid to any such director for such services or special exertions. Such remuneration may be so determined either by way of a salary or a percentage of profits or otherwise and such remuneration may be either in addition to, or in lieu of, any other remuneration determined under article 85. The Company may also refund to such director reasonable expenses incurred by him while acting in the course of the business of the Company."

3.

**Disclosure of interests**

"88. (a) Save as set out in sub-paragraph (d), a director shall not vote in respect of any contract or arrangement in which he is interested (and if he shall do so his vote shall not be counted) nor shall he be counted in the quorum for the purpose of any resolution regarding the same, in the quorum present at the meeting, but this shall not apply to any of the following matters:

(i)

Any arrangement for giving to him any security or indemnity in respect of money lent by him or any obligation undertaken by him for the benefit of the Company.

(ii) Any arrangement for the giving by the Company of any security to a third party in respect of any contract or obligation of the Company for which he himself has assumed responsibility in whole or in part under a guarantee or indemnity or by the deposit of a security.

(iii) Any contract by him to subscribe for or underwrite shares or debentures of the Company.

(iv) Any contract or arrangement with any other company in which he is interested in shares or debentures of that company.

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no more than one per cent of either any class of the equity share capital, or the voting rights of the company.

(v) Any such scheme or fund as is referred to in Article 146, which relates both to directors or employees or a class of employees and does not accord to any director as such any privilege or advantage not generally accorded to the employees to which such scheme or fund relates.

(vi) Any contracts, transactions or dealings of any nature whatsoever between the Company and any other company:

(a) which is its subsidiary, where the director's interest in the contract, transaction or dealing is only by virtue of the other company being a subsidiary of the Company; or

(b) in which it is a shareholder or is otherwise interested, where the director's interest in the contract, transaction or dealing is only by virtue of the Company being a shareholder of or otherwise interested in the other company; or

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(c) which is its holding company, where the director's interest in the contract, transaction or dealing is only by virtue of the other company being the Company's holding company; or

(d) which is a subsidiary of its holding company, where the director's interest in the contract, transaction or dealing is only by virtue of the other company being a subsidiary of the Company's holding company; or

(e) in which its holding company is a shareholder or is otherwise interested, where the director's interest in the contract, transaction or dealing is only by virtue of the Company's holding company being a shareholder or otherwise interested in the other company."

"88.(b) The provisions of this Article may by the Company in general meeting at any time be varied to any extent and either generally or in respect of any particular contract, arrangement or transaction or any particular contract, arrangement or transaction carried out in contravention of this Article as ratified by the Company in general meeting. Notwithstanding the provisions of article 58, any decision of the Company in general meeting in terms of this article 88(b) shall be decided by a 75% (seventy five percent) majority of votes."

"88.(c) A director, notwithstanding his interest may be counted in the quorum present at any meeting or any other director is appointed to hold any office or place of profit under the Company or where the directors resolve to exercise any of the rights of the Company (whether by the exercise of voting rights or otherwise) to appoint or concur in the appointment of a director to hold any office or place of profit under any other company or where the terms of any such appointment as hereinbefore mentioned are considered or varied, and he may vote on any such matter other than in respect of his own appointment, in the arrangement or variation of the terms thereof."

#### 4.

##### **Borrowing powers**

"124. Subject to articles 125 and 127 the directors may from time to time at their discretion authorise the Company to secure the payment of any sum or sums of money for the purposes of the Company as they see fit, and any particular may pass mortgage bonds or issue debentures or debenture stock of the Company whether secured or unsecured or secured by all or any part of the property of the Company, whether present or future assets of the Company."

"125. Where the Company is a listed company and is not a subsidiary of a listed company, the directors shall not restrict the borrowing of the Company and exercise all voting and other rights or powers of control exercisable by the Company in relation to its subsidiary companies (as regards subsidiary companies as by such exercise they can procure) and that the aggregate principal amount outstanding in respect of any such monies so raised, borrowed or secured by the Company and any of its subsidiary companies for the purposes of the Company (hereinafter referred to as "the Group"), as the case may be, exclusive of inter-company borrowings, shall not exceed with the consent of the Company in general meeting, exceed R40 000 000 (forty million Rand) or the aggregate from time to time of the issued and paid-up capital of the Company, together with the aggregate of the amounts standing to the credit of all distributable and non-distributable reserves (including minority interests in subsidiary companies and provision for deferred taxation), any share premium accounts of the Company and its subsidiaries certified by the Company's auditors and as appearing in or forming part of the last annual financial statements of the Company or of the Group, as the case may be, which shall have been drawn up to be laid before the Company in general meeting at the relevant time, whichever is the greater; provided that no such sanction shall be required to the borrowing of any such monies intended to be applied and actually applied within 90 (ninety) days in the repayment (with or without interest) of such monies."

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premium) of any monies then already borrowed and outstanding and notwithstanding that such new borrowing may result in the abovementioned limit being exceeded."

"126. For the purposes of article 125 "borrowings" shall:

(a) without limitation, include monetary guarantees executed by the Company or by any controlling company or subsidiary of the Company other than:

(i) guarantees in respect of the borrowing of moneys, where the amount of such borrowing is already included in the aggregate referred to in article 125;

(ii) guarantees of the obligations of any subsidiary where such obligations arise from acts which had been performed by the Company as principal, would not constitute borrowings within the meaning of this Article;





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provided that where the guarantees have been executed to secure bank overdraft or other facilities of a variable nature, such guarantees shall only be deemed to be borrowings to the extent to which such overdraft or other facilities are used from time to time;

(b) not include any borrowing by the Company from any of its subsidiaries or by any of its subsidiaries from the Company or from any other of its subsidiaries."

"127. In the event that the Company is a subsidiary of a listed holding company, the total amount of monies raised, borrowed or secured shall not exceed the amount authorised by the listed holding company."

"128. No lender or person dealing with the Company shall be obliged to see or enquire whether the conditions imposed by articles 125 and 127 are observed."

"129. Debentures, debenture stock, bonds and other instruments of debt may be issued at par or at a premium, and with any special privileges as to redemption, surrender and drawings, provided that no special privileges as to allotment of shares or stock, attending and voting at general meetings, or of directors or otherwise shall be given save with the sanction of the Company in general meeting."

5.

### **Appointment of directors and managing directors**

"79.

The directors shall have power at any time to appoint any eligible person as a director, either to fill a vacancy, or as an addition to the Board, but the total number of the directors shall not at any time exceed the maximum number fixed. Any director so appointed shall hold office only until the next following general meeting of the Company and then shall be eligible for election."

"110. The directors may from time to time appoint one or more of their body to any executive office in the Company, and may from time to time remove or dismiss the person or persons so appointed and appoint another person or persons in his or their place or places. Every such appointment shall be made by a majority of disinterested directors. No director shall be appointed to any such office for a period in excess of five years at any one time."

"111. If a director is appointed to any executive office in the Company the contract under which he shall hold that office, whichever period is the shorter, be subject to retirement by rotation. In such case the period shall be taken into account in determining the retirement of directors by rotation. Notwithstanding the foregoing, where the Company is a listed company the number of directors who may be appointed to any executive office on the condition that they shall not be subject to retirement by rotation shall not equal or exceed the total number of the directors at the time of such appointment."

"112. The remuneration of executive directors appointed in terms of article 110 shall from time to time be determined by a quorum of disinterested directors or by the Company in general meeting."

"113. The directors may from time to time entrust to and confer upon a managing director or other director for the time being such of the powers exercisable under these Articles by the directors as they may deem fit, and may confer such powers either collaterally with or to the exclusion of and in substitution of any powers conferred upon any other director."

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or any of the powers of the directors in that behalf, and may from time to time revoke, withdraw, all or any of such powers."

"114. A person appointed to an executive office in terms of article 110 shall be subject to t  
to vacation of office as the other directors of the Company, and if he ceases to hold the office  
any cause he shall ipso facto cease to hold such executive office."

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**Annexure 2**

**Report of the independent reporting accountants on the *pro forma* financial effects of the merger to the shareholders of Harmony**

"The Directors  
Harmony Gold Mining Company Limited  
PO Box 2  
Randfontein  
1760

25 July 2003

**Report of the independent reporting accountants on the unaudited *pro forma* financial information relating to the proposed merger with ARMgold**

**INTRODUCTION**

Harmony Gold Mining Company Limited ("Harmony") has reached agreement for a merger with African Rainbow Minerals Gold Limited ("ARMgold"). It is intended that the merger will be implemented by means of a scheme of arrangement to be proposed by Harmony between ARMgold and its shareholders in terms of section 311 of the Companies Act.

We report on the unaudited *pro forma* financial effects and balance sheet ("the *pro forma* financial information") set out in paragraph 6 and Annexure 3, respectively, of the circular to Harmony shareholders to be dated on or about 7 August 2003 ("the Circular").

The unaudited *pro forma* financial information has been prepared for illustrative purposes only to provide information on how the merger would have impacted on the financial position and results of Harmony. Because of their nature, the unaudited *pro forma* financial information may not give a fair reflection of Harmony's financial position after the merger, nor the effect on future earnings.

At your request, and for purposes of the merger, we present our report on the unaudited *pro forma* financial information of Harmony in compliance with the Listings Requirements of the JSE Securities Exchange South Africa ("JSE").

**RESPONSIBILITIES**

The directors of Harmony are solely responsible for the preparation of the unaudited *pro forma* financial information to which this independent reporting accountants' report relates, and for the financial statements and financial information from which it has been prepared.

It is our responsibility to form an opinion on the unaudited *pro forma* financial information and to report our opinion to you. We do not accept any responsibility for any reports previously given by us on any financial information used in the compilation of the unaudited *pro forma* financial information, beyond that owed to those to whom those reports were addressed at their dates of issue.

**BASIS OF OPINION**

Our work, which did not involve any independent examination of any of the underlying financial information, consisted primarily of agreeing the unadjusted financial information to the published quarterly results of Harmony for the three quarters ended 31 March 2003, considering the evidence supporting the adjustments to the unaudited *pro forma* financial information, recalculating the amounts based on the information obtained and discussing the unaudited *pro forma* financial information with the directors of Harmony.

Because the above procedures do not constitute either an audit or a review made in accordance with statements of South African Auditing Standards, we do not express any assurance on the fair presentation of the unaudited *pro forma* financial information.





Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with statements of South African Auditing Standards, other matters might have come to our attention that would have been reported to you.

**OPINION**

In our opinion:

- the unaudited *pro forma* financial information has been properly compiled on the basis stated
- such basis is consistent with the accounting policies of Harmony; and
- the adjustments are appropriate for the purposes of the unaudited *pro forma* financial information in section 8.29 of the JSE Listings Requirements.

Yours faithfully

**PricewaterhouseCoopers Inc.**  
*Chartered Accountants (SA)*  
*Registered Accountants and Auditors*

Sunninghill"

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**Annexure 3**

*Pro forma financial information of Harmony*

The unaudited *pro forma* balance sheet of Harmony has been prepared for illustrative purposes only to provide information on how the merger would have impacted on the financial position of Harmony. Because of its nature, the unaudited *pro forma* balance sheet may not give a fair reflection of Harmony's financial position after the merger

The report thereon of PricewaterhouseCoopers Inc. is set out in Annexure 2 of this circular.

**Specific issue**

**Harmony**

**ARMgold**

**of shares in**

**before**

**before                      Dividend                      consideration**

**Harmony**

**merger**

**merger**

**adjustment**

**of merger**

**after merger**

**R'million**

**R'million**

**R'million**

**R'million**

**R'million**

**Note 1**

**Note 2**

**Note 3**

**Note 4**

**BALANCE SHEET**

**ASSETS**

**Non-current assets**

10 361

1 571

-

4 819

16 751

Tangible assets

8 986

1 571

-

3 371

13 928

Intangible assets

-

-

-

1

448

1

448

Investments

1 375

-

-

-

1 375

**Current assets**

3 899

2 575

(471)

-

6 003

Inventories

449

-

-

449

Trade and other receivables

322

178

-

-

500

Cash and cash equivalents

3 128

2 397

(471)

-

5 054

**Total assets**

14 260

4 146

(471)

4 819

22 754

**EQUITY AND LIABILITIES**

Ordinary shareholders' interest

8 932

2 249

(471)

3 808

14 518

Outside shareholders' interest

**Total shareholders' interest**

8 932

2 249

(471)

3 808

14 518

**Long-term borrowings**

2 015

529

-

-

2 544

**Deferred taxation**

851

-

1 011

1 862

**Deferred financial liabilities**

491

**Long-term provisions**

686

248

-

-

934

**Current liabilities**

1 285

1 120

-

-

2 405

Trade and other payables

1 008

1 120

-

-

2 128

Taxation

272

-

-

272

Shareholders for dividends

5

-

-

-

5

**Total equity and liabilities**

14 260

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4 146

(471)

4 819

22 754

Shares in issue (`000)

184 163

-

-

-

247 830

Net asset value per shares (cents)

4 850

-

-

-

5 858

Net tangible asset value per share (cents)

4 850

-

-

-

5 274

**Notes:**

1. Extracted from Harmony's published quarterly report for the period ended 31 March 2003.
2. Extracted from ARMgold's published quarterly report for the period ended 31 March 2003.







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3. The net asset value per share has been adjusted to take account of a special dividend of 500 dividend is a condition of the merger and will be paid prior to the completion date.

4. The purchase price was calculated as 95 500 000 ARMgold shares at R58,50 per share on the da price of R87,75 at close of business on 22 July 2003, being the most recent share price). The dif R5 587 million and the net asset value at 31 March 2003 of R2 249 million, as well as the decreas payment, is R3 808 million. After the deferred tax gross up of R1 011 million the total fair valu follows:

- R3 371 million to tangible assets; and
- R1 448 million to intangible assets.

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**Annexure 4**

**Historical financial information of Harmony**

The following information was extracted from the audited company financial statements for the years to 30 June 2002, 30 June 2001, 30 June 2000 and the unaudited quarterly for 9 months to March 2003.

**Harmony income statement**

**Unaudited**

**Audited**

**Audited**

**Audited**

**9 months**

**Year**

**Year**

**Year**

**ended**

**ended**

**ended**

**ended**

**31 March**

**30 June**

**30 June**

**30 June**

**R'million**

**2003**

**2002**

**2001**

**2000**

**Revenue**

**7 152**

**7 806**

**4 495**

**2 996**

Cash operating costs

(4 962)

(5 215)

(3 822)

(2 535)

**Cash operating profit**

**2 190**

**2 591**

**673**

**461**

Income from associates

24

-

-

-

Interest and dividends

-

138

45

63

Other income - net

141

94

81

54

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Employment termination and restructuring costs

(35)

(83)

(36)

(1)

Corporate, administration and other expenses

(90)

(78)

(19)

(12)

Exploration expenditure

(80)

(61)

(27)

(16)

Marketing and beneficiation development

(89)

(38)

(12)

Profit/(Loss) of sale of listed investments

469

46

(11)

16

Interest paid

(182)

(230)

(114)

(20)

**Cash profit**

**2 437**

**2 328**

**554**

**533**

Depreciation and amortisation

(403)

(308)

(237)

(136)

(Provision)/Reversal of provision for  
rehabilitation costs

(34)

(20)

52

2

Gain/(Loss) on financial instruments

210

48

58

54

Gain on listed investments

(523)

595

-

(9)

Foreign exchange losses

(49)

-

-

-

Impairment of assets

-

(362)

(215)

-

(Provision)/Reversal of provision for former employees' post-retirement benefits

-

(2)

17

25

**Profit before tax**

**1 638**

**2 279**

**229**

**469**

Tax (520)

(583)

(111)

(86)

**Net profit before minority interests**

**1 118**

**1 696**

**118**

**383**

Minority interests



(16)

(3)

(19)

**Net profit**

**1 118**

**1 680**

**115**

**364**

Basic earnings per share (cents)

1 094

112

435

Fully diluted earnings per share (cents)

1 017

108

425

Basic headline earnings per share (cents)

1 316

254

382

Fully diluted headline earnings per share (cents)

1 223

246

373

Interim dividends per share (cents)

75

50

50

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Proposed final/final dividends per share (cents)

425

70

70

Total dividends per share (cents)

500

120

120





31

**Harmony balance sheet**

**Unaudited at**

**Audited at**

**Audited at**

**Audited at**

**31 March**

**30 June**

**30 June**

**30 June**

**2003**

**2002**

**2001**

**2000**

**R'million**

**R'million**

**R'million**

**R'million**

**ASSETS**

**Non-current assets**

**10 361**

**11 502**

**5 996**

**4 259**

Property, plant and equipment

8 986

9 433

5 424

3 738

Investments

1 375

1 778

572

425

Investment in associate

-

291

-

-

Investments in subsidiaries

-

-

-

-

Other assets

-

-

-

47

Restricted cash

-

-

-

49

**Current assets**

**3 128**

2 574

2 258

932

Inventories

-

448

300

189

Receivables

-

685

799

215

Cash and cash equivalents

3 128

1 441

1 159

528

**Total assets**

**13 489**

**14 076**

**8 254**

**5 191**

**EQUITY AND LIABILITIES**

**Ordinary shareholders' interest**

**8 932**

**7 963**

**4 594**

**2 875**

Share capital

-

85

72

49

Share premium

-

5 462

3 727

2 021

Options issued

-

-

69

69

Non-distributable reserves

-

88

54

(16)

Retained earnings

-

2 328

672

752

**Non-current liabilities**

**4 043**



4 232

2 420

1 299

Long-term borrowings

-

1 771

1 212

316

Preference shares

-

-

6

-

Deferred taxation

-

770

368

330

Deferred financial liability

-

971

397

272

Provision for environmental rehabilitation

-

711

427

356

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Provision for post-retirement benefits

-

9

8

25

Minority interests

-

-

2

-

**Current liabilities**

**514**

**1 881**

**1 240**

**1 017**

Accounts payable and accrued liabilities

-

1 648

1 083

926

Income and mining taxes

-

228

50

17

Shareholders for dividends

-

5

107

74

**Total equity and liabilities**

**13 489**

**14 076**

**8 254**

**5 191**





32

**Harmony cash flow statement**

**Unaudited**

**Audited**

**Audited**

**Audited**

**9 months**

**year**

**year**

**year**

**ended**

**ended**

**ended**

**ended**

**31 March**

**30 June**

**30 June**

**30 June**

**R'million**

**2003**

**2002**

**2001**

**2000**

**Cash flow from operations**

Cash generated from operations

2 436

473

298

Interest and dividends received

138

45

19

Interest paid

(230)

(114)

(20)

Income and mining tax paid

(88)

(30)

(8)

**Net cash inflow from operating activities**

**1 687**

**2 256**

**374**

**289**

**Cash flows from investing activities**

Net increase in amounts invested  
in environmental trusts

(61)

(6)

(5)

Decrease in short-term investments

-

-

65

Cash cost to close Randfontein Hedges

(250)

-

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-

Restricted cash

-

50

(50)

Cash held by subsidiaries on acquisition

154

-

64

Cash paid for Randfontein

-

-

(349)

Cash paid for West Rand Cons and Kalgold

-

-

-

Cash paid for New Hampton mines

-

(229)

(6)

Cash paid for Elandskraal mines

(210)

(1 053)

-

Cash paid for Free Gold Mines

(900)

-



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-

Cash paid for Hill 50 mines

(1 419)

-

-

Investment in associate acquired

(292)

-

-

Investment in Highland Gold acquired

(188)

-

-

Loan repaid by Khumo Bathong

90

-

-

Proceeds on disposal of listed investments

158

-

-

Increase in other non-current investments

(156)

(64)

24

Proceeds on disposal of mining assets

34

87

70

Additions to property plant and equipment

(733)

(422)

(158)

Foreign currency translation adjustments

105

-

-

**Net cash utilised in investing activities**

**(228)**

**(3 668)**

**(1 532)**

**(345)**

**Cash flow from financing activities**

Long term borrowings raised - net

335

468

353

Preference shares issued

-

6

-

Ordinary shares issued net of expenses

1 580

1 435

37

Dividends paid

(221)

(120)

(81)

**Net cash generated by financing activities**

228

1 694

1 789

309

**Net increase in cash and cash equivalents**

1 687

282

631

253

Cash and equivalents at beginning of period

1 441

1 159

528

275

**Cash and equivalents at end of period**

3 128

1 441

1 159

528





33

Harmony statement of changes in equity

Number of

Harmony

ordinary

Number of

listed

Non-

shares

options

Share

Share

options

Retained

distributable

issued

issued

capital

premium

issued

earnings

reserves

Total

R'million

R'million

R'million

R'million

R'million

**R'million**

**Harmony**

Balance - 30 June 2000

97 310 435

7 579 900

49

2 021

69

752

(16)

2 875

Net income

-

-

-

-

-

115

-

115

Change in accounting policy

-

-

-

-

-

(43)

-

(43)

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Dividends declared

-  
-  
-  
-  
-

(152)

-

(152)

Issue of shares

- Public offerings

31 784 200

-

16

1 324

-

-

-

1 340

- IDC/Simane offering

10 736 682

-

5

381

-

-

-

386



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- Private offering

568 774

-

-

23

-

-

-

23

- Share trust

2 000 000

-

1

34

-

-

-

35

Exercise of employee share  
options

2 153 200

-

1

52

-

-

-

53

Share issue expenses

-

-

-

(108)

-

-

(108)

Issue of warrants

-

9 027 500

-

-

-

-

-

-

Reversal of marked-to-market  
Due to sale of Western Areas  
Limited shares

-

-

-

-

-

-

28

28

Foreign exchange translation reserve

-

-

-

-

-

-

(20)

(20)

Mark-to-market of listed and other  
investments

-

-

-

-

-

-

80

80

Mark-to-market of hedging  
instruments

-

-

-

-

-

-

(18)

(18)

**Balance - 30 June 2001**

**144 553 291**

16 607 400

72

3 727

69

672

54

4 594

Net income

-

-

-

-

-

1 680

-

1 680

Dividends declared

-

-

-

-

-

(119)

-

(119)

Issue of shares

- Public offerings

222 300

-

-

8

-

-

-

8

- International private placement

8 500 000

-

4

1 139

-

-

-

1 143

Exercise of employee share options

3 998 800

-

2

132

-

-

-

134

Conversion of preference shares

10 958 904

-

6

455

-

-

-

461

Share issue expenses

-

-

-

(42)

-

-

-

(42)

Conversion of warrants

1 014 054

(1 014 054)

1

43

-

-

-

44

Listed options expired

-

(7 579 900)

-

-

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(69)

95

(26)

-

Foreign exchange translation reserve

-

-

-

-

-

-

83

83

Mark-to-market of listed and other  
investments

-

-

-

-

-

-

(87)

(87)

Mark-to-market of hedging  
instruments

-

-

-

-

-

-

64

64

**Balance - 30 June 2002**

**169 247 349**

**8 013 446**

**85**

**5 462**

**2 328**

**88**

**7 963**

Currency translation reserve

(489)

Net earnings

1 118

Issue of share capital

1 305

Dividend paid

(965)

Balance - 30 March 2003

8 932

**1.**

**Accounting policies**

**Basis of preparation**

The annual financial statements are prepared on the historical cost basis except for certain financial instruments, which are carried at fair value. The Group's accounting policies as set out below have been consistently applied, and comply with the accounting standards issued by the International Accounting Standards Board, South African









**Use of estimates**

The preparation of the financial statements in conformity with South African Statements of Generally Accepted Accounting Practice and International Accounting Standards requires Harmony's management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Significant estimates used by management include the valuation and amortisation of long lived assets as well as estimates of exposure and liabilities with regard to rehabilitation costs, employee benefit liabilities, taxation and hedging and financial derivatives. Actual results could differ from those estimates.

**Consolidation***Consolidated entities*

The consolidated financial information includes the financial statements of Harmony, its subsidiaries, its proportionate interest in joint ventures and its interests in associates. A company in which Harmony has, directly or indirectly, through subsidiary undertakings, a controlling interest is classified as a subsidiary undertaking. The results of any subsidiary or joint venture acquired or disposed of during the year are consolidated from the date power of control was acquired and up to the date power of control ceased. Any excess or deficit of the purchase price, when compared to the net book value of the subsidiary acquired, is attributed to mineral property interests and amortised in terms of Harmony's accounting policies unless a permanent diminution in the value of the assets occurs, in which case it is written-off. Inter-company profits, transactions and balances have been eliminated.

*Investments in associates*

An associate is an entity, other than a subsidiary, in which the Group has a material long-term interest and in respect of which Harmony exercises significant influence over operational and financial policies, normally owning between 20% and 50% of the voting equity.

Investments in associates are accounted for by using the equity method of accounting based on the most recent audited financial statements or unaudited interim financial statements. Equity accounting involves recognising in the income statement the Harmony's share of the associates' profit or loss for the period. Harmony's interest in the associate is carried in the balance sheet at an amount that reflects the cost of the investment, the share of post-acquisition earnings and other movement in reserves. The carrying value of an associate is reviewed on a regular basis and, if an impairment in the carrying value has occurred, it is written off in the period in which such permanent impairment is identified.

*Investments in joint ventures*

A joint venture is an entity in which the Group holds a long-term interest and which is jointly controlled by Harmony and one or more ventures under a contractual arrangement. The Group's interest in jointly controlled entities is accounted for by proportionate consolidation. Under this method the Group includes its share of the joint venture's individual income and expenses, assets and liabilities in the relevant components of the financial statements on a line-by-line basis.

**Foreign currencies***Foreign entities*

For self sustaining foreign entities, assets and liabilities are translated using the closing rates at year-end, and income statements are translated at average rates. Differences arising on translation are taken directly to shareholders' equity, until the foreign entity is sold or disposed of, when the translation differences are recognised in the income statement as part of the gain or loss on sale.

Goodwill and fair value adjustments arising on the acquisition of foreign entities are treated as assets and liabilities of the foreign entity and translated at the closing rate.





*Foreign currency transactions*

The South African Rand is the functional currency of Harmony. Transactions in foreign currencies are converted at the rates of exchange ruling at the date of these transactions. Monetary assets and liabilities denominated in foreign currencies are translated at rates of exchange ruling at balance sheet date. Gains and losses and costs associated with foreign currency transactions are recognised in the income statement in the period to which they relate. These transactions are included in the determination of other net income.

**Financial instruments**

Financial instruments are initially measured at cost. Subsequent to initial recognition these instruments are measured as set out below. Financial instruments carried on the balance sheet include cash and bank balances, money market instruments, investments, receivables, trade creditors and borrowings.

**Cash and cash equivalents**

Cash and cash equivalents are defined as cash on hand, deposits held at call with banks and short-term highly liquid investments with insignificant interest rate risk and original maturities of three months or less. Cash and cash equivalents are measured at fair value, based on the relevant exchange rates at balance sheet date.

**Investments***Listed investments*

Investments in listed companies, other than investments in subsidiaries, joint ventures and associates, are carried at market value. Market value is calculated by reference to stock exchange quoted selling prices at the close of business on the balance sheet date. Changes in the carrying amount of strategic investments are credited to revaluation and other reserves in shareholders' equity. Movement in the carrying amount of trading securities are charged to the income statement. On disposal of an investment, the difference between the net disposal proceeds and the carrying amount is charged to the income statement. On disposal of strategic investments, amounts in the revaluation and other reserves relating to that investment, are transferred to retained earnings.

*Unlisted investments*

Unlisted investments are reflected at fair value, or cost, where fair value cannot reliably be measured. If the directors are of the opinion that there has been a permanent diminution in the value of these investments they are written- down and recognised as an expense in the period in which the diminution is recognised.

**Inventories**

Inventories which include gold in process and supplies, are stated at the lower of cost or net realisable value after appropriate allowances for redundant and slow-moving items. Stores and materials consist of consumable stores and are valued at average cost. Bullion on hand and gold in process represents production on hand after the smelting process in the case of deep level mines and in the case of open pit operations placement on heap leach pads. It is valued using the weighted average cost method. Costs included are average production costs at the relevant stage of production and relevant administration costs. Net realisable value is the estimated selling price in the ordinary course of business.

**Receivables**

Accounts receivable are stated at the gross invoice value, adjusted for payments received and an allowance for doubtful debt, where appropriate, to reflect the fair value of the anticipated realisable value. Bad debts are written- off during the period in which they are identified.

**Accounts payable**

Accounts payable are stated at cost, adjusted for payments made to reflect the value of the anticipated economic outflow of resources.







**Hedging**

Derivatives are recognised on the balance sheet at their fair value, unless they meet the criteria for normal purchase, normal sales exemption. On the date a derivative contract is entered into, Harmony designates it for accounting purposes as either:

- a hedge of the fair value of a recognised asset or liability (fair value hedge);
- a hedge of a forecasted transaction (cash flow hedge);
- a hedge of a net investment in a foreign entity; or
- a derivative to be marked-to-market.

Certain derivative transactions, however, while providing effective economic hedges under Harmony's risk management policies, do not qualify for hedge accounting.

Changes in the fair value of a derivative that is highly effective, and that is designated and qualifies as a fair value hedge, are recorded in the income statement, along with the change in fair value of the hedged asset or liability that is attributable to the hedged risk.

Changes in the fair value of a derivative that is highly effective, and that is designated and qualifies as a cash flow hedge, are recorded directly in equity. Amounts deferred in equity are included in the income statement in the same periods during which the hedged firm commitment of forecasted transaction affects net profit or loss.

Hedges of net investments in foreign entities are accounted for similarly to cash flow hedges. Recognition of derivatives which meet the criteria for the normal purchases, normal sales exemption under the International Accounting Standards are deferred until settlement, under these contracts Harmony must physically deliver a specified quantity of gold at a future date at a specified price and to the contracted counter party. Changes in the fair value of derivatives which are not designated as hedges or do not qualify for hedge accounting are recognised in the income statement.

Harmony formally documents all relationships between hedging instruments and hedged items, as well as its risk management objectives and strategy for undertaking various hedge transactions. This process includes linking derivatives as hedges to specific assets and liabilities or to specific firm commitments or forecasted transactions. Harmony also formally assesses, both at the hedge inception and on an ongoing basis, whether the derivatives that are used in hedging transactions are highly effective in offsetting changes in fair values or cash flows of hedged items.

**Borrowings**

Borrowings are recognised at amortised cost, comprising original debt less principal payments and

**Exploration costs**

Exploration costs are expensed as incurred. When a decision is taken that a mining property is capable of commercial production, all further pre-production expenditure is capitalised. Costs related to property acquisitions and mineral and surface rights are capitalised. Where the directors consider that there is little likelihood of the properties or rights being exploited or the value of the exploration rights have diminished below cost, a write-down is effected against exploration expenditure.

**Property, plant and equipment**

*Mining assets*

Mining assets, including mine development costs and mine plant facilities, are recorded at cost. Costs include pre-production expenditure incurred in the development of the mine and the present value of future decommissioning costs. Interest on borrowings to specifically finance the establishment of mining assets is capitalised until commercial levels of production are achieved. Development costs incurred to evaluate and develop new orebodies, to define mineralisation in existing orebodies to establish or expand productive capacity are capitalised. Mine development costs in the ordinary course to maintain production are expensed as incurred. Initial development and pre-production costs relating to a new orebody are capitalised until the orebody achieves commercial levels of production at which time the costs are amortised as set out below.





Stripping costs incurred during the production phase to remove waste ore are deferred and charged to operating costs on the basis of the average life of mine stripping ratio. The average stripping ratio is calculated as the number of tonnes waste material removed per tonne of ore mined. The average life of mine ratio is revised annually in the light of additional knowledge and change in estimates. The cost of "excess stripping" is capitalised as mine development costs when the actual stripping ratio exceeds the average life of mine stripping ratio.

*Mining operations placed on care and maintenance*

The net assets of operations placed on care and maintenance are written-down to net realisable value. Expenditure on the care and maintenance of these operations is charged against income, as incurred.

*Non-mining fixed assets*

Land is shown at cost and not depreciated. Buildings and other non-mining fixed assets are shown at cost less accumulated depreciation.

*Depreciation and amortisation*

Depreciation and amortisation of mineral property interests, mineral and surface rights, mine development costs and mine plant facilities are computed principally by the units of production method based on estimated proved and probable reserves. Proved and probable ore reserves reflect estimated quantities of economically recoverable reserves which can be recovered in future from known mineral deposits. Amortisation is first charged on mining ventures from the date on which the mining ventures reach commercial production quantities. Other non-mining fixed assets are depreciated by straight-line over estimated useful lives of two to five years.

*Impairment*

The recoverability of the carrying value of the long-term assets of Harmony, which include development costs are annually compared to the net book value of the assets, or whenever events or changes in circumstances indicate that the net book value may not be recoverable. The recoverable amount is the higher of value in use and net selling price. In assessing the value in use the expected future cash flows from the asset is determined by applying a discount rate to the anticipated pre-tax future cash flows. The discount rate used is Harmony's weighted average cost of capital as determined by the capital asset pricing model. An impairment is recognised in the income statement whenever the carrying amount of the asset exceeds its recoverable amount, to the extent that the carrying amount exceeds the assets' recoverable amount. The revised carrying amounts are amortised in line with Harmony's accounting policies. A previously recognised impairment loss is reversed if the recoverable amount increases as a result of a change in the estimates used to determine the recoverable amount. This reversal is recognised in the income statement and is limited to the carrying amount that would have been determined, net of amortisation, had no impairment loss been recognised in prior years.

The estimates of future discounted cash flows are subject to risks and uncertainties including the future gold price and exchange rates. It is therefore reasonably possible that changes could occur which may affect the recoverability of mining assets.

#### **Environmental obligations**

Estimated long-term environmental obligations, comprising pollution control, rehabilitation and mine closure, are based on Harmony's environmental management plans in compliance with current technological, environmental and regulatory requirements. The net present value of future rehabilitation cost estimates are recognised and provided for in full in the financial statements. The estimates are reviewed annually and are discounted using rates that reflect the time value of money.

Annual changes in the provision consist of finance cost relating to the change in the present value of the provision and inflationary increases in the provision estimate, as well as changes in estimates. The present value of environmental disturbances created are capitalised to mining assets against an increase in the rehabilitation provision. The rehabilitation asset is amortised as noted in Harmony's accounting policy. Rehabilitation projects undertaken, included in the estimates, are charged to the provision as incurred. The cost of ongoing current programmes to prevent and

control pollution is charged against income as incurred.







**Environmental trust funds**

Annual contributions are made to Harmony's trust funds, created in accordance with statutory requirements, to fund the estimated cost of pollution control, rehabilitation and mine closure at the end of the life of Harmony's mines. Contributions are determined on the basis of the estimated environmental obligation over the life of the mine. Income earned on monies paid to environmental trust funds is accounted for as investment income. The funds contributed to the trusts plus growth in the trust funds are included under investments on the balance sheet.

**Provisions**

Provisions are recognised when Harmony has a present legal or constructive obligation as a result of past events where it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation, and a reliable estimate of the amount of the obligation can be made.

**Deferred taxation**

Harmony follows the comprehensive liability method of accounting for deferred tax using the balance sheet approach. Under this method deferred income and mining taxes are recognised for the tax consequences of temporary differences by applying expected tax rates to the differences between the tax base of certain assets or liabilities and its balance sheet carrying amount. Deferred tax is charged to the income statement except to the extent that it relates to a transaction that is recognised directly in equity, or a business combination that is an acquisition. The effect on deferred tax of any changes in tax rates is recognised in the income statement, except to the extent that it relates to items previously charged or credited directly to equity.

The principal temporary differences arise from amortisation and depreciation on property, plant and equipment, provisions, post-retirement benefits and tax losses carried forward. Deferred tax assets relating to the carry forward of unused tax losses are recognised to the extent that it is probable that future taxable profit will be available against which the unused tax losses can be utilised.

**Pension plans and other employee benefits***Pension plans*

Pension plans are funded through annual contributions. Harmony's contributions to the defined contribution pension plans are charged to the income statement in the year to which they relate. Harmony's liability is limited to its annually determined contributions.

*Medical plans*

Harmony provides medical cover to current employees and certain retirees through one fund.

The medical accounting costs for the defined benefit plan are assessed using the projected unit credit method. The health care obligation is measured as the present value of the estimated future cash outflows using market yields consistent with the term and risks of the obligation. Actuarial gains and losses as a result of these valuations are recognised in the income statement. No contributions are made for employees retiring after 30 June 1996. A liability for retirees and their dependents prior to this date is accrued in full based on regular actuarial valuations.

*Equity compensation benefits*

Harmony grants share options to certain employees under an employee share plan. Costs incurred in administering the scheme are expensed as incurred. No compensation cost is recognised in these financial statements for options or shares granted to employees from employee share plans.

**Revenue recognition***Revenue*

Revenue represents gold sales and is recognised when the risks and rewards of ownership has passed to the buyer with delivery from the refinery. Sales revenue excludes value-added tax but includes the net profit and losses arising from hedging transactions to the extent that they relate to that metal and have been matched at the date of the financial statements.





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*Interest income*

Interest is recognised on a time proportion basis, taking into account the principal outstanding and the effective rate over the period to maturity, when it is determined that such income will accrue to Harmony.

*Dividend income*

Dividend income is recognised when the shareholder's right to receive payment is established, recognised at the last date of registration.

**Dividends declared**

Dividends paid are recognised when declared by the board of directors. Dividends are payable in South African Rands. Dividends declared which are payable to foreign shareholders are subject to approval by the South African Reserve Bank in terms of South African foreign exchange control regulations. In practice, dividends are freely transferable to foreign shareholders.

**Comparatives**

Where necessary comparative figures have been adjusted to conform with changes in presentation in

2.

**CASH OPERATING COSTS**

**R'million**

**2002**

**2001**

Cash operating costs include mine production, transport and refinery costs, general and administrative costs, movement in inventories and ore stockpiles as well as transfers to and from deferred stripping. These costs, analysed by nature, consist of the following:

Labour costs, including contractors

2 458

2 388

Stores and materials

1 101

912

Water and electricity

475

457

Changes in inventory

(23)

(68)

Other

1 204

133

5 215

3 822

**3.**

**INCOME BEFORE TAX**

**R'million**

**2002**

**2001**

The following have been included in income before tax:

Professional fees

32

18

Auditors' remuneration

5

2

Fees current year

2

1

Fees other services

3

1







40

4.

**OTHER INCOME NET**

**R'million**

**2002**

**2001**

Profit on sale of property, plant and equipment

21

80

Foreign exchange gains

99

9

Other (expenditure)/income - net

(26)

(8)

94

81

5.

**EMPLOYMENT TERMINATION AND RESTRUCTURING COSTS**

**R'million**

**2002**

**2001**

Free State

16

-

Randfontein and Elandskraal

36

34

Evander

2

1

Kalgold

-

1

Australian operations

32

-

Bissett mine

(3)

-

83

36

The closure of Virginia 2 shaft and Harmony 4 in the Free State resulted in certain excess labour, which could not be accommodated on the other shafts, becoming surplus and made redundant. Elandskraal continued the process of restructuring, which was started in the previous year, which lead to certain positions becoming redundant. The acquisition of Hill 50 in Australia resulted in the merger of the New Hampton and Hill 50 operations, which lead to certain restructuring and employment termination costs being incurred. The Bissett mine was placed on care and maintenance at 30 June 2001, due to the mining operations being uneconomic at gold prices at the time. As restructuring has been completed, over-provision on restructuring have been reversed.

During the year ended 30 June 2001, due to the closure of No. 4 shaft at Randfontein and the restructuring of Elandskraal certain restructuring costs were incurred which included the termination of service of certain production employees.

6.

**PROFIT/(LOSS) ON SALE OF LISTED INVESTMENTS**

**R'million**

**2002**

**2001**

Profit/(Loss) on sale of listed investments

46

(11)

As part of the initial public offering of ArmGold, Harmony subscribed to 2 860 000 shares at R38,67 per share. These shares were subsequently disposed of.

With the acquisition of Randfontein Estates Limited, Harmony acquired 4 944 948 shares in Western Areas Limited. These shares were disposed of at a loss of R11 million in the 2001 financial year.

7.

**GAIN ON LISTED INVESTMENTS**

R'million

2002

2001

Gain on mark-to-market of listed investments

595

-

The gain on the mark-to-market of listed investments is due to the reclassification of Harmony's investment in Aurion Gold to a trading security from a strategic security. This reflected a change in the Group's intentions regarding the Aurion Gold investment from a strategic, long term investment to a non-core investment. As a result of the reclassification, Harmony recorded a gain in the mark-to-market of listed investments of R595 million. These shares, which were purchased at Australian \$1.29 per share, were revalued at Australian \$3.93 per share at year end. Subsequent to year-end these shares were disposed of.





41

8.

**IMPAIRMENT/ (REVERSAL OF IMPAIRMENT) OF ASSETS**

**R'million**

**2002**

**2001**

Free State operations

63

(43)

Randfontein operations

12

(12)

Evander operations

-

(11)

Bissett operations

-

(149)

New Hampton operations

(437)

-

(362)

(215)

The current higher Rand gold price has resulted in significantly more economically mineable reserves being available at some of the older shafts, which has extended the life of several shafts and made them more profitable. Therefore some of the impairments of prior years have been reversed.

Harmony completed the redevelopment programme at New Hampton's Big Bell underground mine during the year. Production have indicated however that the grade is significantly less than expected. Therefore it has been deemed prudent to reduce the grade estimates for future production, which gave rise to a severe cut in the underground reserves at this mine. This has resulted in a significant impairment to the carrying value of this asset in Harmony's balance sheet.

Due to the depletion of economically mineable reserves, certain shafts at Randfontein, Evander and Free State were closed and the remaining net book value written -off during the prior financial year.

The Bissett mine was placed on care and maintenance at 30 June 2001 due to the mining operations being uneconomic at gold prices at that time. The write-down reflected the excess of book value of long-term and other assets over the estimated salvage values of those assets.

The recoverable amount for the impairment calculation was determined at the cash-generated unit level (the shaft) and represents the value in use. Discount rates of 11,5% for the South African operations and 10% for the Australian operations were used in the calculations of the recoverable amount.

9.

**TAXATION**

**R'million**

**2002**

**2001**

Current income and mining taxes

(265)

(63)

Deferred income and mining taxes

(318)

(48)

Total income and mining taxation (expense)/benefit

(583)

(111)

Mining tax on mining income is determined on a formula basis which takes into account the profit and revenue from mining operations during the year. Non-mining income is taxed at a standard rate. Tax on mining and non-mining income of Australian operations are taxed at a standard tax rate. Deferred tax is provided at the estimated expected future mining tax rate for temporary differences. Major items causing the Company's income tax provision to differ from the estimated effective mining rate of 29%^ (2001: 20.5%) were:







42

**R'million**

**2002**

**2001**

Tax on net income at estimated mining statutory rate

(659)

(26)

Valuation allowance raised against deferred tax assets

53

(75)

Non-taxable income/additional deductions

40

(4)

Difference between non-mining tax rate and estimated

mining statutory rate on non-mining income

(17)

(6)

Income and mining tax (expense)/benefit

(583)

(111)

**Deferred income and mining tax liabilities and assets on the balance sheet as of 30 June 2002 and 30 June 2001, relate to the following:**

Deferred income and mining tax liabilities

Depreciation and amortisation

1 257

653

Product inventory not taxed

33

35

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Other

198

30

Gross deferred income and mining tax liability

1 488

718

Net deferred income and mining tax assets

(718)

(350)

Deferred financial liability

(238)

(55)

Unredeemed capital expenditure

(416)

(250)

Provisions, including rehabilitation accruals

(34)

(98)

Tax losses

(30)

(15)

Valuation allowance

68

770

368

The Group's net deferrred tax liability is made up as follows:

Deferred tax assets

(243)

-

Deferred tax liabilities

1 013

368

770

368

As at 30 June 2002 the Group has unredeemed capital expenditure of R1 573 million (2001: R1 046 million) and tax losses carried forward of R93 million (2001: R53 million) available for deduction against future mining income. These future deductions are utilisable against mining income generated only from the Group's current mining operations and does not expire unless the Group ceases to trade for a period longer than one year.





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**10. MINORITY INTERESTS**

With effect from 1 April 2002, Harmony re-acquired the 10% participation interest in the Elandskraal mine that it had sold to a subsidiary of Khuma Bathong, a Black Economic Empowerment Company (BEE).

This has allowed Khuma Bathong to realise its investment and pursue other opportunities in the South African mining industry. The aggregate consideration paid by Harmony to Khuma Bathong was R210 million. This was netted off against the remaining R91 million due to Harmony under its original loan of April 24, 2001 to Khuma Bathong. This 10% participation interest in Elandskraal had been disposed of in the prior year, and minority interest had subsequently been separately accounted for.

**11. EARNINGS PER SHARE**

2002

2001

R'million

R'million

**Basic earnings per share**

Basic earnings per share is calculated by dividing the net income attributable to shareholders by the weighted number of ordinary shares in issue during the year

Net income attributable to shareholders

1 680

115

Weighted average number of ordinary shares in issue

153 509 862

102 997 239

**Basic earnings per share (cents)**

1 094

112

**Fully diluted earnings per share**

For the diluted earnings per share, the weighted average number of ordinary shares in issue is adjusted to assume conversion of all share options granted and warrants in issue. The average number of options used in the calculation of diluted earnings per share is calculated by taking the average number of ordinary options allocated in terms of the share option scheme multiplied by the weighted average option price divided by the average price of the ordinary shares on the JSE.



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Weighted average number of ordinary shares in issue

153 509 862

102 997 239

Adjustments for share options

7 346 070

3 348 123

Adjustments for warrants in issue

4 361 156

-

Weighted average number of ordinary shares for diluted earnings per share

165 217 088

106 345 362

**Fully diluted earnings per share (cents)**

1 017

108

**Headline earnings per share**

The calculation of headline earnings per share is based on the basic earnings per share calculation adjusted for the following items:

Net income attributable to shareholders

1 680

115

Profit on sale of property, plant and equipment

(21)

(80)

Net impairment of assets

362

215

Other

-

11

Headline earnings

2 021

261

**Basic headline earnings per share (cents)**

1 316

254

**Fully diluted headline earnings per share (cents)**

1 223

246





44

**12. DIVIDENDS DECLARED**

**2002**

**2001**

**R'million**

**R'million**

As a result of adopting IAS 10 (revised), dividends now relate to those declared in the current financial year. The final dividend proposed for this financial year was only approved after the balance sheet date.

**Dividends declared**

Interim dividend no. 74 of 75 cents per share (2001: 50 cents)

119

51

Final dividend (2001: 70 cents per share)

-

101

119

152

Under the previous accounting policy, the dividends proposed would have been as follows:

**Dividends proposed**

Final dividend no. 75 proposed of 425 cents per share (2001: Nil)

719

-

**Dividend cover based on total declared and proposed (times)**

Based on attributable income

2,0

0,8

Based on headline earnings

2,4

1,7

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The final dividend in respect of the 2002 financial year was approved on 2 August 2002. These financial statements does not reflect the final dividend proposed. It will be accounted for in the 2003 financial year.

**13. PROPERTY, PLANT, AND EQUIPMENT**

**2002**

**2001**

**R'million**

**R'million**

Mining properties, mine development costs and mine plant facilities

9 285

5 273

Other non-mining assets

148

151

9 433

5 424

**Mining properties, mine development costs and mine plant facilities**

**2002**

**2001**

**R'million**

**R'million**

Cost at beginning of year

8 771

6 614

Acquired through the purchase of subsidiaries

3 843

1 751

Additions

735

411

Disposals

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(22)

(5)

Foreign currency translation adjustments

1 060

-

14 387

8 771

Accumulated depreciation and amortisation at beginning of year

3 498

2 972

Acquired through the purchase of subsidiaries

515

93

Impairment of fixed assets

355

202

Disposals

(8)

(2)

Foreign currency translation adjustments

447

-

Charge

295

233

5 102

3 498

**Net book value**

9 285

5 273







45

**Other non-mining assets**

**2002**

**2001**

**R'million**

**R'million**

Cost at beginning of year

189

177

Additions

6

12

Disposals

(3)

-

Foreign currency translation adjustments

1

-

193

189

Accumulated depreciation and amortisation at beginning of year

38

33

Disposals

(3)

-

Foreign currency translation adjustments

2

-

Charge for the year

8

5

45

38

**Net book value**

148

151

**Total net book value**

9 433

5 424

Other non-mining assets consist of mineral subscription and participation rights, freehold land, equipment and motor vehicles.

**14. NON-CURRENT INVESTMENTS**

**2002**

**2001**

**R'million**

**R'million**

**Listed investments**

Investments in listed shares (a)

988

320

**Other investments**

Investment in Highland Gold Limited (b)

188

-

Unlisted investments and loans (c)

26

23

Amounts contributed to environmental trust funds (d)

487

193

Loan to Harmony Share Trust (e)

89

36

790

252

**Total non-current investments**

1 778

572

(a) Listed investments consist of 43 350 992 shares in Aurion Gold Limited (previously Goldfields) valued at R22,78 per share. The shares are listed on the Australian Stock Exchange. The market value of the shares at the close of business on 30 June 2002 by reference to stock exchange quoted prices and rates was R988 million (2001: R320 million). Subsequent to year end this investment was disposed of (refer to note 34). Dividends received during the year from Aurion Gold amounted to R11 million.

(b) The company has acquired a strategic 32,5% shareholding in Highland Gold Limited on 31 May 2002 for US\$18 million. Highland Gold Limited is a Jersey-based company which holds Russian gold assets, including a producing gold mine together with projects and potential projects at various stages of development.

(c) Unlisted investments comprise of various industry related investments and loans, which have been valued at book value by the directors. The directors of the Company perform independent valuations of the investments on an annual basis to ensure that no permanent diminution in the value of the investments has occurred. Dividends received from these investments amounted to R2 million in the financial year.

(d) The environmental trust funds are irrevocable trusts under the Group's control. The monies invested primarily in interest bearing short-term and other investments and approximate their fair value.

(e) A loan of R89 million was made to the Harmony Share Trust to acquire 2 716 600 shares for participating in the Harmony Share Option Scheme. Refer to note 29 for details on the share option scheme.





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**15. INVESTMENT IN ASSOCIATE AND SUBSIDIARIES**

**2002**

**2001**

**R'million**

**R'million**

**Listed investment in associate**

Shares, at cost

292

-

Share of results before tax

(14)

-

Costs capitalised

14

-

Net share of results of associate

Exchange differences

(1)

-

Closing carrying amount

291

-

Valued by the directors at book value.

As at 30 June 2002 the Group held 294 222 437 shares in Bendigo Mining NL, a company incorporated in Australia. The investment represent a 31,8% interest in a single project gold company, listed on the Australian Stock Exchange. The company is developing into virgin underground orebodies which have been proved to exist beneath old workings which made up this gold field which closed in the early 1950's after 100 years of continuous production. All pre-production costs are capitalised. The market value of this investment as determined by closing prices on the

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Australian Stock Exchange at the close of business and closing exchange rates amounted to R503 million. Harmony has also been granted options to acquire 360 million shares in Bendigo any time before 31 December 2003 at Australian \$0,30 per share.

The Group's interest of 31,8% in the summarised balance sheet of the associate is as follows:

**2002**

**2001**

**R'million**

**R'million**

Capital and reserves

79

-

Non-current liabilities

2

-

81

-

Fixed assets

6

-

Net current assets

75

-



81

-

**16. INTEREST IN JOINT VENTURE**

The Group has a 50% interest in a joint venture with ARMgold Limited, the ARMgold/Harmony Freegold Joint Venture Company (Pty) Limited, which operates as a gold mining company in the Welkom area of the Free State goldfields. The joint venture company purchased the Free Gold and Joel assets from AngloGold limited for approximately R2 831 million and took operational control of these assets on 3 January 2002. The following amounts represent the Group's share of the assets and liabilities and revenue and expenses of the joint venture and are included in the consolidated balance sheet and income statement:





47

**2002**

**2001**

**R'million**

**R'million**

Property, plant and equipment

1 079

-

Investments

229

-

Current assets

571

-

1 879

-

Non-current interest-bearing borrowings

517

-

Non-current intergroup borrowings

907

-

Deferred income and mining taxes

(213)

-

Provision for environmental rehabilitation

200

-

Provision for post-retirement benefits

1

-

Current liabilities

181

-

1 593

-

**Net assets**

286

-

Profit before taxation

422

-

Taxation

(136)

-

**Profit after taxation**

286

-

Operating cash flows

525

-

Investing cash flows

(922)

-

Financing cash flows

900

-

**Total cash flows**

503

-

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Proportionate interest in joint venture commitments

14

-

There are no contingencies relating to the Group's interest in the joint venture. The number of employees in the joint venture was 13 734 at year-end.

Freegold has announced that it has reached an agreement in principal with Goldfields Limited to acquire the assets of St Helena gold mine for a gross sale consideration of R120 million. In addition the joint venture company will pay a royalty of 1% of revenue to Goldfields from the effective date for a period of 48 months. The agreement is subject to the fulfilment of certain conditions precedent. Thereafter implementation of the agreement will be subject to the obtaining of all necessary regulatory consents and approvals by 31 October 2002. It is expected that this deal will be concluded after year-end.

### 17. INVENTORIES

2002

2001

R'million

R'million

Gold in-process

286

195

Stores and materials at average cost

162

105

448

300

### 18. RECEIVABLES

2002

2001

R'million

R'million

Value-added tax

92

103

Trade receivables

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103

70

Amount owing relating to share issue

-

292

Interest and other

490

334

685

799







48

**19. SHARE CAPITAL AND SHARE PREMIUM**

**2002**

**2001**

**R'million**

**R'million**

**Share capital**

*Authorised*

250 000 000 (2001: 250 000 000) ordinary shares of 50 cents each

10 958 904 (2001: 10 958 904) redeemable convertible preference shares of 50 cents each

*Issued*

169 247 349 (2001: 144 553 291) ordinary shares of 50 cents each

Ordinary shares of 50 cents each at 1 July 2001

72

49

Issued in terms of the share option scheme

2

2

Issued for cash to repay debt

4

21

Conversion of preference shares

6

-

Warrants converted

1

-

Balance at 30 June 2002

85

72

**Share premium**

5 462

3 727

The unissued shares are under the control of the directors until the forthcoming Annual General Meeting. The directors report and note 29 set out details in respect of the share option scheme.

The Company has a general authority to purchase its shares up to a maximum of 20% of the issued share capital in any one financial year. This is in terms of the annual general meeting of shareholders on 16 November 2001. The general authority is subject to the Listings Requirements of the JSE and the Companies Act of South Africa, as amended.

**20. HARMONY LISTED OPTIONS AND WARRANTS**

**2002**

**2001**

**R'million**

**R'million**

For the acquisition of Vermeulenskraal Noord, 1 125 000 warrants were issued at a fair value of South African Rand 10 per warrant on 3 December 1996

-

11

For the acquisition of Lydex, 6 418 855 warrants were issued at a fair value of South African R8,89 per warrant during the period January through March 1997

-

58

For obtaining the credit facility from NM Rothschild 36 045 warrants were issued at fair value of South African R5,70 per warrant on 6 June 1998

-

0

-

69

The options were exercisable at a price of South African R60,00, at which time they could have been converted into ordinary shares of the Company, on or before July 31, 2001. None of the options were exercised and they lapsed. In terms of a transaction dated 29 June 2001, 27 082 500 ordinary shares and 9 027 500 options to purchase 9 027 500 additional ordinary shares were issued. Ordinary shares were purchased in integral multiples of three and investors

received one option for every three shares purchased. Each option will entitle its holder to purchase, on any business day on or before 28 June 2003, one ordinary share at South African R43,00. As at 30 June 2002, 1 013 554 options were exercised, leaving a balance of 8 013 946 options still to be exercised. These warrants are traded on the JSE.





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**21. NON-DISTRIBUTABLE RESERVES**

**2002**

**2001**

**R'million**

**R'million**

Foreign exchange translation reserve

64

(19)

Mark-to-market of listed investments

-

86

Mark-to-market of financial instruments

47

(18)

Other

(23)

4

88

54

The balance of the foreign exchange translation reserve represents the cumulative translation effect of the Company's off-shore operations.

The mark to market of listed investments consisted of listed shares in AurionGold held by the Company as a strategic interest. Subsequently this investment was reclassified as a trading security, from an strategic investment, to reflect a change in the Company's intentions regarding this investment from a strategic long-term investment to a non-core investment. This resulted in movements in the share price being reflected against earnings instead of equity.

Subsequent to year-end this interest was sold as described in note 34.

The mark-to-market of financial instruments relate to the currency hedge taken out in Harmony and to the movement in the derivative instruments of Randfontein which qualified for hedge accounting, in the prior year. Refer to note 30 for detail on financial instruments.

**22. BORROWINGS**

**Long-term borrowings**

**2002**

**2001**

**R'million**

**R'million**

**Unsecured**

Senior unsecured fixed rate bonds (a)

1 200

1 200

Fair value adjustment

(21)

9

Less: Amortised discount and bond issue costs

(20)

(25)

**Total unsecured long-term borrowings**

1 159

1 184

Secured

BAE Systems Plc (b)

37

28

BOE loan (c)

500

-

Less: Short term portion

(125)

-

375

-

Anglo Gold (d)

516



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-

*Less:* Short-term portion

(316)

-

200

-

**Total secured long-term borrowings**

612

28

**Total long-term borrowings**

1 771

1 212





50

(a) On 16 June 2001, Harmony launched and priced an issue of senior unsecured fixed rate bonds with a principal amount of Rand 1 200 million, with semi-annual interest payable at a rate of 13% per annum. These bonds will be repayable on 14 June 2006, subject to early redemption at Harmony's option. The bonds are listed on the Bond Exchange of South Africa. The bonds were issued to settle existing debt and fund operations of Elandskraal and New Hampton. As long as the bonds are outstanding, Harmony will not permit any further encumbrances on its present or future assets or revenues to secure indebtedness for borrowed money, but will secure the outstanding bonds equally and ratably with such indebtedness, except for certain specifically permitted encumbrances. Including in the amortisation charge as per the income statement is R5 million for the amortisation of the bond issue costs.

(b) The loan from BAE Systems Plc is a US dollar denominated term loan of R36 million (\$3,5 million). The loan is for the design, development and construction of a facility for the manufacture and sale of value-added products at Harmony's premises in the Free State. The loan is secured by a notarial covering bond over certain assets, including proceeds and other assets and is repayable in full on 30 April 2004. The loan bears interest at LIBOR plus 1,5% and interest is accrued daily from the drawdown date and interest is repayable on a quarterly basis.

(c) On 18 April 2002 Harmony entered into a term loan facility of R500 million with BOE Bank Limited. The loan is for the purpose of partially funding loans made by Harmony to the Free Gold in connection with the acquisition of mining assets. The facility is collateralised by a pledge of Harmony's shares in the Free Gold Joint Venture Company and is guaranteed by Randfontein, Evander, Kalgold and Lydex. The loan is repayable in full on 23 April 2006 by way of eight semi-annual capital installments which are due beginning 23 October 2002. The loan bears interest at a rate equal to the JIBAR rate for deposits in Rand plus 1,5% plus specific charges. Interest is accrued daily from the drawdown date and is payable quarterly in arrears commencing 23 July 2002. The following restrictive covenants apply:

- (i) a consolidated net worth must be more than R4 600 million;
- (ii) the total debt to EBITDA ratio not to exceed 1,5; and
- (iii) EBITDA to total debt service ratio should not be less than 3,5.

(d) On 24 December 2001 Free Gold entered into an agreement with AngloGold Limited to purchase certain assets for R2 832 million. R1 800 million was payable on 1 January 2002 at the call rate from the date of the 10th business day after the date of fulfilment of the last of the conditions precedent. R400 million was payable on 1 January 2005 at no interest charge. The balance of the consideration is payable five business days after the date of fulfilment of the last of the conditions precedent. AngloGold is obliged to pay recoupment tax, capital gains tax and any other income tax on the disposal of the assets at no interest charge. Harmony's 50% portion of the outstanding loan balance at 30 June 2002 was R516 million, which was proportionately consolidated.

#### **Other borrowings**

The level of the Company's borrowing powers, as determined by its Articles of Association, is such that, taking into account the obligations as at 30 June 2002, the Company will have unrestricted access to loan financing for its reasonably foreseeable requirements. At year end, total borrowings amounted to R2 212 million.

#### **23. PREFERENCE SHARES**

Harmony entered into an agreement with Simane Security Investments (Pty) Limited ("Simane"), a South African empowerment group, and the Industrial Development Corporation of South Africa Limited ("IDC") on behalf of Simane, pursuant to which, subject to the fulfilment of certain specified conditions, Simane and the IDC subscribed for, respectively, 222 222 Harmony ordinary shares and 10 736 682 Harmony ordinary shares at R36,00 per share.

Under the agreement, the IDC also subscribed for 10 958 904 redeemable convertible preference shares at a price equal to their par value of Rand 0,50 each. The preference shares could be converted into ordinary Harmony shares for a period of 5 years from their issue at the payment of an additional R41,50 per preference share. During January and February 2002, all of the preference shares were converted into ordinary shares, leaving Simane with a stake of 6,4% in the Company.





51

**24. DEFERRED FINANCIAL LIABILITY/(ASSET)**

**2002**

**2001**

**R'million**

**R'million**

Mark-to-market of speculative financial instruments at year-end

84

390

Amount owing on close out of derivatives

-

22

Mark-to-market of hedging financial instruments at year-end

887

(15)

971

397

The Randfontein hedge book was closed during the year at a net cost of R135 million after tax. The balance currently provided relates to the Hill 50 hedge book, acquired with the acquisition of Hill 50, as well as the remaining portion of the New Hampton hedge book. These hedge books have been restructured as normal sales. The financial liability will be reflected in the income statement as gold is delivered into the contracts. Refer to note 30 for more detail on the financial instruments outstanding.

**25. PROVISION FOR ENVIRONMENTAL REHABILITATION**

**2002**

**2001**

**R'million**

**R'million**

Provision raised for future rehabilitation

Opening balance

427

356

Acquisition of subsidiaries



264

123

Charge to income statement

20

(52)

Closing balance

711

427

While the ultimate amount of rehabilitation costs to be incurred in the future is uncertain, the Group has estimated that based on current environmental and regulatory requirements, the total cost for the mines, in current monetary terms, will be R1 085 million (2001: R655 million).

The movements in the investments in the Group Environmental Trust Funds, were as follows:

**2002**

**2001**

**R'million**

**R'million**

Opening balance

193

124

Transferred from other trust funds

222

55

Interest accrued

23

13

Contributions made

50

3

Reimbursement of costs incurred

(1)

(2)

Closing balance

487

193

Future net obligations

598

462

The Group intends to finance the ultimate rehabilitation costs from the money invested with the environmental trust funds, ongoing contributions, as well as the proceeds on sale of assets and gold from plant clean-up at the time of mine closure.





52

**26. PROVISION FOR POST-RETIREMENT BENEFITS**

The provision for former employees' post-retirement benefits comprise medical benefits for former employees who retired. The amounts were based on an actuarial valuation conducted during the current year.

**2002**

**2001**

**R'million**

**R'million**

The amounts recognised in the balance sheet are as follows:

Present value of unfunded obligation

9

8

The amounts recognised in the income statement are as follows:

Interest cost

2

3

Additional liability raised Elandskraal

1

-

Benefits paid

3

-

Net actuarial gains

(5)

(20)

1

(17)

The movement in the liability recognised in the balance sheet is as follows:

At beginning of year

8

25

Total expenses as above

1

(17)

At end of year

9

8

The principal actuarial assumptions used for accounting purposes were:

Discount rate

12%

-

Assumed medical subsidy inflation

0% - 7%

-

**27. ACCOUNTS PAYABLE AND ACCRUED LIABILITIES**

**2002**

**2001**

**R'million**

**R'million**

Trade payables

263

220

Short-term portion of long-term borrowings

441

-

Short-term borrowings

36

78

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Payroll and leave liabilities

408

253

Other (including accrued liabilities)

500

532

1 648

1 083

**Leave liability**

Employee entitlements to annual leave are recognised on an ongoing basis. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.







53

**28. EMPLOYEE BENEFITS**

**2002**

**2001**

**R'million**

**R'million**

**Number of permanent employees:**

Harmony Free State

12 644

14 671

Evander

7 384

6 909

Kalgold

222

229

Randfontein

7 455

9 700

Elandskraal

7 559

7 200

Australian operations

309

169

Bissett

6

208

Exploration

20

13

35 599

39 099

Free Gold Joint venture (50%)

6 867

-

Total

42 466

39 099

**Aggregate earnings:**

The aggregate earnings of employees including directors were:  
Salaries and wages and other benefits

1 780

1 667

Retirement benefit costs

191

123

Medical aid contributions

40

31

2 011

1 821

**29. EMPLOYEE BENEFIT PLANS**

**PENSION AND PROVIDENT FUNDS:** The Group contributes to several pension and provident funds governed by the Pension Funds Act, 1946, for the employees of its South African subsidiaries. The pension funds are multi-employer industry plans. The Group's liability is limited to its annually determined contributions.

The provident funds are funded on the "money accumulative basis" with the member's and employer's contributions having been fixed in the constitution of the funds.

The Australian group companies make contributions to each employee's Superannuation (pension) funds in accordance with the Superannuation Guarantee Scheme (SGS). The SGS is a Federal Government initiative enforced by law which compels employers to make regular payments to regulated funds providing for each employee on their retirement. The Superannuation Guarantee Contributions were set at a minimum of 8% of gross salary and wages for the 2002 year.

Substantially all the Group's employees are covered by the above mentioned retirement benefit plans. Funds contributed by the Group for fiscal 2002 amounted to R191 million (2001: R123 million).

**POST-RETIREMENT BENEFITS OTHER THAN PENSIONS:** Skilled workers in South Africa participate in the Minemed medical scheme, as well as other medical schemes. The Group contributes to these schemes on behalf of current employees and retired employees who retired prior to 31 December 1996 (Minemed scheme). The Group's contributions to these schemes on behalf of retired and current employees amounted to R40 million and R31 million for 2002 and 2001, respectively.

No post-retirement benefits are available to other workers. No liability exists for employees who were members of these schemes who retired after the date noted above. The medical schemes pay certain medical expenses for both current and retired employees and their dependents. Current and retired employees pay an annual fixed contribution to these schemes.

An updated actuarial valuation was carried out during the current fiscal year on the Minemed medical scheme following the last actuarial valuation in fiscal 2000.





Assumptions used to determine the liability relating to the Minemed medical scheme included, investment returns of 12%, no increases in employer subsidies (in terms of the agreement) and mortality rates according to the SA "a mf" tables and a medical inflation rate of 0% to 7%.

Randfontein had a liability to certain retirees and their dependants who retired prior to 30 September 1991 in terms of the JCI medical scheme. During the June 2001 year an agreement was reached with these retirees whereby they were transferred to the Minemed medical scheme and the provision was therefore reversed in June 2001.

**SHARE OPTION SCHEME:** The Company has an Employee Share Option Scheme ("Harmony Share Option Scheme") hereunder referred to as the HSOS scheme under which certain qualifying employees may be granted options to purchase shares in the Company's authorised but unissued ordinary shares. Of the total of 8 000 000 ordinary shares under the specific authority of the directors in terms of the Harmony (2001) Share Option Scheme, 5 968 200 shares have been offered to participants leaving a balance of 2 031 800. In addition a total of 3 108 800 shares were still outstanding under the Harmony (1994) Share Option Scheme. In terms of the rules of the HSOS scheme, the exercise price of the options granted is equal to fair market value of the shares at the date of the grant. Options currently expire no later than 10 years from the grant date and annually from the grant date, a third of the total options granted are exercisable. Proceeds received by the Company from the exercise are credited to share capital and share premium.

Share option activity was as follows:

Number of

Average

share

exercise

options

price per

granted

share

Rand

Balance at 30 June 2000

6 899 000

-

Share options granted during year

1 728 400

-

Share options exercised during year

(2 835 700)

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20,89

**Balance at 30 June 2001**

5 791 700

-

Share options granted during year

5 968 200

-

Share options exercised during year

(2 682 900)

26,88

**Balance at 30 June 2002**

9 077 000

-

The number of shares held by the Harmony Share Trust at year end amounted to 2 185 200 (2001: 1 185 200). The following table summarises the status of share options outstanding at 30 June 2002:

**Grant**

**Number of**

**Option**

**date**

**options**

**price**

**Rand**

2 December 1997

18 500

11,70

31 August 1998

5 000

19,50

21 September 1999

1 268 800



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22,90

23 February 1999

18 000

25,75

15 November 2000

584 500

27,20

31 January 2000

752 600

35,40

24 April 2001

461 500

36,50

20 November 2001

5 968 100

49,60

9 077 000

30,00





55

**30. DERIVATIVE FINANCIAL INSTRUMENTS AND FAIR VALUE AND CREDIT RISK OF FINANCIAL INSTRUMENTS**

Harmony is exposed to market risks, including credit risk, foreign currency, commodity price, interest rate and liquidity risk associated with underlying assets, liabilities and anticipated transactions. Following periodic evaluation of these exposures, Harmony may enter into derivative financial instruments to manage these exposures. Harmony does not hold or issue derivative financial instruments for trading or speculative purposes.

**Commodity price sensitivity**

As a general rule, Harmony sells its gold production at market prices. Harmony, generally, does not enter into forward sales, derivatives or other hedging arrangements to establish a price in advance for the sale of its future gold production. In order to secure loan facilities, there have been instances where Harmony has made use of commodity contracts (all of which have subsequently expired). In addition, a significant proportion of Randfontein Estate's, New Hampton and Hill 50's production was already hedged when acquired by Harmony. The inherited Randfontein hedge which had previously been treated as speculative was closed out during the year at a cost of R250 million (US\$22 million). The Group's remaining commodity contracts relate to a portion of both New Hampton's and Hill 50's production. These contracts were restructured towards the end of the year to normal purchase, normal sale agreements where we will physically deliver a specified quantity of gold at a future date, subject to the pricing arrangements described below.

**The Harmony Group's commodity contracts by type as at 30 June 2002**

**Maturity scheduled for delivery in**

2003

2004

2005

2006

2007

2008

2009

**Total**

Normal sales  
contracts

Forward Sales  
Agreements

Ounces

**\*1**

425 792

229 000

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205 000

187 500

125 000

100 000

100 000            1 372 292

A\$/ounce

514

522

524

523

514

518

518

519

Variable price  
sales contracts  
(with "caps")

Ounces

**\*2**

62 425

175 500

130 000

40 000

-

-

-

407 925

A\$/ounce

545

544

512

552

-

-

-

535

Variable price  
sales contracts  
(with "floors")

Ounces

**\*3**

33 000

-

-

-

-

-

-

33 000

A\$/ounce

500

-

-

-

-

-

-

500

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521 217

404 500

335 000

227 500

125 000

100 000

100 000 1 813 217

**\*1** The Group must deliver into these agreements at the prices indicated.

**\*2** The Group must deliver its production into these agreements subject to the capped price in

**\*3** The Group must deliver its production into these agreements subject to the floor price ind







The contracts are treated as normal purchase, normal sales contracts. The mark-to-market of these contracts was a negative R913 million (US\$88 million) as at 30 June 2002 based on independent valuations provided by Standard Risk and Treasury Management Services (Pty) Ltd (SRTMS). The value was based on a gold price of US\$316 (A\$557) per ounce, exchange rates of R/US\$10.39 and US\$/A\$0.57 and prevailing market interest rates and volatilities at the time.

**Foreign currency sensitivity**

In the ordinary course of business, Harmony enters into transactions denominated in foreign currency (primary US dollars). In addition, the Group has investments and liabilities in Canadian, Australian and US dollars. As a result Harmony is subject to transaction and translation exposure from fluctuations in foreign currency exchange rates. Harmony does not generally hedge its exposure to foreign currency exchange rates, however during the year, it entered into monthly forward sales agreements totalling US\$90 million, at an average of R/US\$11.76 maturing over the period July to December 2002. These contracts were entered into to preserve the revenue streams for the Free State operations.

These contracts are accounted for as cash flow hedges and are recorded in each period in reserves and subsequently reclassified to revenue on the contract expiry date.

The mark-to-market value of the transactions making up the positions was a positive R47 million (US\$5 million) as at 30 June 2002, the valuation was based on an exchange rates of R/\$10.42 and the prevailing interest rates and volatilities at the time.

**Concentration of credit risk**

Financial instruments, which subject the Company to significant concentrations of credit risk, consist principally of cash and equivalents, short-term investments and various derivative financial instruments. The Group's financial instruments do not represent a concentration of credit risk because the Group deals and maintains cash and cash equivalents, short-term investments and derivative financial instruments with a variety of well established financial institutions of high quality and credit standing. The credit exposure to any one counter party is managed by setting exposure limits, which are reviewed regularly. The Group's debtors and loans are regularly monitored and assessed, and an adequate level of provision is maintained.

**Interest rates and liquidity risk**

Fluctuations in interest rates and gold lease rates impact on the value of short-term cash and financing activities. Harmony generally does not undertake any specific actions to cover its exposure to gold lease rates in respect of its lease rate swaps. Through its acquisitions of New Hampton and Hill 50, Harmony holds certain gold lease rate swaps, which are listed below:

2003

2004

2005

2006

2007

2008

2009

2010

Ounces

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1 906 500	1 879 000	1170 000	1 170 000
900 000			
675 000			
675 000			
-			
Lease rate received			
1,0%			
1,0%			
1,2%			
1,2%			
1,0%			
1,1%			
1,1%			
-			

The above instruments are all treated as speculative. The mark-to-market of the above contracts was a negative R84 million (US\$8 million) as at 30 June 2002, based on valuations provided by independent treasury and risk management experts.

The Group has interest rate swap agreements to change R600 million of its R1,2 billion fixed rate bond to variable rate debt. The interest rate swap runs over the term of the loan and comprises two separate tranches: (a) R400 million: receive interest at a fixed rate of 13% and pay floating at JIBAR (reset quarterly) plus a spread of 1,8%.





(b) R200 million: receive interest at a fixed rate of 13% and pay floating at JIBAR (reset quarterly) plus a spread of 2,2%. These transactions which mature in June 2006 are designated as fair value hedges. The marked-to-market value of the transactions was a negative R21 million (US\$2 million) as at 30 June 2002.

In the ordinary course of business, the Group receives cash from its operations and is required to fund its working capital and capital expenditure requirements. The cash is managed to ensure that surplus funds are invested to provide sufficient liquidity at the minimum risk.

#### **Fair value**

The fair value of the financial instrument is defined as the amount at which the instrument could be exchanged in a current transaction between willing parties. The carrying amount of the receivables, all accounts payable and cash and equivalents are a reasonable estimate of the fair values because of short-term maturity of such instrument. The investments in the environmental trust funds approximates fair values as the funds are invested in short-term maturity investments. Listed investments (including those in the environmental trust fund) are carried at market value. Long-term loans, other than the bonds, approximates fair value as they are subject to market-based rates. The carrying value of the bond approximates their market value at 30 June 2002.

#### **31. CASH GENERATED FROM/ (UTILISED IN) OPERATIONS**

2002

2001

R'million

R'million

#### **Reconciliation of profit before taxation to cash generated from operations:**

Income before taxation

2 279

229

#### **Adjustments for:**

Interest and dividends received

(138)

(45)

Interest paid

230

114

Loss/(Profit) on sale of other assets and listed investments

(46)

7

Profit on sale of mining assets

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(21)

(80)

Depreciation and amortisation

308

237

Impairment of assets

362

215

Gain on financial instruments

(46)

(140)

Mark-to-market of listed investments

(595)

-

Net (decrease)/increase in provision for environmental rehabilitation

20

(52)

Net decrease/(increase) in provision for former employees' post-retirement benefits

2

(17)

Other non cash transactions

(4)

(2)

**Effect of changes in operating working capital items:**

Receivables

127

(274)

Inventories (93)

(82)

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Accounts payable and accrued liabilities

51

363

Cash generated by operations

2 436

473







58

**32. ADDITIONAL CASH FLOW INFORMATION**

The income and mining taxes paid in the statement of cash flow represents actual cash paid.

**(a) Non cash-items**

Excluded from the statements of consolidated cash flows are the following for the years ended 30 June 2001:

The minorities' share in the profits of Elandskraal.

**(b) Acquisitions of subsidiaries/businesses**

**(i) For the year ended 30 June 2002**

(a) With effect from 3 January 2002, the Company had acquired a 50% shareholding in the ArmGold

Free Gold Joint Venture Company (Proprietary) Limited. The aggregate fair value of the assets acquired and the liabilities assumed were as follows:

**2002**

**R'million**

Environmental Trust Fund

222

Property, plant and equipment

1 090

Accounts payable and accrued liabilities

(53)

Long-term liabilities

(190)

Deferred tax

347

Total purchase price

1 416

Paid for by way of borrowings

(516)

Paid for by cash

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(900)

Cash and cash equivalents at acquisition

(b) With effect from 1 April 2002, Harmony acquired the remaining 10% interest in Elandskraal Bathong. The fair value of assets acquired were as follows:

**2002**

**R'million**

Property, plant and equipment

110

Net minority interest in Elandskraal

100

Total purchase price

210

Paid for by cash

(210)





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59

(c) With effect from 1 April 2002, Harmony acquired the entire share capital of Hill 50 Gold N subsidiaries. The aggregate fair value of the assets acquired and the liabilities assumed were as

**2002**

**R'million**

Inventories

54

Accounts receivable

29

Property, plant and equipment

2 754

Accounts payable and accrued liabilities

(134)

Long-term liabilities

(52)

Deferred financial liability

(944)

Deferred tax

(442)

Total purchase price

1 265

Paid for by cash

(1 419)

Cash and cash equivalents at acquisition

(154)

**(ii) For the year ended 30 June 2001**

(a) With effect from 9 April 2001, the Company acquired Elandskraal (Elandsrand and Deelkraal Anglogold. The aggregate fair value of the assets required and liabilities assumed were as follow

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**2002**

**R'million**

Property, plant and equipment

1 053

Investments

55

Long-term liabilities

(55)

Total purchase price

1 053

Paid for by cash

(1 053)

(b) With effect from 1 April 2001, the Company had acquired a majority shareholding in New Ham

during the period to 30 June 2001 increased its shareholding such that as at 30 June 2001, the Co  
acquired 100% of the issued share capital of New Hampton. The aggregate fair value of the assets  
and liabilities assumed were:

**2002**

**R'million**

Inventories

44

Accounts receivable

18

Investments

26

Property, plant and equipment

610

Accounts payable and accrued liabilities

(149)

Long-term liabilities



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(320)

Total purchase price

229

Paid for by cash

(229)





60

(c) **Disposal of subsidiaries/businesses**

(i) **For the year ended 30 June 2001**

(a) With effect from 24 April 2001, Harmony disposed of a 10% interest in Elandskraal to Khuma

book value of assets and liabilities disposed of were:

**2002**

**R'million**

Property, plant and equipment

107

Stores

7

Total sales price

114

Paid for by way of receivables

(114)

**33. COMMITMENTS AND CONTINGENCIES**

**2002**

**2001**

**R'million**

**R'million**

**Capital expenditure commitments**

Contracts for capital expenditure

33

123

Authorised by the directors but not contracted for

267

199

300

322

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This expenditure will be financed from existing cash resources.

### **Contingent liabilities**

Guarantees and suretyships

5

Environmental guarantees

82

87

### **34. SUBSEQUENT EVENTS AFTER BALANCE SHEET DATE**

**(a)** On 27 May 2002, Harmony announced that it had entered into a pre-acceptance agreement with Placer Dome whereby it agreed to accept Placer Dome's offer for its 9,8% holding in AurionGold. The Company subsequently accepted Placer Dome's increased, final and unconditional offer on 29 July 2002, which provided for an Australian \$0,35 cash payment per AurionGold share held. Harmony held 43 350 992 shares in AurionGold which were converted into 7 586 422 shares in Placer Dome.

**(b)** Refer to note 16 for the proposed acquisition of the St Helena assets by Free Gold.





**35. GEOGRAPHICAL AND SEGMENT INFORMATION**

The primary reporting format of the Company is by business segment. As there is only one business segment, being mining, extraction and production of gold, the relevant disclosures have been given in the financial statements. The secondary reporting format is by geographical analysis by origin. The accounting policies of the segments are the same as those described in the accounting policy notes.

The results of the Free Gold joint venture have been included from 3 January 2002 and Hill 50 from

Segmental information includes the results of operations of Elandskraal and New Hampton from date of acquisition with effect from 1 March 2000 and 1 April 2001 respectively. Gold operations are internally reported based on the following geographic areas: Free State, Evander, Kalgold, Randfontein, Elandskraal, New Hampton, Hill 50 and Free Gold. The Free State, Randfontein, Kalgold, Evander and Elandskraal are specific gold producing regions within South Africa. The Bissett mine is located in Canada and the New Hampton and Hill 50 mines are located primarily in Western Australia. The Company also has exploration interests in Southern Africa and Australia which are included in Other. Selling, administrative, general charges and corporate costs are allocated between segments based on the size of activities based on production results.

The segmental split on a geographical basis is:



Year ended 30 June 2002

FreeGold

New

Free State

Evander

Kalgold

Randfontein

Elandskraal

Joint Venture

Hampton

Hill 50

(\*)

(South Africa)

(South Africa)

(South Africa)

(South Africa)

(South Africa)

(South Africa)

(Australia)

(Australia)

Other

Total

R'million

R'million

R'million

R'million

R'million

R'million

R'million

R'million

R'million

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R'million

Profit and loss

Revenue

1 829

1 191

179

1

628

1

365

918

493

7

806

Production costs

(1 351)

(723)

(130)

(1 013)

(950)

(431)

(474)

(134)

(9)

(5 215)

Cash

operating

profit

478

468

49

615

2

591

Non-cash items:

Depreciation and amortisation

(82)

(26)

(11)

(51)

(36)

(30)

(25)

(44)

(3)

(308)

Impairment

63

12

(437)

(362)

Mark

to

market

of listed

investment

595

595

Financial			
instruments			
10			
(121)			
46			
113			48
Operating			
profit			
before			
tax			
513			
441	36		355
2			
279			
Taxation expense			
(75)			
(150)			
43			
(140)			
(15)			
(136)			
(5)			
(105)			
(583)			
Net profit/(loss) for the year			
before			
minority			
interest			

438

291

79

215

1

696

Kilograms gold (\*\*)

19 034

12 920

1 934

17 469

14 807

8 681

5 957

1 912

257

82 971

Tonnes milled (\*\*) ('000)

4 536

2 352

961

4 799

3 279

2 186

3 833

949

39

22 934

Capital expenditure

95

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98	25	15
735		
<b>Total assets</b>		
5 801		
1 222		
332		
2 233		
393		
981		
1 488		
1 496		
130		
14 076		
<b>Total liabilities</b>		
2		
443		
372	(23)	
504	133	608
1		
373	47	
6		
113		
(*)		

The Bissett mine in Canada was placed on care and maintenance at the end of the previous financial year.

(\*\*)

Production statistics are unaudited.

Year ended 30 June 2001

Free State

Evander

Kalgold

Randfontein

Elandskraal

New Hampton

Bissett

(South Africa)

(South Africa)

(South Africa)

(South Africa)

(South Africa)

(Australia)

(Canada)

Other

Total

R'million

R'million

R'million

R'million

R'million

R'million

R'million

R'million

R'million

Profit and loss

Revenue

1 431

952

103

1

479

283

137



4

495

Production costs

(1 385)

(693)

(98)

(1 205)

(195)

(135)

(111)

(3 822)

Cash operating profit

46

259

5

274

88

2

(3)

2

673

Non-cash items:

Depreciation and amortisation

(90)

(15)

(17)

(53)

(26)

(10)

(25)

(1)

(237)

Impairment

(43)

(11)

(12)

(149)

(215)

Financial

instruments

43

15

Operating profit/(loss) before tax

(135)

282

(12)

219

37

(1)

(187)

26

229

Taxation

expense

8

(76)

(31)

(16)

4

(111)

Net profit/(loss) for year  
before minority interest

(127)

206

(12)

188

21

(1)

(187)

30

118

Kilograms gold (\*\*)

21 346

14 251

1 535

22 500

3 822

1 731

1 378

66 563

Tonnes milled (\*\*) ('000)

5 289

2 481

959

6 285

706

1 088

266

17 074

Capital expenditure

120

69

33

Total assets

2 234

876

172

2 175

1 216

1 033

66

482

8 254

Total liabilities

2

035

286

30

3

660

(\*\*)

Production statistics are unaudited.





63

Annexure 5

Historical information of ARMgold

ARMgold income statement

Unaudited

Audited

Audited

Audited

3 months

12 months

12 months

12 months

ended

ended

ended

ended

31 March

31 December

31 December

31 December

R'000

2003

2002

2001

2000

Revenue

718 480

3 537 791

**1 181 947**

**1 090 791**

Cost of sales

560 069

2 052 703

(911 119)

(937 542)

**Profit from metals mined**

**158 411**

**1 485 088**

**270 828**

**153 249**

Corporate, administration and  
other expenditure

14 145

(37 965)

(26 455)

(21 704)

Tribute expenditure

-

-

(53 653)

(124 828)

**Profit from operations**

**144 266**

**1 447 123**

**190 720**

**6 717**

Net non-mining income



6 652

31 258

6 000

-

Net finance income

49 560

69 790

19 325

10 333

**Profit before tax**

**200 478**

**1 548 171**

**216 045**

**17 050**

Tax

74 924

(565 588)

(83 574)

(3 225)

**Net profit attributable to  
ordinary shareholders**

**125 554**

**982 583**

**132 471**

**13 825**

Profit on sale of mining assets

(5 466)

(8 351)

-

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-

Profit on redemption of long-term debt

-

-

(21 000)

-

**Headline earnings**

**120 088**

**974 232**

**111 471**

**13 825**

Earnings per share (cents)

131,47

1 222,43

264,94

27,65

Headline earnings per share (cents)

125,75

1 212,05

222,94

27,65

Diluted earnings per share (cents)

131,47

1 222,43

264,94

27,65

Dividends per share (cents)

-

3,60

40 000

-





**ARMgold balance sheet**

**Unaudited**

**Audited**

**Audited**

**Audited**

**31 March**

**31 December**

**31 December**

**31 December**

**R'000**

**2003**

**2002**

**2001**

**2000**

***Assets***

**Non-current assets**

**1 868 659**

**1 855 116**

**101 172**

**101 935**

Property, plant and equipment

1 095 700

1 103 286

77 219

81 767

Investments and loans

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362 423

354 185

18 268

7 280

Deferred taxation

112 500

143 917

-

-

Restricted cash

298 036

253 728

5 685

5 685

Long-term receivables

-

-

-

7 203

**Current assets**

**2 277 524**

**2 049 232**

**200 945**

**205 718**

Inventories

34 749

26 502

10 833

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6 895

Accounts receivable

143 378

135 687

78 217

54 009

Cash and cash equivalents

2 099 397

1 884 185

111 895

144 814

Short-term portion of deferred tax

-

2 858

-

-

**Total assets**

**4 146 183**

**3 904 348**

**302 117**

**307 653**

**Equity and liabilities**

**Capital**

Ordinary share capital

96

96

50

50



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Share premium

1 132 454

1 132 454

-

-

Retained income

1 116 732

991 178

8 613

76 142

Ordinary shareholders' interest

**2 249 282**

**2 123 728**

**8 663**

**76 192**

**Non-current liabilities**

**777 671**

**745 826**

**51 079**

**97 366**

Long-term borrowings

529 305

503 963

-

51 786

Deferred taxation

-

-

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9 539

395

Rehabilitation and closure cost obligations

247 253

240 750

41 540

45 185

Provision for post-retirement liability

1 113

1 113

-

-

**Current liabilities**

**1 119 230**

**1 034 794**

**242 375**

**134 095**

Accounts payable

334 519

282 089

144 971

124 296

Short-term portion of borrowings

452 288

450 695

30 786

-

Current tax liability

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332 423

302 010

66 618

9 799

**Total equity and liabilities**

**4 146 183**

**3 904 348**

**302 117**

**307 653**

Weighed number of shares in issue ('000)

95 500

80 379

50 000

50 000

Net asset value per share (cents)

2 355,27

2 642,14

17,33

152,38

Net tangible asset value per share (cents)

2 355,27

2 642,14

17,33

152,38





65

**ARMgold cash flow statement**

**Cash flow statements**

**Unaudited**

**Audited**

**Audited**

**Audited**

**3 months**

**12 months**

**12 months**

**12 months**

**ended**

**ended**

**ended**

**ended**

**31 March**

**31 December**

**31 December**

**31 December**

**R'000**

**Notes**

**2003**

**2002**

**2001**

**2000**

**Cash generated from  
operating activities**

Cash receipts

710 789

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3 525 656

1 157 739

1 081 500

Cash paid to suppliers  
and employees

(490 961)

(1 898 820)

(964 849)

(1 013 566)

Cash generated by operations

1

219 828

1 626 836

192 890

67 934

Net finance income

45 811

81 158

17 859

10 333

Normal taxation paid

2

(5 921)

(81 031)

(17 611)

(6 991)

Dividends paid

3

-

(12 196)

(187 822)

-

**Net cash inflow from  
operating activities**

**259 718**

**1 614 767**

**5 316**

**71 276**

**Cash flows from  
investing activities**

Acquisition of businesses

4

-

(960 000)

-

-

Mining and other fixed  
assets acquired

(23 805)

(115 201)

(39 716)

(14 795)

Proceeds on disposal of  
mining assets

-

11 469

3 800

54

Costs of acquisitions capitalised



-

(1 881)

-

-

Movement in investments

(8 232)

(75 149)

(2)

Movement in long-term receivables

-

-

7203

1 097

Net increase in investment in

Rehabilitation Trust Fund

(6 503)

(21 583)

(9 522)

(2 858)

**Net cash outflow from  
investing activities**

**(25 540)**

**(1 162 345)**

**(38 235)**

**(16 504)**

**Cash flow from financing activities**

Proceeds from shares issued -  
net of expenses

-

1 132 454

-

-

Movement in long-term borrowings

25 342

435 457

-

-

**Net cash inflow from  
financing activities**

25 342

1 567 911

-

-

**Net movement in cash and  
cash equivalents**

259 520

2 020 333

(32 919)

54 772

**Cash and cash equivalents at  
beginning of period**

2 137 913

117 580

150 499

95 727

**Cash and cash equivalents at the  
end of period**

2 397 433

2 137 913

117 580

150 499





**Notes to cash flow statements:**

**Unaudited**

**Audited**

**Audited**

**Audited**

**3 months**

**12 months**

**12 months**

**12 months**

**ended**

**ended**

**ended**

**ended**

**31 March**

**31 December**

**31 December**

**31 December**

**R'000**

**2003**

**2002**

**2001**

**2000**

**1.**

**CASH GENERATED FROM OPERATIONS**

Profit before taxation

200 478

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1 548 171

216 045

17 050

*Adjusted for non-cash items:*

- Amortisation and depreciation

31 391

121 171

40 464

37 850

- Profit on sale of mining assets

(5 466)

(8 351)

-

-

- Proceeds on loan waived

-

-

(21 000)

-

- Provision for irrevocable loans and debtors

-

15 000

-

- Movement in gold inventory

(1 564)

(7 216)

-

-

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- Bad debts

275

-

-

- Movement in provision for  
post-retirement benefits

1 113

(3 645)

2 151

- Movement in environmental  
rehabilitation obligation

6 502

14 101

-

-

Adjustment for:

Net finance income

(49 569)

(69 790)

(19 325)

(10 333)

Operating profit before working  
capital changes

181 772

1 599 474

227 539

46 718

Working capital changes

- Movement in accounts receivable



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(7 691)

(56 672)

(39 208)

(9 291)

- Movement in inventories

(6 683)

(8 453)

(3 938)

2 571

- Movement in accounts payable

52 430

92 487

8 497

27 936

**Cash generated from operations**

**219 828**

**1 626 836**

**192 890**

**67 934**

**2.**

**TAXATION PAID**

Charge as per the income statement

(74 924)

(565 588)

(83 574)

(3 225)

Liability - previous period

(302 010)

(66 618)

(9 799)

451

Liability - current period

332 423

302 010

66 618

9 799

Movement in deferred tax liability

38 590

249 165

9 144

(14 016)

**Taxation paid**

**(5 921)**

**(81 031)**

**(17 611)**

**(6 991)**

**3.**

**DIVIDENDS PAID**

Charge as per the statement of  
changes in equity

-

-

(200 000)

-

Capitalisation issue of 18 000 000  
ordinary shares of R0,001 each

-

(18)

-

-

Shareholders for dividends at beginning  
of period

-

(12 178)

-

-

Shareholders for dividends at end  
of period

-

-

12 178

-

**Dividends paid**

-

(12 196)

(187 822)

-





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**Audited**

**Audited**

**Audited**

**12 months**

**12 months**

**12 months**

**ended**

**ended**

**ended**

**31 December**

**31 December**

**31 December**

**R'000**

**2002**

**2001**

**2000**

**4.**

**ACQUISITION OF BUSINESSES**

With effect from 1 January 2002, Free Gold purchased the Free Gold assets and liabilities from AngloGold for R2 741 million of which R1 370,5 million relates to ARMgold's 50% portion. The aggregate fair value of the assets acquired and liabilities assumed were as follows:

Environmental trust fund

221 936

-

-

Property, plant and equipment

978 359

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-

-

Accounts payable and accrued liabilities

(58 633)

-

-

Long-term borrowings

(158 590)

-

-

Deferred tax

387 457

-

-

**Total purchase price**

**1 370 529**

-

-

Paid for by way of borrowings

(470 529)

-

-

Paid for by cash

(900 000)

-

-

**Cash and cash equivalents at acquisition**

-

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-

-

With effect from 30 October 2002, Free Gold purchased the St Helena assets and liabilities from Gold Fields for R120 million of which R60 million relates to ARMgold's 50% portion. The aggregate fair value of the assets acquired and liabilities assumed were as follows:

Environmental trust fund

17 250

-

-

Property, plant and equipment

54 879

-

-

Accounts payable and accrued liabilities

1 073

-

-

Long-term borrowings

(23 772)

-

-

Deferred tax

18 022

-

-

**Total purchase price**

**67 452**

-



-

Paid for by way of borrowings

(7 452)

-

-

Paid for by cash

(60 000)

-

-

**Cash and cash equivalents at acquisition**

-

-

-





68

**ARMgold statement of changes in equity**

**Retained**

**R'000**

**Share capital**

**Share premium**

**income**

**Total**

*Audited movements*

**Balance at 31 December 1999**

50

-

62 317

62 367

Net income for the year

-

-

13 825

13 825

**Balance at 31 December 2000**

50

-

76 142

76 192

Net income for the year

-

-

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132 471

132 471

Dividends paid

-

-

(200 000)

(200 000)

**Balance at 31 December 2001**

50

-

8 613

8 663

Net income for the year

-

-

982 583

982 583

Dividends paid

-

-

(18)

(18)

Share premium raised  
during the period

-

1 209 973

-

1 209 973

Expenditure written-off against

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share premium

-

(77 519)

-

(77 519)

Shares issued during the period

46

-

-

46

**Balance at 31 December 2002**

96

1 132 454

991 178

2 123 728

*Unaudited movements*

Net income for the period

-

-

125 554

125 554

**Balance at 31 March 2003**

96

1 132 454

1 116 732

2 249 282

**Accounting policies**

***Basis of preparation***

The financial statements are prepared according to the historical cost accounting convention. The Group's accounting policies set out below are consistent in all material respects with those applied in the previous years, except for the adoption of South African Standard AC 133: Financial Instruments: Recognition and Measurement.

*Use of estimates*

The preparation of the financial statements in conformity with South African Statements of Generally Accepted Accounting Practice requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

*Consolidation*

The Group financial statements incorporate the financial statements of the company and its proportionate interest in joint ventures.

The financial statements for joint ventures are prepared for the same reporting period as the holding company, using the same accounting policies.

A joint venture is an entity in which the Group holds a long-term interest and which is jointly controlled by the Group and one or more other ventures under a contractual arrangement. The Group's interest in a jointly controlled entity is accounted for by proportionate consolidation from the date on which joint effective control is transferred to the Group and is no longer consolidated from the date on which joint control is ceased. Under this method, the Group includes its share of the joint venture's income and expenditure, assets and liabilities and cash flows on the relevant components of the financial statements.







All inter-company transactions, balances and unrealised surpluses and deficits on transactions between Group companies have been eliminated.

***Goodwill***

Where an investment in a subsidiary or joint venture is made, any excess of the purchase price over the fair value of the attributable mineral reserves and the net assets is recognised as goodwill. Goodwill that represents resources is amortised on a systematic basis, which recognises the depletion of resources over the lesser of the life of the mine or 20 years. Goodwill in respect of subsidiaries and proportionately consolidated joint ventures is disclosed as an intangible asset in the balance sheet.

The carrying amount of goodwill is reviewed on a regular basis and written-down for impairment where the recoverable amount exceeds the carrying amount.

***Foreign currencies***

Foreign currency transactions are accounted for at the rates of exchange ruling at the date of the transaction. Monetary assets and liabilities are translated at year-end exchange rates unless hedged by forward exchange contracts, in which case the rates specified in such forward contracts are used. Gains and losses arising on settlement of such transactions, and from the translation of foreign currency monetary assets and liabilities arising from such transactions, are recognised in the income statement, except when deferred in equity as qualifying cash flow hedges.

***Revenue recognition***

Revenue is recognised to the extent that it is probable that the economic benefits will flow to ARMgold and the revenue can be reliably measured. The following criteria must also be present:

- Revenue from the sale of gold and silver is recognised when the risks and rewards of ownership have transferred to the buyer of the products.
- Interest income is recognised as it accrues (taking into account the effective yield on the investment) unless there is doubt about the realisation of the income.
- Dividend income is accrued when ARMgold's right to receive payment, is established.

***Exploration expenditure***

Exploration expenditure is expensed as incurred. When a decision is taken that a mining venture is capable of commercial production, all further pre-production expenditure is capitalised. Expenditure incurred to evaluate and develop new ore bodies, to define mineralisation in existing ore bodies, to establish or expand productive capacity and, expenditure designed to maintain productive capacities, are capitalised until commercial levels of production are achieved.

***Property, plant and equipment***

***Mining assets***

Mining assets, including mineral and surface rights, ore reserves, mine development costs and mine plant facilities, are recorded at cost less accumulated amortisation and impairments.

***Mine development costs***

Mine development costs include expenditure incurred to develop new ore bodies, to define further mineralisation in existing ore bodies and to expand the capacity of the mine.

Mine development and pre-production costs are capitalised until the ore body is brought into production. Mine development costs relating to major programmes to expand production capacities at existing mines, are capitalised.

Mine development costs in the ordinary course to maintain production, are expensed as incurred.





**Undeveloped properties**

Undeveloped properties, upon which the Group has not performed sufficient exploration work to determine whether significant mineralisation exists, are carried at original cost. Where the directors consider that there is little likelihood of the properties being exploited, or the value of the exploitable right has diminished below cost, a write-down is affected against exploration expenditure.

**Borrowing costs**

Interest costs on borrowings to finance the construction of mining assets, property, plant and equipment, requiring a substantial period of time to prepare for their intended future use, are capitalised during the period that is required to prepare the asset for its intended use and until the asset achieve commercial levels of production. All other borrowing costs are expensed.

*Non-mining assets*

Land is recorded at cost and is not depreciated as it is deemed to have an unlimited life. Buildings and non-mining assets are shown at cost less accumulated depreciation and any impairment losses.

**Amortisation and depreciation***Mining assets*

Mining assets (includes mineral property, mineral and surface rights, ore reserves, exploration costs, mine development costs, capitalised interest and mine plant facilities) are amortised using the units-of-production method based on estimated economically recoverable proven and probable ore reserves. Proven and probable ore reserves reflect estimated quantities of economically recoverable reserves, which can be recovered in the future from known mineral deposits. Amortisation begins on new mining ventures from the date on which the mine produces commercial quantities.

*Non-mining assets*

Non-mining assets are depreciated on the straight-line method to write-off the cost of each asset to their residual values over their estimated useful lives, as follows:

Office equipment

Vehicle

5 years

Computer equipment

3 years

**Impairment property, plant and equipment**

Management, on a continuous basis, reviews the recoverability of the carrying amounts of mining and non-mining assets of ARMgold. When the carrying amount of an asset is greater than its recoverable amount, an allowance is made for impairment.

**Investments**

During the period under review, ARMgold adopted AC 133 and classified its investments into the following categories: trading, held-to-maturity and available-for-sale. Investments that are acquired principally for the purpose

of generating a profit from short-term fluctuations in price are classified as trading investments and included in current assets. Investments with fixed maturity, that the management has the intent and ability to hold to maturity, are classified as held-to-maturity and are included in non-current assets. Investments intended to be held for an indefinite period of time, which may be sold in response to needs for liquidity or changes in interest rates, are classified as available-for-sale and are included in non-current assets, unless management has the express intention of holding the investment for less than 12 months from the balance sheet date, or unless they will need to be sold to raise operating capital, in which case they are included in current assets. Management determines the appropriate classification of its investments at the time of the purchase and re-evaluates such designation on a regular basis.

All purchases and sales of investments are recognised on the trade date, which is the date that ARMgold commits to purchase or sell the asset. Cost of purchase includes transaction costs. Trading and available-for-sale investments are subsequently carried at fair value, whilst held-to-maturity investments are carried at amortised cost using the effective yield method. Realised and unrealised gains and losses arising from changes in the fair value of trading investments and of available-for-sale investments, are included in the income statement in the period in which they arise.







Listed investments, other than investments in subsidiaries and joint ventures, are subsequently measured at fair value, which is calculated by reference to the quoted selling price at the close of business on the balance sheet date.

Unlisted investments are classified as available for sale financial assets and are measured at fair value.

Changes in the fair values of the investments are recognised in the income statement.

On disposal of an investment, the difference between the net disposal proceeds and the carrying value is charged or credited to the income statement.

At each reporting date, the Group reviews its investments for declines that are other than temporary. Unrealised losses that are other than temporary would be realised in the income statement.

***Investment in rehabilitation trust fund***

Annual contributions are made to the ARM Environmental Rehabilitation Trust Fund, created in accordance with South African statutory requirements, to fund the estimated cost of rehabilitation during and at the end of the life of the Group's mines. Interest earned on funds paid to the environmental trust fund is accrued and credited to the income statement on an annual basis. The funds that have been paid into the trust fund, plus the growth in the trust fund, are shown as an asset on the balance sheet.

***Short-term investments***

Short-term investments consist of similar investments to cash and cash equivalents, but mature in periods greater than three months but less than twelve months and are classified as available-for-sale financial instruments.

Short-term investments are measured at fair value and the changes in fair value are recognised in the income statement.

***Inventories***

In-process metal on hand is stated at the lower of cost and net realisable value. The cost is based on the weighted average production costs. Production costs includes raw materials used, direct labour, other direct costs and related production overheads, which includes amortisation, but excludes interest expenses.

Stores and material are valued at the lower of cost and net realisable value on a first-in, first-out basis. The cost is based on the supplier's cost and includes delivery charges. Obsolete, redundant and slow-moving stock is identified and written-down to economic or realisable values.

Net realisable value is the estimate of the selling price, in the ordinary course of business, less the cost of completion and selling expenses.

***Trade and other receivables***

Trade and other receivables are carried at net realisable value. Estimates are made for doubtful debts based on a review of all outstanding amounts at year-end. Irrecoverable amounts are written-off during the year in which they are identified.

***Cash and cash equivalents***

Cash and cash equivalents are defined as cash in hand, demand deposits, and short-term, highly liquid, investments, with a maturity of less than three months at the date of purchase, readily convertible to known amounts of cash and subject to insignificant risk of changes in value.

***Environmental expenditure***

ARMgold provides for future rehabilitation cost on the full liability method, which is based on ARMgold's environmental management plans, in compliance with the current environmental and regulatory requirements. Under this method the estimated future cost of repairing past damage and other related shut down costs are provided for in full as soon as the commitment is incurred. The estimates are reviewed annually to take the effect of inflation and other changes into account and are discounted using rates that reflect the time value of money. Annual increases in the provision are charged to income and relate to increases in costs due to the change in the present value of the provision,

inflationary increases and changes in estimates. The present value of additional environmental disturbances created is capitalised to mining asset with a corresponding increase in the rehabilitation provision.





The rehabilitation asset is amortised in terms of ARMgold's accounting policy for mining assets (refer accounting policy on "Property, plant and equipment").

Based on current environmental regulations and known rehabilitation requirements, management has included its best estimate of these obligations in its rehabilitation requirements. It is however possible that this estimate could change as a result of changes in regulations or cost estimates. Ongoing rehabilitation and environmental costs are charged to the income statement in the period in which it is incurred. Rehabilitation projects undertaken, included in the estimates, are charged to the provision as incurred. Gains from the expected disposal of assets are not taken into account when determining the provision for environmental rehabilitation.

#### ***Deferred taxation***

Deferred taxation is provided in full, using the liability method, on all temporary differences at the balance sheet date between the tax bases of assets and liabilities and their carrying values in the financial statements.

Under this method, ARMgold is required to make provision for deferred income taxes by applying an estimated future tax rate to the difference between the tax values and carrying amounts of assets and liabilities at the balance sheet date. The estimated tax rate is the rate at which the directors estimate any deferred tax liabilities and assets will be realised, and is based on current legislation. Tax losses are only recognised to the extent that they are considered to be recoverable.

Deferred tax assets are only recognised to the extent that it is probable that the temporary differences will reverse in the foreseeable future and future taxable profit will be available against which the temporary differences can be utilised.

The carrying amount of deferred tax assets is reviewed at each balance sheet date and reduced to the extent that it is no longer probable that sufficient future taxable profit will be available to allow all or part of the deferred tax asset to be utilised.

#### ***Pension obligations***

Independent defined benefit and defined contribution funds provide pension and other benefits to all ARMgold's permanent employees.

The expected costs of defined post-retirement benefits are assessed in accordance with the advice of qualified actuaries. Contributions to the relevant funds, including cost of improved benefits or experience adjustments, are charged to income over the service lives of employees entitled to those benefits. Contributions to defined contributions funds are charged against income, as incurred.

#### ***Other post-retirement obligations***

Except for those mentioned above, ARMgold does not supply any other employee benefits that will result in post-retirement obligations.

#### ***Financial liabilities***

Financial liabilities, other than trading financial liabilities and derivatives, are measured at amortised cost, being the original obligation less principal payments and amortisations. Trading financial liabilities and derivatives are measured at fair value.

#### ***Provisions***

Provisions are recognised when ARMgold has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation, and a reliable estimate of the amount of the obligation can be made.

#### ***Employee annual leave and holiday leave allowances***

Employee entitlements to annual leave and holiday leave allowances are recognised when they accrue to employees. A provision is made for the estimated liability for unused annual leave and holiday leave allowances as a result of services rendered by employees up to the balance sheet date.







### **Leases**

Leases where a significant portion of the risks and rewards of ownership are retained by the lessor, are classified as operating leases. Payments made under operating leases are charged to the income statement on a straight-line basis over the period of the operating lease

### **Financial instruments**

Financial instruments recognised on the balance sheet include trade and other receivables, loans, cash and bank balances, investments, trade and other payables, and borrowings. Financial instruments are initially measured at cost, including transaction costs, when ARMgold becomes a party to their contractual arrangements. The subsequent measurement of financial instruments is dealt with in the accounting policies of trade and other receivables, cash and cash equivalents, investments, financial liabilities and derivative instruments.

#### **Derivative instruments**

AC 133 requires that derivative instruments be treated as follows:

- Commodity based ("normal purchase or normal sale") contracts that meet the requirements of in earnings when they are settled by physical delivery.
- Where the conditions in AC 133 for special hedge accounting are met the derivative is recognised as either a financial asset or financial liability, and recorded at fair value. When ARMgold enters the effective portion of fair value gains or losses are recognised in equity until the underlying the gains or losses are recognised in earnings or included in the initial measurement of the asset. The ineffective portion of fair value gains and losses is recorded in earnings in the period to which they relate.
- All other derivative instruments are subsequently measured at their estimated fair value, with fair value at each reporting date being reported in earnings in the period to which they relate.
- The estimated fair values of derivative instruments are determined at discrete points in time using market information. These estimates are calculated with reference to the market rates using industry valuation techniques.

### **Business segments**

Based on risks and returns, the directors consider that the primary reporting format is by business segment. The directors consider that there is only one business segment, being mining, relating to the extraction and production of gold. Therefore the disclosures for the primary segment have already been given in these financial statements.





**Annexure 6**

**Significant contracts of ARMgold**

1.

On 15 January 1998, ARMgold concluded a Sale of Assets Agreement with AngloGold Limited ("AngloGold") in terms of which ARMgold, with effect from 27 January 1998, acquired Shafts Numbers 1 and Numbers 3 to 7 as well as certain associated assets, mining leases, mineral rights and certain movable assets and surface rights permits in respect of the Vaal River Operations in Orkney, North West Province. The purchase price for the Vaal Reefs Sale Assets was R38,2 million, which ARMgold has since paid in full.

2.

On 27 July 2001, ARMgold concluded a Sale of Assets Agreement with AngloGold in terms of which ARMgold acquired Shaft No. 2 of the Vaal River Operations, in Orkney, North West Province. This agreement replaced the Tributing Agreement under which ARMgold had been mining Shaft No. 2 on a tribute basis.

3.

On 5 February 1999, ARMgold and AngloGold concluded an agreement in respect of the supply of services, which agreement is deemed to have commenced on 27 January 1998. This agreement continues indefinitely for so long as ARMgold conducts mining operations at Shafts Numbers 1 to 7 at Vaal Reefs, Orkney, North West Province.

4.

On 5 February 1999, ARMgold concluded a Toll Ore Processing Agreement with AngloGold, which agreement is deemed to have commenced on 27 January 1998. AngloGold for cannot terminate this agreement for so long as ARMgold conducts mining operations at any of the Orkney operations, unless ARMgold breaches the agreement and fails to remedy the breach.

5.

On 18 March 1999, ARMgold concluded a Transport of Bullion Agreement with AngloGold, which agreement is deemed to have commenced on 27 January 1998. The agreement continues indefinitely subject to either party having the right to cancel the agreement on 60 days' notice. The agreement also terminates when AngloGold ceases to produce bullion for ARMgold in terms of the Toll Ore Processing Agreement referred to above. In terms of the agreement, AngloGold transports by helicopter or other means, the bullion produced pursuant to the Toll Ore Processing agreement to Rand Refinery for a fee of R18 000 per month.

6.

On 17 September 1998, ARMgold concluded a Sale of Assets Agreement with AngloGold in terms of which ARMgold acquired portions of the mining lease area, surface rights permits, movable assets, excluding the major rotating equipment, and all other assets relating to the mining and associated operations of Free State Consolidated Mines Limited at the Western Holdings Mine Shafts Numbers 1 to 4 and Numbers 6 and 7.

7.

A Memorandum of Co-operation Agreement was concluded between ARMgold and Harmony on 13 October 2001 and endured for a period of 12 months from such date. In terms of the agreement, ARMgold and Harmony agreed to negotiate the Joint Venture Agreement in respect of their relationship as regards Free Gold and to refer to each other all gold mining opportunities that each wished to pursue in South Africa. Such gold mining opportunities exclude the exploitation or expansion of the parties' existing gold mining and related assets.

8.

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On 24 December 2001, ARMgold concluded a Sale of Business Agreement with AngloGold, Free Gold and Harmony, which agreement was implemented with an effective date of 1 January 2002. In terms of the agreement, certain gold mines and related assets and surface operations in the Free State were acquired by Free Gold.

The purchase price is payable by Free Gold (50% of which is the responsibility of ARMgold) is as

- R1,8 billion plus interest of R54,9 million that was paid on 23 April 2002;

- R400 million is payable on 1 January 2005; and

- tax payable by AngloGold resulting from the sale of the Free Gold Assets is payable five bu

AngloGold is obliged to make any such tax payments. This amount has now been paid.

9.

On 24 December 2001, Free Gold and AngloGold concluded a Sale of Property Agreement. The assets purchased in terms of this agreement are the immovable properties used in connection with the businesses purchased in terms of the Free Gold Sale of Business Agreement referred to above. The purchase price in respect of these immovable properties is included in the purchase price as set out in the Free Gold Sale of Business Agreement.







75

10.

On 5 April 2002, ARMgold and Harmony (collectively, the "shareholders") and Free Gold entered into a Joint Venture Agreement governing the relationship of the shareholders as shareholders of Free Gold.

11.

In terms of an agreement reached on 22 April 2003, ARMgold and Harmony jointly acquired a 34,5% shareholding in Avmin for a consideration of R1,7 million.





**Annexure 7**

**Trading history of Harmony shares**

The high, low and closing prices of Harmony shares on the JSE, and the volumes traded, since 31 July 2000, were as follows:

**High**

**Low**

**Close**

**Volume**

**(cents)**

**(cents)**

**(cents)**

**Quarter ended**

31 August 2000

3 900

3 300

3 670

8 610 069

30 November 2000

3 700

2 600

3 525

12 946 300

28 February 2001

4 700

3 080

3 860

12 254 756

31 May 2001

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5 100

3 615

4 690

20 690 449

31 August 2001

4 920

3 850

4 900

22 217 718

30 November 2001

9 9700

4 800

7 850

38 280 991

28 February 2002

13 360

7 000

12 740

59 093 052

31 May 2002

18 730

11 000

14 200

86 643 890

31 August 2002

18 150

10 350

16 700

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78 034 135

30 November 2002

16 520

11 550

14 700

61 230 817

28 February 2003

15 620

8 650

9 760

68 846 490

31 May 2003

11 750

7 100

9 850

102 654 014

**Month ended**

30 June 2002

17 400

12 000

14 200

30 361 439

31 July 2002

17 100

10 350

11 810

32 404 342

31 August 2002

15 200

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10 400

14 850

15 174 230

30 September 2002

18 150

14 400

16 700

30 455 563

31 October 2002

16 520

11 910

13 500

20 341 047

30 November 2002

15 600

11 550

11 799

15 492 925

31 December 2002

15 800

11 560

14 700

25 396 845

31 January 2003

15 620

13 100

13 100

24 945 829

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28 February 2003

13 600

10 540

11 050

23 470 805

31 March 2003

11 390

8 650

9 760

20 429 856

30 April 2003

9 850

7 100

7 700

19 952 328

31 May 2003

11 070

7 900

10 539

62 449 097

30 June 2003

11 750

9 600

9 850

20 252 589

**Trading day**

1 July 2003

10 280



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9 950

10 250

1 642 970

2 July 2003

10 480

10 150

10 350

1 010 884

3 July 2003

10 470

10 150

10 350

782 947

4 July 2003

10 255

10 000

10 165

679 761

7 July 2003

10 050

9 620

9 688

1 759 006

8 July 2003

10 000

9 600

9 900

1 343 626

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9 July 2003

9 950

9 700

9 700

664 135

10 July 2003

9 675

9 330

9 400

1 421 818

11 July 2003

9 575

9 360

9 456

856 481

14 July 2003

9 800

9 400

9 551

1 206 263

15 July 2003

9 900

9 275

9 275

1 234 498

16 July 2003

8 990

8 400

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8 400

6 975 720

17 July 2003

8 690

8 475

8 580

4 410 245

18 July 2003

8 600

8 370

8 420

1 806 711

21 July 2003

8 699

8 381

8 699

2 390 159

22 July 2003

8 850

8 640

8 775

1 777 358

23 July 2003

8 900

8 650

8 900

2 146 532

24 July 2003

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9 060

8 850

9 060

2 440 559

25 July 2003

9 400

9 070

9 270

1 053 470





77

Annexure 8

Competent person's report on Harmony and ARMgold

AN INDEPENDENT COMPETENT PERSON'S REPORT ON CERTAIN MINING ASSETS OF  
HARMONY GOLD MINING COMPANY LIMITED

AND

AFRICAN RAINBOW MINERALS GOLD LIMITED

*Prepared for:*

HARMONY GOLD MINING COMPANY LIMITED AND AFRICAN RAINBOW MINERALS  
GOLD LIMITED

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## Edgar Filing: HARMONY GOLD MINING CO LTD - Form 6-K

### An independent competent person's report on certain mining assets of Harmony Gold Mining Company Limited and African Rainbow Minerals Gold Limited

1.

#### INTRODUCTION

1.1

##### Background

Steffen, Robertson and Kirsten (South Africa) (Pty) Limited ("SRK") is a subsidiary of the International group holding company, SRK Global Limited (the "SRK Group"). SRK has been commissioned by the directors of Harmony Gold Mining Company Limited ("Harmony") and African Rainbow Minerals Gold Limited ("ARMgold") to prepare an independent competent person's report ("CPR") on certain mining assets (the "Mining Assets") of Harmony and ARMgold (the "Companies").

The Mining Assets of Harmony include:

- a 50% interest in ARMgold/Harmony Free Gold Joint Venture Company (Proprietary) Limited ("Harmony Free Gold");
- a 100% interest in Randfontein Estates Limited ("Randfontein");
- a 100% interest in Evander Gold Mining Company Limited ("Evander");
- a 100% interest in Kalahari Goldridge Mining Company Limited ("Kalgold");
- a 100% interest in Harmony Gold (Australia) Pty Limited ("Harmony Australia");
- a 100% interest in Harmony Gold (Canada) Inc ("Harmony Canada");
- a 100% interest in various mining operations situated in the Free State Goldfield, South Africa defined as Harmony Free State ("Harmony Free State"). Ownership of these assets is held at the Har level; and
- a 100% interest in various significant exploration properties, notably the Rolspruit gold project ("Rolspruit"), the Poplar gold project ("Poplar") and the Kalplats PGM project ("Kalplats").

In addition Harmony holds interests in wholly-owned, joint venture and associate companies through direct and indirect subsidiaries, which comprise dormant companies, exploration companies, investment holding companies, management service companies, marketing companies, beneficiation companies, mineral rights holding companies and property holding companies.

The Mining Assets of ARMgold include:

- a 50 % interest in Free Gold;
- a 100% interest in ARMgold's mining operations situated in Orkney, South Africa ("ARMgold Orkney") and

A 100% interest in ARMgold's mining operations situated in Welkom, South Africa ("ARMgold Welkom")

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All assets incorporating operating mines and exploration assets for which the Companies, collectively, hold less than 100% and/or do not have legal rights to disclose information, other than that already reported in the public domain, have been excluded from the collective term Mining Assets in this report. Specifically the assets, which are not reported upon in this CPR, include:

- a 34.5% interest in Anglovaal Mining Limited ("Avmin") which was recently acquired through ARMgold/Harmony joint venture. The principal assets in Avmin include:
  - 50.3% of Assmang Limited which operates various manganese ore, iron ore and chrome ore operations located in the Republic of South Africa ("South Africa"),
  - 42% of Avgold Limited ("Avgold") which operates the Target gold mine ("Target") located in Free State Province, South Africa,
  - 41.3% of Two Rivers Platinum (Proprietary) Limited ("Two Rivers") which is currently developing a platinum mining operation located in Mpumalanga Province, South Africa,
  - 75% of the Nkomati nickel mine ("Nkomati") located in Mpumalanga Province, South Africa;

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- Harmony's 32.5% interest in Highland Gold Mining Limited ("Highland Gold"), a company listed on the Alternative Investment Market ("AIM") of the London Stock Exchange plc ("LSE") which owns, operates and has various interests in gold mining assets in the Russian Federation;
- Harmony's 21% interest in High River Gold Mines Limited ("High River"), a company listed on the Toronto Stock Exchange ("TSE"), Canada which has gold mining assets in the Russian Federation, Canada and Africa;
- Harmony's 31.8% interest in Bendigo Mining NL ("Bendigo") a company listed on the Australian Stock Exchange ("ASX") which owns a single gold development project in Australia; and
- Harmony's 87% interest in Abelle Limited ("Abelle") a company listed on the ASX, which operates a gold mining operation in Australia and has various interests in exploration properties in Australia and New Guinea.

Appendix 1 to this report includes brief technical summaries of these assets, which have been reproduced from public domain information. As SRK has not had access to either the underlying information or supporting data no opinion is provided herein.

### 1.2

#### Requirement for the CPR

SRK has been informed that Harmony and ARMgold have reached an agreement, in terms of a merger agreement, regarding their proposed merger (the "Merger"). It is intended that the merger will be implemented by means of a Scheme of Arrangement (the "Scheme") to be proposed by Harmony, between ARMgold and its shareholders. This CPR principally comprises a technical-economic appraisal of the Mining Assets, and has been prepared in compliance with the Listings Requirements of the JSE Securities Exchange South Africa (the "JSE"), specifically Sections 12.3, 12.8, 12.9 and 12.14.

A copy of this CPR will be included in the Scheme document and circular to be dispatched to the Companies' shareholders. In this CPR, SRK provides assurances to the directors of the Companies that the technical- economic projections ("TEPs"), including production profiles, operating expenditures and capital expenditures, of the Mining Assets as provided to SRK by the Companies and reviewed by SRK are reasonable, given the information currently available. These audited TEPs have also been provided to the Companies' financial advisers.

### 1.3

#### CPR Structure

For reporting purposes SRK note that the valuations of the Mining Assets have been grouped in accordance with the following Tax Entities, herein referred to as ("the Tax Entities") and that all entries (including text, tables and other data) are not quoted on an attributable basis:

- ARMgold/Harmony Free Gold Joint Venture Company (Pty) Limited ("Free Gold Tax Entity");
- the tax entity within which Joel is assessed ("Joel Tax Entity");
- Harmony Free State ("Harmony Free State Tax Entity");
- ARMgold Welkom ("ARMgold Welkom Tax Entity");
- Randfontein Estates Limited ("Randfontein Tax Entity");
- Evander Gold Mines Limited ("Evander Tax Entity");

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- ARMgold Orkney ("ARMgold Orkney Tax Entity");
- Kalahari Goldridge Mining Company Limited ("Kalgold Tax Entity"); and
- Harmony Gold (Australia) (Pty) Limited comprising:
  - Mt. Magnet & Cue Tax Entity,
  - South Kalgoorlie Tax Entity.

Technical descriptions of the Mining Assets have been grouped into operations that broadly reflect the management structures and/or common geographical entities. All entries included within this CPR (including text, tables and other data) are not quoted on an attributable basis and are grouped into the following operations:

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- Free Gold Operations;
- Harmony Free State Operations;
- ARMgold Welkom;
- West Wits Operations (including Randfontein, Elandsrand and Deelkraal);
- Evander Operations;
- ARMgold Orkney;
- Kalgold Operation; and
- International Operations, sub-divided into Harmony Australian Operations and Harmony Canadian Operations.

### 1.4

#### **Limitations and Reliance on Information**

SRK's opinion is effective 1 July 2003 and is based on information provided by the Companies throughout the course of SRK's investigations, which in turn reflect various technical-economic conditions prevailing at the time of writing. These conditions can change significantly over relatively short periods of time and as such the information and opinions contained in this report may be subject to change.

The achievability of Life-of-Mine ("LoM") plans, budgets and forecasts are neither warranted nor guaranteed by SRK. The forecasts as reported upon herein have been proposed by the Companies' management and cannot be assured; they are necessarily based on economic assumptions, many of which are beyond the control of the Companies. Future cash flows and profits derived from such forecasts are inherently uncertain and actual results may be significantly more or less favourable.

This report includes technical information, which requires subsequent calculations to derive subtotals, totals and weighted averages. Such calculations may involve a degree of rounding and consequently introduce an error. Where such errors occur, SRK does not consider them to be material.

#### **1.4.1**

#### ***Disclaimers and Cautionary Statements for US Investors***

In considering the following statements SRK notes that the term "Mineral Reserve" for all practical purposes is synonymous with the term "ore reserve".

The United States Securities and Exchange Commission (the "SEC") permits mining companies, in their filings with the SEC, to disclose only those mineral deposits that a company can economically and legally extract or produce from. Certain terms are used in this report, such as "resources", that the SEC guidelines strictly prohibit companies from including in filings.

Mineral Reserve estimates are based on many factors, including, in this case, data with respect to drilling and sampling. Mineral Reserves are determined from estimates of future technical factors, future production costs, future capital expenditure, future product prices and the exchange rate between the South African Rand ("ZAR") and the United States Dollar ("US\$"). The Mineral Reserve estimates contained in this report should not be interpreted as assurances of the economic life of the Mining Assets or the future profitability of operations. Because Mineral Reserves are only estimates based on the factors and assumptions described herein, future Mineral Reserve estimates may need to be revised. For example, if production costs increase or product prices decrease, a portion of the Mineral Resources, from which the Mineral Reserves are derived, may become uneconomical to recover and would therefore result in lower estimated Mineral Reserves.

The LoM plans and the TEPs include forward-looking statements that are required in compliance with the JSE Listings Requirements. These forward-looking statements are necessarily estimates and involve a number of risks and uncertainties that could cause actual results to differ materially.

1.5

**Basis of Valuation of the Mining Assets**

1.5.1

***Technical-Economic Appraisal***

The technical-economic appraisals reported herein have been determined according to the following

- inspection visits to surface and underground operations, processing facilities, surface structures and associated infrastructure at each of the Mining Assets during May and June 2003;
- access to key mine Business Units ("BU") and head office personnel for discussion and enquiries.

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- a review and, where considered appropriate by SRK, modification of the Companies' estimates of their classification of Mineral Resources and Mineral Reserves;
- a review of the Companies' plans and supporting documentation and, where considered appropriate by SRK, modification of the Companies' LoM plans and the associated TEPs, including assumptions regarding future operating costs, capital expenditures and gold production of the Mining Assets; and
- an examination of historical information and results made available by the Companies in respect of the Mining Assets in support of, in particular, the forecasts contained in the LoM plans and one-year budgets.

SRK's approach in undertaking a review of the Mineral Resource and Mineral Reserve estimations and classifications is detailed in Section 4 of this CPR. In summary, SRK has generated Mineral Resource and Mineral Reserve statements based on a review of the LoM plans and the methodologies applied for estimation and classification of Mineral Resources and Mineral Reserves. Given the generally extensive history of the Mining Assets and geological investigations undertaken by the Companies, SRK has not independently verified the underlying data, including sampling and assay data.

### 1.5.2

#### *Technical-Economic Models*

In complying with Section 12.14 of the JSE Listings Requirements, specifically the non-technical requirements of 12.14(b), SRK has obtained certain inputs to the technical-economic models (the "TEMs") for each of the Mining Assets, inter alia, from the Companies' Financial Advisors. These inputs, as described in Section 13, are duly acknowledged by SRK. Further, in reproducing the results of the TEMs, SRK provides assurances to the directors of the Companies that the technical-economic inputs of the Mining Assets as provided to and reviewed by SRK (Sections 12.14(b)(i, ii, iii, v, vi and vii)), including operating costs, capital expenditure and production profiles, are accurately incorporated into the TEMs. SRK also duly acknowledges the Companies' Financial Advisors' opinion, that the remaining inputs to the TEMs required in compliance with Section 12.14(b)(iv, viii, ix, x, xi, xii, xiii, xiv, xvi, xv, xvi, xvii and xviii), are accurately reflected in the TEMs.

For the purpose of establishing the TEMs, the Companies' Financial Advisors have provided, inter alia, various macro-economic parameters to enable derivation of assumed expenditures in nominal ZAR. For the purpose of this report, the inputs represent Financial Years ending 30 June and commencing 1 July.

Further, all assumed costs, unless otherwise stated, including total operating and capital expenditures are quoted in 1 January 2004 terms. The nominal exchange rate in Table 1.1 is calculated using purchase price parity ("PPP").

**Table 1.1 Base Case Macro-Economic Parameters**

**Parameter**

**Units**

**2004**

**2005**

**2006**

**2007**

**2008**

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Gold Price - Nominal

(US\$/oz)

350

357

364

371

379

(ZAR/kg)

93,000

98,580

104,495

110,764

117,410

(AUS\$/oz)

547

567

581

595

610

RSA PPI

(%)

6.00%

6.00%

6.00%

6.00%

6.00%

AUS PPI

(%)



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2.50%

2.50%

2.50%

2.50%

2.50%

US PPI

(%)

2.00%

2.00%

2.00%

2.00%

2.00%

Nominal Exchange Rate - PPP

(US\$:ZAR)

8.26

8.59

8.93

9.28

9.64

(US\$:AUS\$)

1.49

1.50

1.51

1.51

1.52

(AUS\$:ZAR)

5.54

5.73

5.92

6.12

6.33

**1.5.3**

***LoM Plans***

The LoM plans and associated Mineral Reserve statements for the Mining Assets have been derived using a gold price of ZAR93,000/kg for the Mining Assets located in South Africa and AUS\$522/oz for the Mining Assets located in Australia.

The post-tax pre-finance cash flows from each tax entity have been developed on the basis of a US\$ gold price of US\$350/oz and macro-economic factors as defined in Table 1.1 above.

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## 1.6

**Qualifications of Consultant**

The SRK Group comprises 500 staff, offering expertise in a wide range of resource engineering disciplines. The SRK Group's independence is ensured by the fact that it holds no equity in any project. This permits the SRK Group to provide its clients with conflict-free and objective recommendations on crucial judgement issues. The SRK Group has a demonstrated track record in undertaking independent assessments of resources and reserves, project evaluations and audits, CPRs and independent feasibility evaluations to bankable standards on behalf of exploration and mining companies and financial institutions worldwide. The SRK Group has also worked with a large number of major international mining companies and their projects, providing mining industry consultancy service inputs. SRK also has specific experience in commissions of this nature.

This CPR has been prepared based on a technical and economic review by a team of 30 consultants sourced from the SRK Group's offices in South Africa, the United Kingdom and Australia over a two-month period. These consultants are specialists in the fields of geology, resource and reserve estimation and classification, underground and open pit mining, rock engineering, metallurgical processing, hydrogeology and hydrology, tailings management, infrastructure, environmental management and mineral economics.

Neither SRK nor any of its employees and associates employed in the preparation of this report has any significant beneficial interest in the Companies or in the assets of the Companies. SRK will be paid a fee for this work in accordance with normal professional consulting practice.

The individuals who have provided input to this CPR, who are listed below, have extensive experience in the mining industry and are members in good standing of appropriate professional institutions:

- Andrew MacDonald MSc, MBL, C.Eng., Pr.M., MIMMM, MISRM;
- Andrew Pooley, Pr. Eng, MSAIMM, AMIMM, B.Eng (Mining);
- Andrew Smithen, Pr. Eng., MBL, MSAICE, MSAIAE, MSAIMM, MSc;
- Andrew Vigar, FAusIMM, BSc (Applied Geology);
- Awie Swart, MSAIMM, MSANIRE, COM Adv. Rock Eng. Cert. B.Eng.;
- Boet van der Vyfer, FMVS, Adv. Cert. Mine Env. Control;
- Dawood Wepener, BSc Eng., MSAIME, Govt. Cert of Comp.;
- Ian Home, MIAIA, MSc;
- Iestyn Humphreys, AM.I.Min.E, AIME, PhD;
- Jim Williams, ACSM, C.Eng., FAusIMM;
- Jonathan Suthers, B.Eng.;
- John Miles, C. Eng., MIMMM, MSc;
- Kenneth Owen, FSAIMM, MAMMSA, MSc Eng;
- Kirsty Sells, CPEnv, FAuSIMM, BSc, MBS;
- Lee Barnes, B. Eng., MSc;
- Louis Voortman, CPGeo, FAusIMM, MAIG, MGAA, MGASA, SIA(aff), AIM(Aff), Sc MSc;

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- Louie Human, COM Adv. Rock Eng. Cert., NHD (Geology);
- Mark Campadonic FGS, AIQ, Msc;
- Michael Boylett, C.Eng, MA (Met.), MSAIMM, MIMMM;
- Michael Harley, Pr. Sci Nat., MSAIMM, MAusIMM, PhD;
- Michael McWha Pr.Sci Nat., FGSSA, MSAIMM, BSc Hons;
- Mike Warren, MAuSIMM, BSc (Mining), MBA;
- Neal Rigby, C. Eng, MIMM. MAIME, PhD;
- Peter Munro, MAuSIMM, B. Appl. Sc., B. Comm, B. Econ;
- Peter Theron, Pr. Eng, MSAICE, BSc., GDEm;

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- Robert Wilson, Pr. Eng, FSAIMM, B.Sc.Eng.(Mech.);
- Roger Dixon, Pr. Eng, FSAIMM, BSc (Mining);
- Victor Hills, Pr.Eng., MSAIMM, B.Eng.;
- Wally Waldeck, Pr. Eng, MSAIMM, BSc (Mining), MBA; and
- William Schoeman, Pr. Eng, MSAIME, BSc.Eng (Mech).

The collective group of companies defined earlier as SRK has prepared this report. In this context and as considered by various international exchanges, SRK the Company is the Competent Person, which takes ultimate responsibility for this report. Notwithstanding this statement and in compliance with Section 12.3 of the JSE Listings Requirements, the following should be noted:

- the Competent Person with overall responsibility for the compilation of this CPR is Mr. H. Eng who is an employee of SRK. Mr. Waldeck is a mining engineer with 28 years' experience in the industry and has supervised numerous due-diligence reviews and various technical studies on the Witwatersrand Basin during the past five years. In compliance with the SAMREC requirements, Mr. Waldeck also assumes responsibility for the reporting of Mineral Reserves as included in this CPR
- in compliance with the SAMREC requirements and definitions, the Competent Person with overall responsibility for Mineral Resources is Dr. Michael Harley who is an employee of SRK. Dr. Michael is a mining geologist with 14 years' experience in the mining industry and has been responsible for reporting of Mineral Resources on various properties in South Africa and internationally during the past five years.

The information with respect to Mineral Resources and Mineral Reserves as defined by the Companies has been prepared under the direction of the following individuals:

- for Harmony: The information with respect to the Mineral Resources and Mineral Reserves has been prepared under the direction of Mr. Graham Briggs, Pr. Sci. Nat, BSc (Hons) Geology. Mr. Briggs is responsible for ore reserve management, organic growth and capital projects on the executive committee of Harmony. He has 29 years' experience in the gold mining industry and is a registered geological surveyor and
- for ARMgold: The information with respect to the Mineral Resources and Mineral Reserves has been prepared under the direction of Mr. Chris Lerm, Pr. MS, GDE, FIMSSA, MIMSA, MSc. Mr Lerm is the Strategic Planning Leader for ARMgold and Competent Person for Mineral Resource and Mineral Reserve accounting. He has 24 years' experience in gold mining evaluation and is registered with the South African Council for Professional and Technical Surveyors ("PLATO"). Mr. Lukas Korff also assisted Mr. Chris Lerm. Mr Korff has 24 years' experience in the gold mining industry.

2.

### **MINING ASSETS**

#### **2.1**

##### **Introduction**

This section gives a brief overview of the Companies and Mining Assets, property description, mining methods, operating results, location and historical development. Specifically where reference is made to legal compliance within the regulatory environment in which the Companies operation, SRK has placed reliance on the Companies and

their respective legal advisors.

**2.2**

**Companies and Operating Structures**

**2.2.1**

***Harmony***

Harmony is a public listed company. Its primary listing is on the JSE and secondary listings are on the LSE, the Paris Bourse, with International Depositary Receipts ("IDR") traded on the Brussels Bourse, and an American Depositary Shares ("ADS") programme on the New York Stock Exchange ("NYSE").

Harmony, either through wholly-owned subsidiaries or joint venture agreements, manages and operates BUs, comprising operating and developing mines in three countries, comprising underground, open-pit and surface reclamation operations. In addition, Harmony's exploration programme targeting gold and PGEs extends its country presence through direct and indirect subsidiaries to five countries.

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Harmony's company ownership comprises holdings in direct subsidiaries, indirect subsidiaries, direct and indirect joint venture companies, and indirect associate companies. These comprise dormant companies, exploration companies, gold mining companies, investment holding companies, management service companies, marketing companies, beneficiation companies, mineral rights holding companies and property holding companies.

Harmony's operating structure principally comprises two reporting entities represented by South African Operations and International Operations. South African Operations are sub-divided into six reporting entities: Free State Operations (excluding Free Gold), Evander Operations, Randfontein Operations, Elandskraal Operations, Kalgold Operations and Free Gold Operations. International Operations are sub-divided into two operations, namely the Australian Operations and Canadian Operations.

Harmony's principal executive offices are located at 4 High Street, First Floor, Melrose Arch, Melrose North 2196, Johannesburg, Gauteng Province, South Africa.

Table 2.1 gives the recent historical development of Harmony to date. By measure of attributable annual gold production Harmony is ranked 6th and by attributable total cash costs ranked 13th in terms of the world's gold mining companies. Harmony's core business is gold mining whose activities include the exploration, development and operation of gold mines, including direct interests in the marketing of gold and indirect interests in the manufacturing and retailing of gold jewellery.

Table 2.2 gives attributable historical and forecast operating statistics for Harmony from 2001 through to 30 June 2004, inclusive, with figures reported on a financial year basis.

**Table 2.1 Harmony: company development**

**Date**

**Activity**

August, 1950

Harmony Gold Mining Company Limited incorporated and registered as a public company in South Africa.

1994

Management agreement between Randgold & Exploration Company Limited ("Randgold") and Harmony cancelled and replaced with service agreement.

1997

Service agreement between Randgold and Harmony cancelled resulting in Harmony operating as a completely independent gold mining company.

1997

Acquisition of Lydenburg Exploration Limited ("Lydex") for a consideration of ZAR204m.

June, 1998

Acquisition of Bissett gold mine from the liquidators of Rea Gold corporation for a consideration of ZAR26m.

July, 1998

The acquisition of Evander Gold Mines Limited for a consideration of ZAR545m.

October, 1999

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Acquisition of Kalahari GoldRidge Mining Company Limited and West Rand Consolidated Mines Limited for a consideration of ZAR321m.

March, 2000

Acquisition of Randfontein Estates Limited for a consideration of ZAR931m.

April, 2001

Acquisition of the Elandskraal mining operations from AngloGold Limited for a consideration of ZAR1,053m.

April, 2001

Acquisition of New Hampton Goldfields Limited for a consideration of ZAR229m.

September, 2001

Acquisition of 31.8% of the issued share capital of Bendigo Mining NL for a consideration of ZAR292m.

December, 2001 (effective date 3 January 2002)

Acquisition of 50% of the issued share capital of Free Gold wh

Free Gold operations and certain other assets for approximately ZAR1,4bn.

April, 2002

Acquisition of Hill 50 Limited for a consideration of ZAR1,419m.

May, 2002

Acquisition of 32.5% of the ordinary share capital of Highland Gold Limited for a consideration of ZAR188m.

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### Date

### Activity

October, 2002

Joint acquisition by Free Gold of St Helena BUs from Gold Fields Limited, for a gross sale consideration of ZAR120m.

November, 2002

Harmony lists on the New York Stock Exchange ("NYSE").

November, 2002

Acquisition of 21% of the ordinary share capital of High River Gold Limited for a consideration of ZAR141m.

February, 2003

Harmony announces offer for Abelle Limited ("Abelle") which values Abelle at ZAR689m.

May, 2003

Announcement of merger with ARMgold.

May, 2003

Announcement of an acquisition by Clidet No 454 (Pty) Limited, a 50-50 JV between harmony and ARMgold of 34.5% of the shares of Avmin for a consideration of ZAR1,888m in which Harmony and ARMgold each have 50%.

### Table 2.2 Harmony: salient historical and forecast operating statistics

(1), (2)

### Statistic

### Units

2001

2002

2003

(3)

2004

(4)

### Production

Area Mined

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(m

2

)

2,027,043

2,286,395

2,444,772

2,816,196

Tonnes Milled

(kt)

17,074

22,934

31,752

27,513

Yield

(g/t)

3.9

3.6

3.4

3.5

Gold Production

(koz)

2,140

2,668

3,431

3,089

Development

(m)

128,625

152,006

167,041

139,808

**Productivity**

TEC

(No.)

43,448

46,873

46,074

41,164

Centares

(m

2

/TEC/month)

3.9

4.8

5.5

5.7

Milling

(t/TEC/month)

32

41

57

56

Gold Production

(g/TEC/month)

125

147

193

194

**Health and Safety**

Fatalities

(No.)

26

37

29

-

Fatality Rate

(per mmhrs)

0.28

0.35

0.27

-

LTIFR

(per mmhrs)

28

23

23

-

**Expenditures**

Cash Operating Costs

(ZARm)

3,822

5,215

7,425

6,746

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### Capital Expenditure

(ZARm)

424

735

763

1,104

### **Cost Performance**

#### Cash Operating Costs

(ZAR/t)

224

227

234

245

(ZAR/kg)

57,419

62,853

69,577

70,221

#### Capital Expenditure

(ZAR/t)

25

32

24

40

(ZAR/kg)

6,370

8,859

7,152

11,492

(1)

TEC and productivity statistics exclude the Canadian operations as TEC figures unavailable.

(2)

Health and Safety statistics for Canadian and Australian operations for 2001 are unavailable.

(3)

2003 incorporates actual results to Q3 and forecast results for Q4 ending June 2003.

(4)

2004 comprises forecasts for the first year of the current LoM plans.

### 2.2.2

#### **ARMgold**

ARMgold is a public listed company on the JSE. Table 2.3 gives the recent historical development of ARMgold to date. By measure of attributable annual gold production ARMgold is ranked 10th and by attributable total cash costs ranked 7th in terms of the world's gold mining companies. ARMgold states its core business as that directly associated with a gold company whose activities include exploration for, development of and operation of gold mines.

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ARMgold's Mining Assets are managed via the Joint Venture and the ARMgold Sandton Office, which manages the Orkney Operations and Welkom Operations, which are in turn sub-divided into various BUs. ARMgold provides managerial and operational support from an Operations Office situated in Orkney, North West Province, South Africa.

**Table 2.3 ARMgold: company development**

**Date**

**Activity**

1994

Future Mining (Pty) Limited was formed and entered into a contractual agreement to undertake mining activities for Vaal Reefs Exploration and Mining Company at BU No. 8 at the Vaal Reef Complex.

November, 1997

African Rainbow Minerals and Exploration (Pty) Limited was registered.

January, 1998

Acquisition of six mining BUs (BUs No's 1 to 7, excluding No. 2) situated in Orkney area, from Vaal Reefs Exploration and Mining Company Limited for a consideration of ZAR38.2m.

September, 1998

Acquisition of six mining BUs (No's 1 to 7, excluding No. 5) and a gold plant in the Welkom area from Free State Consolidated Gold Mines Operations Limited ("Free State Consolidated") for a consideration of ZAR28m.

July, 2001

Acquisition of the Orkney BU No. 2 from AngloGold Limited for a consideration of ZAR10m.

December, 2001 (effective date January, 2002)

Acquisition of 50% of the issued share capital of Free Gold wh

Free Gold operations and certain other assets for approximately ZAR1.4bn.

October, 2002

Acquisition by Free Gold of St. Helena from Gold Fields Limited for a gross sale consideration of ZAR120m.

May, 2003

Announcement of merger with Harmony.

May, 2003

Announcement of an acquisition by a new joint venture company between ARMgold and Harmony of 34.5% of the issued share capital of Avmin for a consideration of ZAR844m.

Table 2.4 gives the historical and forecast attributable operating statistics for ARMgold from 2001 through to 30 June 2004, inclusive.

**Table 2.4 ARMgold: salient historical and forecast operating statistics**

**Statistic**

**Units**

**2001**

**2002**

(1)

**2003**

(2)

**2004**

(3)

**Production**

Area Mined

(m

2

)

421,523

400,752

899,729

1,018,153

Tonnes Milled

(kt)

2,400

3,352

7,023

7,049

Yield

(g/t)

6.8

5.1

4.6

4.4

Gold Production

(koz)

524

546

1,047

993

Development

(m)

8,240

13,773

34,174

21,207

**Productivity**

TEC

(No.)

8,071

15,321

15,675

14,445

Centares

(m

2

/TEC/month)

4.4

4.4

4.8

5.9

Milling

(t/TEC/month)

25

36

37

41

Gold Production

(g/TEC/month)

168

185

173

178

**Health and Safety**

Fatalities

(No.)

14

9

3

-

Fatality Rate

(per mmhrs)

0.63

0.29

0.12

-

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LTIFR

(per mmhrs)

26

16

15

-

**Expenditures**

Cash Operating Costs

(ZARm)

875

949

2,065

2,141

Capital Expenditure

(ZARm)

40

46

123

263

95





**Table 2.4 ARMgold: salient historical and forecast operating statistic (continued)**

**Statistic**

**Units**

**2001**

**2002**

(1)

**2003**

(2)

**2004**

(3)

**Cost Performance**

Cash Operating Costs

(ZAR/t)

364

283

294

304

(ZAR/kg)

53,681

55,897

63,414

69,349

Capital Expenditure

(ZAR/t)

17

14

17

37



(ZAR/kg)

2,437

2,708

3,767

8,524

(1)

2002 comprises six months to 30 June 2002.

(2)

2003 incorporates actual results to Q3 and forecast results for Q4 ending June 2003.

(3)

2004 comprises forecasts for the first year of the current LoM plans.

## 2.3

### Overview of the Mining Assets

#### 2.3.1

##### *Free Gold Operations*

The Free Gold Operations are situated in the Free State Province, South Africa, some 270km southwest of Johannesburg. Located at approximately latitude 2800'S and longitude 2630'E, the site is accessed via the national highway N1 between Johannesburg and Bloemfontein.

Exploration, development and production history in the area dates from the early 1940s, leading to commercial production by 1947. Subsequent consolidation and restructuring led to the formation of Free State Consolidated, which in addition to HJ Joel, became a wholly-owned subsidiary of AngloGold Limited ("AngloGold") in June 1998. Free Gold acquired the assets from AngloGold in December 2001 and St Helena BUs from Goldfields during May 2002.

Mining operations comprise nine underground mining BUs: Tshepong, Phakisa, Bambanani, West, Eland, Sable & Kudu, Nyala, Joel and St. Helena (comprising BUs No.2, No.4, No.8, and No.10). Phakisa is currently a project for which capital is committed and is anticipated to commence in 2004. The mining operations feed four process facilities: FS1 Plant; FS2 Plant; Joel Plant and St. Helena Plant.

Table 2.5 gives the salient operating statistics and Table 2.6 gives the historical and forecast operating statistics for Free Gold Operations from 1 January 2001 through to 30 June 2004 inclusive. Note that 2001 is reported on a calendar year, 2002 comprises six months to 30 June 2002, and 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.5 Free Gold operations: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

Tshepong BU

165

147

16

long-life

Bambanani BU

195

134

8

medium-life

West BU

80

19

4

short-life

Eland BU

70

36

3

short-life

Kudu & Sable BU

120

22

4

short-life

Nyala BU

280

22

7

medium-life

Joel North and South BU

350

44

11

long-life

Phakisa BU

150

80

8

medium-life

St. Helena 335

48

5

medium-life

**Total Hoisting Capacity**

**1,745**

**473**

**18**

**long-life**

Surface Sources

300

296

4

short-life

**Processing Plants**

FS1 Plant

420

402

18

long-life

FS2 Plant

300

300

4

short-life

Joel Plant

150

72

11

long-life

St. Helena 100

93

3

short-life

**Total Processing Capacity**

**970**

**867**

**18**

**long-life**

96





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Table 2.6 Free Gold Operations: salient historical and forecast operating statistics

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Area Mined

(m

2

)

1,045,758

395,496

974,682

1,173,912

Tonnes Milled

(kt)

8,479

4,371

9,371

9,546

Yield

(g/t)

4.4

4.0

3.8

4.1



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Gold Production

(koz)

1,199

558

1,155

1,259

Development

(m)

41,455

19,324

48,768

30,727

**Productivity**

TEC

(No.)

20,368

14,722

15,478

17,211

Centares

(m

2

/TEC/month)

4.3

4.5

5.2

5.7

Milling

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(t/TEC/month)

35

49

50

46

Gold Production

(g/TEC/month)

153

197

193

192

**Health and Safety**

Fatalities

(No.)

11

10

1

-

Fatality Rate

(per mmhrs)

0.35

0.24

0.05

-

LTIFR

(per mmhrs)

17

15

15

-

**Expenditures**

Cash Operating Costs

(ZARm)

2,409

883

2,167

2,612

Capital Expenditure

(ZARm)

58

32

113

380

**Cost Performance**

Cash Operating Costs

(ZAR/t)

284

202

231

274

(ZAR/kg)

64,619

50,879

60,300

66,038

Capital Expenditure

(ZAR/t)

7

7

12

40

(ZAR/kg)

1,555

1,827

3,131

9,698

**2.3.2**

***Harmony Free State Operations***

The Harmony Free State Operations are situated in the Free State Province, South Africa, some 270km southwest of Johannesburg. Located at approximately latitude 2810'S and longitude 2630'E, the site is accessed via the national highway N1 Between Johannesburg and Bloemfontein.

Exploration, development and production history in the area dates from the early 1940s. Harmony's Free State Operations commenced with amalgamation of Harmony, Virginia and Merriespruit mining operations. Subsequent acquisitions included: Unisel BU in 1996; Saaiplaas BU in 1997; Brand BU's in 1998 and Masimong BU in 1998. Table 2.7 gives the salient operating statistics and Table 2.8 gives the historical and forecast operating statistics for Harmony Operations from 1 January 2001 through to 30 June 2004 inclusive. Note that 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.





Table 2.7 Harmony Free State Operations: salient operating statistics

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

Harmony No. 2 BU

227

46

5

medium-life

Harmony No. 3 BU

90

-

-

non-operational

Harmony No. 4 BU

146

-

-

non-operational

Merriespruit No. 1 BU

129

35

9

medium-life

Merriespruit No. 3 BU

197

60

9

medium-life

Virginia No. 2 BU

103

-

-

non-operational

Unisel BU

137

61

11

long-life

Saaiplaas No. 3 BU

176

25

10

long-life

Brand No. 2 BU

120

-

-

non-operational

Brand No. 3 BU



120

41

5

medium-life

Brand No. 5 BU

151

0

3

short-life

Masimong Complex

**149**

**109**

**15**

long-life

- No. 4 BU

30

10

long-life

- No. 5 BU

80

15

long-life

**Total Hoisting Capacity**

**1,745**

**378**

**15**

long-life

Surface Sources

200

197

13

long-life

**Processing Plants**

Central Plant

240

240

11

long-life

Virgina Plant

180

162

9

medium-life

Saaiplaas Plant

220

222

15

long-life

**Total Processing Capacity**

**640**

**624**

**15**

long-life

**Table 2.8 Harmony Free State Operations: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Area Mined

(m

2

)

721,709

738,793

807,334

917,293

Tonnes Milled

(kt)

5,289

4,536

5,351

7,487

Yield

(g/t)

4.0

4.2

3.5

2.9

Gold Production

(koz)

686

612

606

692

Development

(m)

50,027

51,188

58,272

26,513

**Productivity**

TEC

(No.)

15,668

12,776

12,219

12,896

Centares

(m

2

/TEC/month)

3.8

4.8

5.5

5.9

Milling

(t/TEC/month)

28

30

36

48

Gold Production

(g/TEC/month)

114

124

129

139

**Health and Safety**

Fatalities

(No.)

9

8

2

-

Fatality Rate

(per mmhrs)

0.26

0.27

0.07

-

LTIFR

(per mmhrs)

35

26

24

-

**Expenditures**

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### Cash Operating Costs

(ZARm)

1,385

1,351

1,500

1,617

### Capital Expenditure

(ZARm)

120

95

130

63

### **Cost Performance**

#### Cash Operating Costs

(ZAR/t)

262

298

280

216

(ZAR/kg)

64,883

70,978

79,619

75,162

#### Capital Expenditure

(ZAR/t)

23

21

24

8

(ZAR/kg)

5,622

4,991

6,912

2,925

**98**







2.3.3

**ARMgold Welkom Operations**

The ARMgold Welkom Operations are situated in the Free State Province, South Africa, some 270km southwest of Johannesburg. Located at approximately latitude 2800'S and longitude 2630'E, the site is accessed via the national highway N1 between Johannesburg and Bloemfontein.

Exploration, development and production history in the area dates from the 1940s leading to commercial production by 1947. Mining operations comprise five underground mining BUs: BU No. 1; BU No. 2; BU No. 4; BU No. 6; and BU No. 7 which have a combined rock hoisting capacity of 313ktpm. The mining operations process their ore via a toll agreement with Free Gold.

Table 2.9 gives the salient operating statistics and Table 2.10 gives the historical and forecast operating statistics for ARMgold Welkom Operations from 1 January 2001 through to 30 June 2004, inclusive. Note that 2001 is reported on a calendar year, 2002 comprises six months to 30 June 2002, and 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.9 ARMgold Welkom Operations: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

No. 1 BU

68

25

3

short-life

No. 2 BU

54

6

2

short-life

No. 3 BU

55

5

3

short-life

No. 4 BU

55

4

2

short-life

No. 6 BU

68

9

3

short-life

No. 7 BU

68

24

8

medium-life

**Total Hoisting Capacity**

**368**

**72**

**8**

**medium-life**

**Table 2.10 ARMgold Welkom Operations: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Area Mined

(m

2

)

73,178

38,065

104,571

173,703

Tonnes Milled

(kt)

340

224

575

861

Yield

(g/t)

5.1

4.9

3.4

3.5

Gold Production

(koz)

56

35

63

96

Development

(m)

1,296

1,483

5,168

96

**Productivity**

TEC

(No.)

1,492

1,786

2,092

2,007

Centares

(m

2

/TEC/month)

4.1

3.6

4.2

7.2

Milling

(t/TEC/month)

19

21

23

36

Gold Production

(g/TEC/month)

97

102

78

124

**Health and Safety**

Fatalities

(No.)

4

2

1

-

Fatality Rate

(per mmhrs)

0.92

0.35

0.27

-

LTIFR

(per mmhrs)

17

12

13

-

**Expenditures**

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Cash Operating Costs

(ZARm)

144

101

201

241

Capital Expenditure

(ZARm)

10

7

28

-

**Cost Performance**

Cash Operating Costs

(ZAR/t)

425

449

349

280

(ZAR/kg)

82,737

92,093

102,745

80,927

Capital Expenditure

(ZAR/t)

28

33

49

-

(ZAR/kg)

5,444

6,778

14,508

-

99







## 2.3.4

**West Wits Operations**

The West Wits Operations principally comprise Elandsrand, Deelkraal, Cooke 1, Cooke 2, Cooke 3, and Doornkop and the non-operational Randfontein No.4 BU. Elandsrand and Deelkraal are situated in the Gauteng and North West Province, South Africa, some 85km southwest of Johannesburg. Located at approximately latitude 2600'S and longitude 2700'E, the site is accessed via the national highway N12 between Johannesburg and Kimberley. Cooke and Doornkop are situated in the Gauteng Province, South Africa, some 50km west of Johannesburg. Located at latitude 2622'S and longitude 2742'E, the site is accessed via the local R28 highway between Randfontein and Westonaria. Exploration, development and production history in the Elandsrand and Deelkraal area dates from 1930, leading to large-scale production by the 1940s whilst exploration, development and production history in the Cooke and Doornkop areas dates back to 1889.

Table 2.11 gives the salient operating statistics and Table 2.12 gives the historical and forecast operating statistics for West Wits Operations from 1 January 2001 through to 30 June 2004, inclusive. Note that 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.11 West Wits Operations: salient operating statistics**

**Production Unit****Design Capacity****Operating Capacity 2004****Life**

(ktpm)

(ktpm)

(years)

**Classification****Business Units**

Elandsrand BU

331

128

19

long-life

Deelkraal BU

187

46

6

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medium-life

Cooke 1 BU

176

53

5

medium-life

Cooke 2 BU

187

64

16

long-life

Cooke 3 BU

265

85

16

long-life

Cooke 4 BU

149

-

-

non-operational

Doornkop BU

50

39

19

long-life

**Total Hoisting Capacity**

**1,345**

415

19

**long-life**

Surface Sources

200

188

6

medium-life

**Processing Plants**

Elandsrand Plant

190

156

19

long-life

Deelkraal Plant

135

94

6

medium-life

Cooke Plant

280

235

19

long-life

Doornkop Plant

220

172

2

short-life

**Total Processing Capacity**

825

657

19

**long-life**

100







**Table 2.12 West Wits Operations: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Area Mined

(m

2

)

870,966

946,311

803,624

889,064

Tonnes Milled

(kt)

6,991

8,078

7,914

7,444

Yield

(g/t)

3.8

4.0

3.5

3.8

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Gold Production

(koz)

846

1,038

879

920

Development

(m)

47,738

59,155

56,015

68,886

**Productivity**

TEC

(No.)

17,640

16,907

15,162

12,250

Centares

(m

2

/TEC/month)

4.1

4.7

4.4

6.0

Milling

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(t/TEC/month)

33

40

43

51

Gold Production

(g/TEC/month)

124

159

150

195

**Health and Safety**

Fatalities

(No.)

12

20

20

-

Fatality Rate

(per mmhrs)

0.32

0.47

0.54

-

LTIFR

(per mmhrs)

24

23

23

-

**Expenditures**

Cash Operating Costs

(ZARm)

1,400

1,963

1,896

1,901

Capital Expenditure

(ZARm)

115

262

179

335

**Cost Performance**

Cash Operating Costs

(ZAR/t)

200

243

240

255

(ZAR/kg)

53,187

60,819

69,335

66,409

Capital Expenditure

(ZAR/t)

16

32

23

45

(ZAR/kg)

4,369

8,117

6,542

11,693

**2.3.5**

***Evander Operations***

Evander Operations are situated in the Mpumalanga Province, South Africa, some 120km east- southeast of Johannesburg. Located at latitude 2828'S and longitude 2906'E, the site is accessed via the local R29 road between Leandra and Bethel in the vicinity of Kinross.

Exploration, development and production history in the area dates from 1903, leading to full-scale production by 1955. Evander Operations originally comprised Kinross, Bracken, Leslie and Winkelhaak that were merged in 1996 due to declining Mineral Reserves. In August 1998, Harmony acquired Evander as a wholly-owned subsidiary. Table 2.13 gives the salient operating statistics and Table 2.14 gives the historical and forecast operating statistics for Evander Operations from 1 January 2001 through to 30 June 2004 inclusive. Note that 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

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**Table 2.13 Evander Operations: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

Evander No. 2 BU

69

44

10

long-life

Evander No. 3 BU

20

-

-

long-life

Evander No. 5 BU

94

25

10

long-life

Evander No. 7 BU

106

42



11

long-life

Evander No. 8 BU

147

58

15

long-life

Evander No. 9 BU

83

16

4

short-life

**Total Hoisting Capacity**

**517**

**185**

**15**

**long-life**

Surface Sources

-

-

-

-

**Processing Plants**

Kinross Plant

198

202

15

long-life

Winkelhaak Plant

72

71

10

long-life

**Total Processing Capacity**

**270**

**273**

**15**

**long-life**

**Table 2.14 Evander Operations: salient historical and forecast operating statistics**

**Statistic**

**Units**

**2001**

**2002**

**2003**

**2004**

**Production**

Area Mined

(m

2

)

434,368

403,543

346,473

422,883

Tonnes Milled

(kt)

2,481

2,352

2,135

2,428

Yield

(g/t)

5.7

5.5

5.2

5.1

Gold Production

(koz)

458

415

354

396

Development

(m)

30,861

32,002

28,371

29,045

**Productivity**

TEC

(No.)

8,805

8,639

8,261

6,631

Centares

(m

2

/TEC/month)

4.1

3.9

3.5

5.3

Milling

(t/TEC/month)

23

23

22

31

Gold Production

(g/TEC/month)

135

125

111

155

**Health and Safety**

Fatalities

(No.)

5

6

4

-

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Fatality Rate

(per mmhrs)

0.27

0.33

0.23

-

LTIFR

(per mmhrs)

22

24

33

-

**Expenditures**

Cash Operating Costs

(ZARm)

693

723

801

891

Capital Expenditure

(ZARm)

69

98

99

105

**Cost Performance**

Cash Operating Costs

(ZAR/t)

279

307

375

367

(ZAR/kg)

48,628

55,960

72,638

72,384

Capital Expenditure

(ZAR/t)

28

42

46

43

(ZAR/kg)

4,842

7,585

8,996

8,505

**2.3.6**

***ARMgold Orkney Operations***

The ARMgold Orkney Operations are situated in North West Province, South Africa, some 175km south-west of Johannesburg. Located at approximately latitude 2630'S and longitude 2645'E, the site is accessed via the national highway N12 between Johannesburg and Kimberley.

Exploration, development and production history in the area dates from 1886, and following dormant periods, large scale production commenced during the 1940s with the formation of Vaal Reefs Gold Mining and Exploration Company Limited ("Vaal Reefs") in 1944.

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Mining operations comprise six underground mining BUs: BU No. 1, BU No. 2, BU No. 3, BU No. 4, BU No. 6 and BU No. 7. BU No. 1 will shortly become non-operational and BU No. 5 has been closed. The mining operations process their ore via a toll agreement with Vaal River Operations ("VRO") of AngloGold.

Table 2.15 gives the salient operating statistics and Table 2.16 gives the historical and forecast operating statistics for ARMgold Orkney Operations from 1 January 2001 through to 30 June 2004, inclusive. Note that 2001 is reported on a calendar year, 2002 comprises six months to 30 June 2002, and 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.15 ARMgold Orkney: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

No. 1 BU

137

-

-

non-operational

No. 2 BU

142

35

3.0

short-life

No. 3 BU

130

22

4.0

short-life

No. 4 BU

160

36

5.0

medium-life

No. 5 BU

110

-

-

non-operational

No. 6 BU

135

18

8.0

medium-life

No. 7 BU

135

7

8.0

medium-life

**Total Hoisting Capacity**

**949**

**118**

**8.0**

**medium-life**

**Table 2.16 ARMgold Orkney: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Area Mined

(m

2

)

348,345

164,939

307,817

257,494

Tonnes Milled

(kt)

2,060

942

1,763

1,415

Yield

(g/t)

7.1

7.6

7.2

5.9

Gold Production

(koz)

468

232

407

267

Development

(m)

6,944

2,628

4,622

5,747

**Productivity**

TEC

(No.)

6,579

6,174

5,845

3,833

Centares

(m

2

/TEC/month)

4.4

4.5

4.4

5.6

Milling

(t/TEC/month)

26

25

25

31

Gold Production

(g/TEC/month)

184

194

180

181

**Health and Safety**

Fatalities

(No.)

10

7

2

-

Fatality Rate

(per mmhrs)

0.56

0.48

0.27

-

LTIFR

(per mmhrs)

28

24

17

-

**Expenditures**

Cash Operating Costs

(ZARm)

730

407

781

594

Capital Expenditure

(ZARm)

30

23

38

21

**Cost Performance**

Cash Operating Costs

(ZAR/t)

355

432

443

420

(ZAR/kg)

50,195

56,450

61,768

71,455

Capital Expenditure

(ZAR/t)

15

24

22

15

(ZAR/kg)

2,076

3,152

3,011

2,496

103







2.3.7

*Kalgold Operation*

The Kalgold Operation is situated some 50km southwest of Mafikeng in the North West Province, South Africa, some 300km west of Johannesburg. Located at latitude 2610'S and longitude 2614'E, the site is accessed via the local R49 road between Mafikeng and Vryburg.

The gold deposits at Kalgold were discovered by Shell South Africa (Pty) limited ("Shell") in 1991 following an exploration programme focused on the poorly exposed Archaean Greenstone belts of the Kraaipan Group, which occur in the area. In 1995 a feasibility study was conducted by West Rand Consolidated Mines Limited ("WRCM") who acquired the mineral and surface rights leading to the development of an open-pit operation in July 1996. Harmony acquired Kalgold in July 1999.

Table 2.17 gives the salient operating statistics and Table 2.18 gives the historical and forecast operating statistics for Kalgold Operations from 1 January 2001 through to 30 June 2004, inclusive. Note that 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.17 Kalgold Operation: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

**Processing Operations**

135

131

4.3

short-life

**Table 2.18 Kalgold Operation: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

**2003**

**2004**

**Production**

Waste Tonnes Mined

(kt)

8,542

7,323

7,685

9,210

Tonnes Milled

(kt)

959

961

1,089

1,584

Yield

(g/t)

1.6

2.0

2.2

1.8

Gold Production

(koz)

49

62

76

93

Stripping Ratio

(t

waste

:t

ore

)

8.9

7.6

7.1

5.8

**Productivity**

TEC

(No.)

453

444

511

481

Milling

(t/TEC/month)

176

180

178

275

Gold Production

(g/TEC/month)

282

363

385

499

**Health and Safety**

Fatalities

(No.)

-

-

-

-

Fatality Rate

(per mmhrs)

-

-

-

-

LTIFR

(per mmhrs)

7

13

4

-

**Expenditures**

Cash Operating Costs

(ZARm)

98

130

159

220

Capital Expenditure

(ZARm)

33

25

49

0.9

**Cost Performance**

Cash Operating Costs

(ZAR/t)

102

135

146

139

(ZAR/kg)

63,844

67,218

67,336

76,423

Capital Expenditure

(ZAR/t)

34

26

36

1

(ZAR/kg)

21,498

12,927

16,796

324

**2.3.8**

*International Operations - Harmony Australian Operations*

The two main operating groups of Harmony Australia are the Mt Magnet and Cue Operations, and the South Kalgoorlie Operations. Mt Magnet and Cue Operations are situated in the Murchison region, Western Australia whilst the South Kalgoorlie operations are located as part of the Eastern Goldfields

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near the town of Kalgoorlie. Mt. Magnet Operation comprises a number of open-pits and decline operations at Morning Star and Hill 50 and the processing of surface stockpiles. The Cue Operation comprises a number of open-pits at Big Bell, Cuddingwarra, Golden Crown and Tuckabianna. The Big Bell underground operation was recently closed. The South Kalgoorlie operations comprise the Jubilee and New Celebration facilities, the Mt. Marion mine comprises an underground and open-pit operations.

Exploration, development and production history at Mt. Magnet & Cue, and South Kalgoorlie areas dates from 1896 and 1937, respectively. Mining at Mt. Magnet began with the discovery of gold in 1896 and up to 30 June 2002 some 5Moz has been produced. Gold mining at Big Bell in the Cue area commenced in 1937 but closed between 1955 and 1989 and up until 30 June 2002 gold sales exceeded 2Moz. Mining at South Kalgoorlie substantively commenced in 1987 and up until 30 June 2002 gold production of some 2Moz has been realised.

Table 2.19 gives the salient operating statistics and Table 2.20 gives the historical and forecast operating statistics for Harmony Australia Operations from 1 January 2001 through to 30 June 2004, inclusive. Note that 2003 comprises nine-months actual results to March 2003 and three-months forecast results to June 2003. 2004 is reported as the twelve-month forecast to June 2004.

**Table 2.19 Harmony Australian Operation: salient operating statistics**

**Production Unit**

**Design Capacity**

**Operating Capacity 2004**

**Life**

(ktpm)

(ktpm)

(years)

**Classification**

**Business Units**

Mount Magnet and Cue Plant

495

208

7.3

medium-life

Jubilee Plant

110

98

3.0

short-life

New Celebration Plant

138

42

0.3

short-life

**Total**

**743**

**348**

**7.3**

**medium-life**

Table 2.20 Harmony Australian Operation: salient historical and forecast operating statistics

**Statistic**

**Units**

**2001**

**2002**

**2003**

**2004**

**Production**

Tonnes Milled

(kt)

1,088

4,782

7,103

3,798

Yield

(g/t)

1.6

1.6

2.2

2.9

Gold Production

(koz)

56

253

504

355

**Productivity**

TEC

(No.)

882

882

831

831

Milling

(t/TEC/month)

103

452

712

381

Gold Production

(g/TEC/month)

164

743

1,571

1,108

**Health and Safety**

Fatalities

(No.)

-

-

-

-

Fatality Rate

(per mmhrs)

n/a

0.00

0.00

-

LTIFR

(per mmhrs)

n/a

15

2

-

**Expenditures**

Cash Operating Costs

(ZARm)

135

608

1,219

727

Capital Expenditure

(ZARm)

18

233

179

358

**Cost Performance**

Cash Operating Costs

(ZAR/t)

124

127

172

191

(ZAR/kg)

77,990

77,265

77,799

63,631

Capital Expenditure

(ZAR/t)

17

49

25

94

(ZAR/kg)

10,399

29,610

11,427

31,360

105







2.3.9

*International Operations - Harmony Canadian Operations*

Harmony's Canadian Operations comprise the Bisset gold mine located near Bisset in the Manitoba Province, Canada. Mining activities were suspended in the second quarter of 2002 for economic reasons. The first mining at Bisset commenced in 1932 and continued until operations were ceased in June 1998 following the liquidation of the Bisset Gold Mine Company. Bisset had sold some 1.3Moz up until June 1995.

Table 2.21 gives the historical operating statistics for Harmony Canadian Operations from 1 July 2001 through to 30 June 2003 inclusive. For 2003, there was no production due to suspension of mining operations in the previous year.

**Table 2.21 Harmony Canadian Operation: salient historical and forecast operating statistics**

**Statistic**

**Units**

2001

2002

2003

2004

**Production**

Tonnes Milled

(kt)

266

39

-

-

Yield

(g/t)

5.2

6.6

-

-

Gold Production

(koz)

44

8

-

-

**Productivity**

TEC

(No.)

n/a

n/a

-

-

Milling

(t/TEC/month)

n/a

n/a

-

-

Gold Production

(g/TEC/month)

n/a

n/a

-

-

**Health and Safety**

Fatalities

(No.)

-

-

-

-

Fatality Rate

(per mmhrs)

n/a

-

-

-

LTIFR

(per mmhrs)

37

32

-

-

**Expenditures**

Cash Operating Costs

(ZARm)

111

9

3

-

Capital Expenditure

(ZARm)

49

-10

-

-

**Cost Performance**

Cash Operating Costs

(ZAR/t)

417

231

-

-

(ZAR/kg)

80,552

35,019

-

-

Capital Expenditure

(ZAR/t)

184

-256

-

-

(ZAR/kg)

35,559

-38,911

-

-

## 2.4

### Significant Exploration Properties

#### 2.4.1

##### *Harmony*

Harmony has three significant exploration properties: namely Poplar, Rolspruit and Kalplats.

The Poplar Project considers the greenfields development through installation of a twin shaft system to some 1,200m below surface to access ore some 20km from the existing Evander Operations. Mineral Resources have been estimated and the project is currently the focus of a pre-feasibility study.

The Rolspruit Project considers the exploitation of deeper resources of the Kimberley Reef adjacent to the No.8 BU. Harmony has recently (March 2003) completed a feasibility study, which assesses two distinct options:

- Greenfields Option: the installation of a twin shaft system from surface; and
  
- Brownfields Option: the installation of a twin sub-vertical shaft system at No.8 BU.

Given the high capital expenditure requirements and long lead-time to full production, current focus is on improving project economic performance.

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The Kalplats Project is situated some 90km southwest of Mafikeng in the North West Province, South Africa, some 340km west of Johannesburg. The project is located some 40km to the west of the Kalgold Operation and accessed via the local R49 road between Mafikeng and Vryburg.

Kalplats is a platinum group metal ("PGM") prospect that was discovered during the course of gold prospecting in the Kraaipan greenstone belt in 2000. Mineralisation is contained in some seven separate ore zones with strike lengths between 500m to 1,000m and widths of some 15m to 45m. Exploration has been completed and comprised a combination of Rotary Air Blast, Reverse Circulation and Diamond Drilling and a Pre-feasibility Study was completed in July 2002.

The Pre-feasibility Study concluded that the future viability of commissioning a mining operation at Kalplats depended on selectively mining the higher-grade reef zones. In 2003 work included the excavation of a 500t bulk sample for metallurgical testing of anticipated flotation recoveries and concentrate grades. Harmony is currently commissioning a Feasibility Study in order to assess the potential development of an open-pit mining operation.

#### 2.5

##### **Mining Authorisations and Mining Leases**

SRK has not reviewed the various agreements relating to mineral rights, authorisations and leases from a legal perspective and has consequently relied on advice by the Companies to the effect that the Companies are entitled to mine all material falling within their respective mineral rights and/or mining rights and that all the necessary statutory mining authorisations are in place.

#### 2.5.1

##### ***South African Law: Current Status***

Ownership of mineral rights and statutory mining rights in South Africa may be affected through the common law or by statute. Under the common law, mineral rights vest with the owner of the land. The common law recognises the principal that mineral rights may be severed from title to land, rendering it possible for the surface rights, the rights to precious metals and the rights to base minerals to be owned by different persons.

Earlier mining legislation, which has since been repealed, granted, by way of mining leases, statutory rights to mine for precious metals. Despite the repeal of this earlier legislation, mining leases continue to be valid under the terms of the Minerals Act (Act 50 of 1991) (the "Act"). Registration of title to mineral rights ensures that real rights are constituted in and to the minerals concerned. Upon registration, those rights (either common law mineral rights or statutory mining rights) become effective against third parties. Registered title may be obtained in a number of ways. For example, where mineral right ownership has been separated from land ownership, registered title to the common law mineral rights is obtained by the registration of such ownership in the Deeds Registry Office. Alternatively, where a person has acquired statutory mining rights pursuant to a mining lease, registered title to the statutory mining rights is effected after receipt of the necessary consent from the Minister of Minerals and Energy and by registration of those rights in the Mining Titles Office.

The Act currently governs prospecting and mining activities in South Africa. The Act provides that statutory mining rights supercede common law mineral rights. Thus, pursuant to the Act, the holders of statutory mining rights are deemed to be the common law holders of the mineral rights.

#### 2.5.2

##### ***South African Law: The Minerals and Petroleum Resources Development Act***

The Minerals and Petroleum Resources Development Act (Act 28 of 2002) was promulgated by the South African Parliament during July 2002 as the Minerals Act (the "Minerals Act"). The Minerals Act sets out to "make provision for the equitable access and sustainable development of the nation's mineral and petroleum resources" by bringing the country's mining law up to internationally accepted standards. It is also expected to provide many opportunities for recognised empowerment exploration and mining companies.

The legislation will enforce the "use it or lose it" principle of mineral exploration and development. In platinum, in particular, it unlocks stagnant areas currently owned by private owners of mineral rights









unwilling or unable to bring them to account and by mining companies wishing to hold reserves and resources for the next 30 years and longer. Government's view is that in order to redress the wrongs of the past, it needs to promote industry to provide employment and to generate revenue for the country- wide Reconstruction and Development Initiative.

The Minerals Act seeks to address the issue of Historically Disadvantaged South Africans ("HDSA") ownership. The South African Government's Mining Charter embodies the policy of facilitating the transfer of ownership within the South African mining industry to HDSA within the next 10 years. All stakeholders have agreed a target of 26% empowerment status to be achieved in a transparent manner and at fair market value.

The Mining Charter also aspires to achieve employment equity and targets of at least 40% HDSA participation in management within five years, with 10% being participation by women.

#### **2.5.3**

##### ***South African Law: Prospecting Permits***

The Act addresses both prospecting and mining. Prospecting is defined as "intentionally searching for any mineral by means which disturb the surface of the earth, including the portion under the sea or under other water or of any tailings, by means of excavation or drilling necessary for that purpose".

Section 5(2) states that no person may prospect or mine without the necessary authorisations. This requirement departs from the common law principles governing ownership of minerals and restricts the right of owners to prospect and exploit Mineral Resources that fall within their ownership. It is a requirement that the applicant for a prospecting permit be the holder of the mineral right or has acquired the written consent of the mineral right holder to prospect for his own account. The prospector may not remove or dispose of any mineral found during prospecting operations unless the Director of Mineral Development has given permission for such removal. Under the Act the Director of Mineral Development has the power to issue prospecting permits. A prospecting application must be submitted and be accompanied by proof of right to the minerals, details about the manner in which the applicant intends to prospect and rehabilitate disturbances of the surface which may be caused by the intended prospecting operations and particulars concerning the applicants' ability to make the necessary provision to rehabilitate disturbances of the surface which may be caused by the intended prospecting operations.

The details of the manner in which the applicant intends to rehabilitate disturbances of the surface are to be submitted in the form of an environmental management programme ("EMP") for approval by the Director of Minerals Development. Such approval is in addition to the approval of the prospecting permit and no prospecting operation may commence without approval of the EMP.

A prospecting permit is issued for a period of 12 months but may be granted for longer should it be so determined by the Director of Minerals Development and can be renewed. The Act restricts and prohibits prospecting on certain lands including National Parks, townships or urban areas, land comprising public roads, a railway or cemetery and land that has been reserved for public purposes.

#### **2.5.4**

##### ***South African Law: Mining Authorisations***

Under the Act, no person or mining entity may mine for minerals without being granted a mining authorisation, either temporary or permanent. Prior to granting a mining authorisation, two requirements must be fulfilled. Firstly, the mining entity must either be the registered holder of the mineral rights or have obtained the written consent of the registered holder of the mineral rights to mine the minerals concerned, for its own account. Secondly, the Department of Minerals and Energy must be satisfied with the scale, manner and duration of the intended mining operations and must approve an Environmental Management Programme Report ("EMPR").

The Act provides for two forms of permanent mining authorisations namely, mining permits and mining licences. A mining permit is issued where the minerals occur in limited quantities or will be mined on a limited scale and on a temporary basis. A mining licence is issued where the minerals occur in more than limited quantities or will be mined on a larger than limited scale and for a period longer than two years.





The Act allows a temporary mining authorisation to be issued either to ensure the continuation of existing operations or to accommodate circumstances where approval of an EMPR is outstanding. Temporary mining authorisations are generally issued for limited periods but are renewable until the EMPR has been approved.

**2.5.5**

***Australian Law***

In Australia, with few exceptions, all onshore mineral rights are reserved to the government of the relevant state or territory. Exploration for and mining of minerals is regulated by the mining legislation of that state or territory and controlled by the relevant state or territory department. Where native title has not been extinguished, native title legislation may apply to the grant of tenure and some subsequent administrative processes. Heritage legislation may operate to preclude or regulate the disturbance of a particular area. In most Australian states, if the holder of an exploration license establishes indications of an economic mineral deposit and expends a minimum level of investment, it may apply for a mining lease which gives the holder exclusive mining rights with respect to all minerals on the property. It is possible for one person to own the surface of the property and for another to own the mineral rights. The maximum initial term of a mining lease is 21 years and the holder has the right to renew the lease for a further period of 21 years. Subsequent renewals are subject to the minister's discretion and the lease can only be assigned with the consent of the relevant minister. Royalties are payable as specified in the relevant legislation in each state or territory. A general-purpose lease may also be granted for one or more of a number of permitted purposes. These purposes include erecting, placing and operating machinery in connection with mining operations, depositing or treating minerals or tailings and using the land for any other specified purpose directly connected with mining operations.

**2.5.6**

***Harmony: Current Status***

Harmony currently classifies their land holding position into four main categories, existing mining authorisation, area for which extensions have been applied for, all contiguous mineral rights, and all non-contiguous mineral rights. On approval of areas currently under consideration for extension Harmony will have mining authorisations totalling 122,615Ha.

Being effectively lease bound, Harmony's South African mining operations do not include any significant mineral rights external to the current lease areas.

Details relating to the EMPR status as required by section 39(1) of the Minerals Act are also included in Section 11 of this CPR.

**Table 2.22 Harmony - South African Operations land holdings**

(1)

**Tax Entity**

**Existing Mining**

**Extension**

**Contiguous**

**Non-Contiguous**

**Authorization**

**Application**

**Mineral Rights**

**Mineral Rights**

(Ha)

(Ha)

(Ha)

(Ha)

Free Gold and Joel

21,204

9,162

4,877

24,484

Randfontein

24,266

3,006

572

Evander

36,898

2,262

2,837

1,462

Harmony Free State

22,583

1,815

3,256

4,094

Kalgold

615

3,810

**Total**



105,566

17,049

13,975

30,612

(1)

Evander excludes prospecting rights granted of 162,237Ha.

Harmony Australian Operations control exploration and mineral rights over a total area of 298,355Ha, of which the active mining areas currently total 75,516Ha.

In Australia, most mineral rights belong to the Government and mining companies must pay royalties to the government based on production. There are, however, limited areas where the government granted freehold estates without reserving mineral rights. Harmony has freehold ownership of its Jubilee mining areas, but the other mineral rights in Harmony Australian Operations belong to the

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Australian Government and are subject to royalty payments. In addition, current Australian law generally requires native title approval to be obtained before a mining license can be granted and mining operations can commence. Harmony Australian Operations have approved mining leases for most of their Mineral Reserves, including all Mineral Reserves that are currently being mined, and Mt. Magnet & Cue Operations has an approved mining license for its current development area. If Harmony Australia Operations expand into additional areas under exploration, these operations would need to convert the relevant exploration licenses prior to commencing mining and that process could require native title approval. There can be no assurance that any approval would be received.

**Table 2.23 Harmony - Australian Operations**

**Tax Entity**

**Prospecting**

**Exploration**

**Mining**

**Miscellaneous Licence**

**(No)**

**(No)**

**(No)**

**(No)**

Mt. Magnet and Cue

30

9

153

9

South Kalgoorlie

85

33

70

16

**Total**

**115**

**42**

**223**

25

2.5.7

***ARMgold: Current Status***

In addition to that stated for Free Gold Operations in Section 2.5.6 ARMgold holds various freehold properties, mining rights, mineral rights and mining authorisations for both the ARMgold Orkney and ARMgold Welkom Operations.

Being effectively lease bound, ARMgold's South African mining operations do not include any significant mineral rights external to the current lease areas.

Details relating to the EMPR status as required by section 39(1) of the Minerals Act are also included in Section 11 of this CPR.

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**Figure 2.1 Mining Assets - location**

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3.

## **GEOLOGY**

3.1

### **Introduction**

This section describes the geology of the Mining Assets. The nature and geometry of the orebodies being or planned to be mined, their structural complexity and the variability of grades is also discussed. In addition to this, a brief description of the geological potential is presented.

3.2

### **Witwatersrand Basin Geology**

Witwatersrand Basin operations are mostly deep-level underground mines exploiting gold bearing, shallow dipping tabular bodies, which have collectively produced over 50kt (1,608Moz) of gold over a period of more than 100 years. The Witwatersrand Basin comprises a 6km vertical thickness of argillaceous and arenaceous sedimentary rocks situated within the Kaapvaal Craton, extending laterally for some 300km east-northeast and 150km south-southeast. The sedimentary rocks generally dip at shallow angles towards the centre of the basin though locally this may vary. The basin sediments outcrop to the south of Johannesburg but further to the west, south and east these are overlain by up to 4km of Achaean, Proterozoic and Mesozoic volcanic and sedimentary rocks. The Witwatersrand Basin sediments themselves are considered to be of the order of 2,700 to 3,100 million years old.

Gold mineralisation in the Witwatersrand Basin occurs within laterally extensive quartz pebble conglomerate horizons, termed reefs. These occur within seven separate goldfields located along the eastern, northern and western margins of the basin. These goldfields are known as the Evander Goldfield, the East Rand Goldfield, the Central Rand Goldfield, the West Rand Goldfield, the Far West Rand Goldfield, the Klerksdorp Goldfield and the Free State Goldfield. As a result of faulting and other primary controls on mineralisation, the goldfields are not continuous and are characterised by the presence or dominance of different reef units. The reefs are generally less than 2m in thickness and are widely considered to represent laterally extensive braided fluvial deposits or unconfined flow deposits, which formed along the flanks of alluvial fan systems that developed around the edge of what was effectively an inland sea.

All major reef units are developed above unconformity surfaces. The extent of unconformity is typically greatest near the basin margin and decreases toward more distal areas. Complex patterns of syn-depositional faulting have caused complex variations in sediment thickness within the basin. Sub-vertical to over-folded reef structures is characteristic of basin margin features within certain areas.

Numerous dykes and sills of diabasic or doleritic composition are developed within the Witwatersrand Basin. These are associated with several separate events including the extrusion of the Achaean Ventersdorp Lavas and the overlying Mesozoic Karoo Volcanic Suite and the emplacement of the Proterozoic Bushveld and Pilanesberg igneous complexes to the north.

The gold generally occurs in native form, often spatially associated with pyrite and carbon. The main gangue components within the reef are quartz pebbles and sand, pyrite, chromite, zircon, spinel, arsenopyrite, pyrrhotite, cobaltite, leucoxene and uraninite. Pyrite and gold within the reefs display a variety of forms, some obviously indicative of detrital transport within the depositional system and others suggesting crystallisation within the reef itself.

Most early theories believed the gold to be deposited syngenetically with the conglomerates, but recent research has confirmed that the Witwatersrand Basin has been subject to metamorphism and that some post-depositional redistribution of gold has occurred. Other experts regard the gold to be totally epigenetic and to have been deposited solely by hydrothermal fluids some time after deposition of the reef sediments.

Despite these varied viewpoints, the most fundamental control to the gold distribution remains the association with quartz-pebble conglomerates on intra-basinal unconformities. The reefs are extremely continuous, as a consequence of the regional nature of the erosional surfaces. Bedrock (footwall) controls have been established governing the

distribution of many of the reefs. Preferential reef development within channel systems and sedimentary features such as facies variations and channel frequency assist in mapping out local gold distributions. In all cases the grade of the orebodies varies above and below the pay limit. Consequently, the identification and modelling of erosional/sedimentary features is the key to in-situ resource estimation.

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3.2.1

*Free State Goldfield*

The Free State Goldfield lies some 270km southwest of Johannesburg on the southwest rim of the Witwatersrand Basin. Exploration within the Free State Goldfield dates from the mid 1940s when values within the Basal Reef, the predominant economic reef in the district, were intersected.

Structurally, the Free State Goldfield lies within a north-south trending syncline forming an apex in the southwestern corner of the Witwatersrand Basin. The northerly plunging syncline is roughly divided by two major faults into three major blocks: the Odendaalsrus section to the west of the De Bron fault, the Central Horst, between the De Bron and Homestead faults, and the Virginia Section east of the Homestead Fault. The Central Horst was uplifted and the Central Rand Group rocks eroded away prior to Ventersdorp time.

The western margin of the Free State Goldfield is characterised by steeply dipping to overturned Central Rand Group sedimentary rocks associated with the low-angle Rheedersdam Thrust Fault. Unconformity relationships in upper Central Rand Group rocks indicate that this reverse faulting influenced sedimentation of the Elsburg Formation.

The Odendaalsrus section is further dissected by a series of north-trending normal faults of late Klipriviersburg age, generally dipping to the west between 30 and 50 with down-throws to the west of the order of 200m to 500m. This results in loss of mineralised ground across the fault zone of as much as 750m, although the composite nature of these fault zones gives rise to the potential for the existence of economic blocks of reef within the deformation zone.

From west to east the most important faults in the Odendaalsrus section are the Uitkyk, the Eureka, the Dagbreek, the Stuurmanspan-Arrarat and the De Bron. Many of these normal faults also display a dextral strike-slip component.

The Central Rand Group in the Free State comprises some 2,000m of sedimentary sequences deposited over successive unconformity surfaces in an expanding depositional area. The lack of major faulting and folding of Central Rand Group age has led to the conclusion that subtle tectonic warping of the basin with granite doming on the margins controlled deposition.

The auriferous horizons are most typically conglomeratic units deposited at the base of each depositional sequence, although they may also occur as scours within a given formation. The principal reefs mined in the Free State are the Basal Reef, the Saaiplaas Reef, the Leader Reef, the 'B' Reef, the 'A' Reef and the Elsburg Reefs.

The Basal Reef is the most extensive, continuous and economically significant reef in the Free State Province, accounting for over one-half of all of the gold produced there to date. The Basal Reef is the primary reef exploited at Bambanani, Tshepong, Unisel, Masimong, Eland, Kudu & Sable and Nyala Business Units.

The Basal Reef occurs at the base of the Harmony formation unconformably overlying the Welkom Formation and represents reworking and redeposition of sedimentary fans in the Welkom Formation. The Basal Reef is commonly divided into three units or facies: the Black Chert Facies, the Steyn Facies and the Lorraine Facies. All are deposited on the same unconformity surface, but are slightly different in age, with the Lorraine Facies being the oldest and the Steyn Facies the youngest. The different facies are derived from different sources and consequently have different pebble assemblages and characteristics.

The Black Chert Facies is found in the central and northern area of the Free State Goldfield and is often eroded, reworked, and overlain towards the south by the Steyn Facies. Palaeocurrent directions for the Black Chert Facies are predominantly to the east. The Black Chert Facies generally consists of a basal scour with a thin (>50cm) conglomerate lag grading into a sandy quartzite and the total Basal Reef Package varies in thickness from 30cm to 1m. Gold mineralisation is frequently associated with kerogen seams developed within the reef. The Black Chert Facies is oligomictic with clasts comprising mainly vein and smoky quartz (81%), chert (18%) and quartzite (1%). The Steyn Facies is found in the southern area of the Free State Goldfield with palaeocurrent directions to the north, northeast and east depending on position within the fan. The Steyn Facies consists of a basal scour surface with a robust conglomerate lag grading into a pebbly quartzite, with lags and some







pebble bands developed. The basal conglomerate is much thicker than in the Black Chert Facies and often constitutes 50% of the total Basal Reef Package, which is generally up to 2m thick. Kerogen seams are seldom preserved although small fragments may be present in the matrix. The Steyn Facies is polymictic with pebbles of white and smoky vein quartz (41%), chert (21%), quartzite (14%), shale (21%) and minor amounts of schist and porphyry (3%). The Lorraine Facies is found in the far north of the Free State Goldfield and its depositional environment is believed to have been a low energy, distal braid plain gently dipping to the south. It is characterised by a thin lag in shallow channels, often only 10cm thick, and predominantly white vein quartz pebbles with very little kerogen present. The channels are overlain by sand deposited as flow energy dropped and the Basal Reef Package is generally less than 50cm.

The Saaiplass Reef is a very minor contributor to economic production in the Free State but bears an unusual relation to the Basal Reef, which can be significant for geological interpretation and resource estimation of the Basal Reef. The Saaiplass Reef is a component of the lowermost quartzite member of the Harmony Formation, which overlies the Basal Reef package. Where the Saaiplass Reef channels down through the Basal Reef it reworks the Basal Reef while diluting the grade. The reworked product of this mixing may carry economic grades in places, particularly close to Saaiplass channel edges, but is generally not economic.

The Saaiplass Reef, while well mineralised in places, does not develop the thickness or lateral continuity of the Basal Reef. Local stope grades may be as high as 12g/t, but average stoping grades over areas significant for mining are generally in the range of 2g/t to 3g/t.

The Middle Reef, which is an inpersistent cherty and/or quartz-pebble conglomerate unit within the Middling Quartzite of the Harmony formation, is exploited at the St Helena Bus, albeit in relatively small quantities.

The Leader Reef is developed throughout the Free State Goldfield, with an estimated coverage of 200km<sup>2</sup>, and has been a significant mining target, particularly in mines towards the south at Harmony Freestate Operations and St. Helena BU. The Leader Reef unconformably overlies the Harmony formation with thickness typically being between 1m and 3m. The Leader Reef has been interpreted to consist of two, separate, coalescing placers. The Alma placer is an oligomictic placer and the older of the two, existing as remnants beneath the younger, polymictic Bedelia placer. Although the coverage of the Leader Reef is sheet-like over its extent, individual conglomerates are lenticular and limited in extent. Channels range from a few to as much as 200m wide. Gold mineralisation is essentially confined to clast-supported conglomerate facies.

The `B' Reef lies at the base of the Spes Bona member of the Aandenk Formation and is restricted to discrete, steep-walled channels incised into the underlying silt/shale member of the Dagbreek Formation. Overbank facies of `B' Reef are scattered and poorly mineralised single pebble lag. The channels are between 20m and 200m wide and may be up to 2m thick. Within the channels the `B' Reef is characterised by scattered local scours within the channel floor, filled with dark-grey, oligomictic conglomerate overlain by polymictic conglomerates and arenites with a more argillaceous matrix.

Significant gold mineralisation within the `B' Reef exists only within the channels and is usually associated with abundant kerogen. On the low-angled sides of asymmetrical channels, the sediment may thin to a lag, consisting predominantly of heavy minerals often having in-situ gold grades in excess of 500g/t. Observations made where the `B' Reef has been extensively mined suggest that only some 35% of the pre-`B' Reef Dagbreek surface contains `B' Reef channels.

The `A' Reef is one of the more significant of the Aandenk Reefs, which consist of a variety of locally developed, generally inpersistent and variably mineralised conglomerates found at various stratigraphic locations within the Aandenk Formation. Several have been found to be economically important for individual mines or BUs including the Beatrix Reef mined at Beatrix and the Kalkoenkrantz Reef mined at Oryx. The `A' Reef is highly channelised and consists of up to four unconformable bands of mature, oligomictic conglomerates and pebbly siliceous quartzites interbedded with argillaceous quartzites. As with the `B' Reef, significant gold mineralisation is confined to the

channels, however, `A' Reef channels are generally more persistent and predictable than `B' Reef channels.

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The Elsburg Reefs are restricted to Loraine in the northern Free State Goldfield, which has been a significant historic producer with over 13Mt of ore mined at an average recovered grade of 13.6g/t Au. The Elsburg Formation represents the last phase of reworking of placer minerals in the Free State Goldfield and consists of a series of high-energy, fan conglomerates developed from reworked underlying sediments. A total of 18 different placer units have been exploited within the Elsburg placers, the most persistent and economically significant of which are the EA1, EA3, EA8 and EA12. These reefs are mostly siliceous and oligomictic, indicative of greater, sorting and consequent concentration of heavy minerals. The Elsburg Reef is very impersistent down-slope with only the proximal facies having economic mineralisation.

The Beatrix Reef conglomerates are found throughout the Joel, Unisel and Bambanani area and generally have multiple basal degradation and internal scour surfaces, often thinning to a single pebble lag on paleo-topographic highs. The Beatrix-VS5 Composite Reef represents a reworking of the Beatrix Reef accompanied by a mixing with lower grade VS5 material. This occupies a 500m to 1,000m wide channel running almost north south through the centre of the lease area, which is interpreted to widen to the northeast of Joel North BU.

### 3.2.2

#### *West Rand Goldfield*

The Cooke and Doornkop BUs of the West Wits Operations are situated in the West Rand Goldfield, the structure of which is dominated by the Witpoortjie and Panvlakte Horst blocks which are superimposed over broad folding associated with the southeast plunging West Rand Syncline. The northern limb of the open syncline dips in a south-southwesterly direction and the western limb in an east-southeasterly direction. The fold axis of the West Rand Syncline is located along a line that runs from the West Rand Consolidated Mines Limited lease area near Krugersdorp and trends southeastwards through the northern part of the Doornkop section.

The structural geology in the north section of the Cooke shafts is dominated by a series of northeast trending dextral wrench faults. The most significant of these are the Roodepoort/Panvlakte Fault and the Saxon Fault, which have downthrows of 550m to the southeast, and the Doornkop Fault which has a 250m downthrow to the southeast. Several other smaller scale faults have downthrows ranging from 20m to 150m. Pilaansburg, Bushveld and Ventersdorp age doleritic dykes are also present. These strike in a northerly direction, with the exception of some of the latter dykes, some of which strike in an easterly direction.

At Cooke Section two major fault trends are present. The first set parallel the Panvlakte Fault striking NNE. These faults are steeply dipping, generally have small throws and do not have any noticeable lateral movement to displace payshoots. A second major fault system, however trends north-westerly to east-west, which significantly displace these payshoots. They have small throws and tend to be water bearing showing a connection to the dolomites and indicating a Transvaal age. Many of them are mylonite or dyke filled.

Six main reef groupings have been identified at West Wits Operations on the West Rand Goldfield, the Elsburg Formations, the Kimberleys, the Black Reef, the Livingstone Reefs, the Ventersdorp Contact Reef (the "VCR") and the South Reef. Within these, a total of nine economic reef horizons have been mined at depths below surface between 600m and 1,260m.

### 3.2.3

#### *Far West Rand Goldfield*

Three primary reefs are exploited in the Far West Rand Goldfield, the VCR located at the top of the Central Rand Group, the Carbon Leader Reef near the base and the Middelvlei Reef, which occurs some 50m to 75m above the Carbon Leader Reef. Secondary reefs also occur in the area but the only examples of any significance are individual bands within the Mondeor Conglomerate Reef Zone that sub-crop beneath the VCR at Deelkraal BU and on the western side of Elandsrand BU.

The separation between the VCR and Carbon Leader Reef increases east to west from 900m to over 1,300m as a result of the relative angle of the VCR unconformity surface to the regional stratigraphic strike and dip. The Carbon Leader Reef strikes west-southwest and dips to the south at 25°. The VCR strikes east-northeast and has a regional dip of 21° to the south-southeast. Local variations in dip are







largely due to the terrace-and-slope palaeotopographic surface developed during VCR deposition. In the location of the Mining Assets the Carbon Leader Reef occurs too deep to allow mining from current infrastructure and is lower in grade than elsewhere on the Far West Rand Goldfield. Consequently the VCR is the only reef currently exploited. There are a series of east trending, north dipping normal faults with throws of up to 40m and a series of north-northeast striking normal faults with generally smaller displacements in the northwest. The original displacements on these faults are occasionally increased as a function of subsequent post- Bushveld displacement but overall faulting is much less prevalent than it is in other Witwatersrand goldfields. There are, for example, no major faults with throws of the order of several hundred meters or more. Moving to the eastern sections of the Far West Rand Goldfield the structure becomes simpler with few major faults. Most faults are high-angle normal faults trending north-northwest and eastwards and having throws of less than 70m.

3.2.4

*Evander Goldfield*

The Evander Basin is a tectonically preserved sub-basin outside of the main Witwatersrand basin, the Devon Dome, a large granitoid cupola, separates it from the main Witwatersrand Basin. It is the most easterly mined Witwatersrand gold occurrence. The basin forms an asymmetric syncline, with the fold axis between No.5 BU and No.6 BU, plunging to the northwest and contains only one economic reef system, the Kimberley Reef.

The Evander Basin was a part of the main Witwatersrand Basin until post Booyens shale times. It was separated from the East Rand and South Rand Basins by uplift in the areas now marked by the basement Devon and Cedarmont Domes. Deeper within the basin, the Central Rand Group is overlain by Ventersdorp Lavas and Transvaal Sequence sedimentary rocks. West Rand Group rocks are present beneath the Central Rand Group. A poorly mineralised reef, stratigraphically above the Kimberley Reef, termed the Intermediate Reef, is also developed but is not economic except where it has eroded the sub- cropping Kimberley Reef in the south and west of the basin.

The Evander Basin is one of the more structurally complicated parts of the Witwatersrand. Mining and drilling have defined the larger elements of the structure of the shallow southern and western basin margins. The northern and northeastern extent of the basin is poorly drilled because of the depth to the Kimberley Reef and because of the generally poor grades encountered to the north. The geological structure there has been inferred from two-dimensional seismic survey lines.

The Kimberley Reef is the basal conglomerate of the Evander Quartzite Formation and varies from an oligomictic conglomerate, dominated by vein-quartz clasts and chert fragments with minor orthoquartzite fragments and silicified shale clasts, interbedded with orthoquartzitic sand to a single pebble lag with flyspeck carbon on the bottom contact. The Kimberley Reef unconformity transgresses over 200m of the underlying stratigraphy, with the youngest footwall rocks in the east and the oldest to the west. The Kimberley Reef is present from fairly shallow depths (400m to 600m) in the extreme southeast and northwest going down to 2,700m in the north. The Kimberley Reef in the Evander Basin is characterised by strongly developed payshoots, the most prominent being a northwesterly direction. The Kimberley Reef in the Evander Basin is characterised by a strong footwall control on reef development (primarily poor reef development above the Kimberley Shale) and by strongly developed payshoots.

3.2.5

*Klerksdorp Goldfield*

The Klerksdorp Goldfield is located on the northwest margin of the Witwatersrand Basin and lays some 150km south-southwest of Johannesburg. Exploration, development and production history in the area dates from 1886, and following dormant periods, large-scale production commenced during the 1940s.

The Witwatersrand Basin sedimentary rocks are overlain by up to 2,000m of cover rocks and the reefs themselves occur at depths of between 80m and 4,000m and, with the exception of the VCR, which dips moderately steeply west-northwest, generally dip gently to the southeast.





The most significant structural features of the Klerksdorp Goldfield are northeast striking normal faults, which dip to the northwest and southeast and have throws of several hundred metres. These features break up the stratigraphy containing the stratiform orebodies into a series of horsts and grabens, which vary in width from several hundred metres to over a thousand metres. These horsts and grabens are internally disturbed by small-scale faults sympathetic to the major faults, which typically have throws of tens of metres and break up the reef into continuous blocks of up to 100m in width. These brittle faults can be identified by drilling from access development and as the dip of the stratigraphy is reasonably consistent, can usually be negotiated without significant difficulty. There are, however, smaller-scale faults in the immediate vicinity of these larger faults, which disrupt the reefs and can result in increased losses and dilution.

All mining to date in the Klerksdorp Goldfield has taken place to the northwest of one of the major northeast-southwest striking normal faults, the Jersey Fault, which has a down throw to the southeast of up to 1,000m, displacing the Vaal Reef down to a depth below surface exceed 3,000m. Two further sub-parallel faults occur to the southeast of the Jersey Fault displacing the reefs down to more than 5,000m below surface.

Two primary conglomerate reefs are exploited within the Klerksdorp Goldfield, namely the Vaal Reef and the VCR. The Vaal Reef and VCR reef horizons occur at depths between 80m and 4,000m. The VCR dips moderately steeply west-northwest, the Vaal Reef generally dips gently to the southeast. Other, secondary reefs, including the Black Reef, Zandpan Marker and Denny's Reef exist, however they are not currently considered to be currently economically viable.

The Vaal Reef is situated above an angular unconformity, there were two main sources of sedimentary material, from the east and west. It comprises a series of oligomictic conglomerates and quartzite packages. Gold is present throughout the reef horizon, however it is mostly concentrated close to the basal contact where carbon commonly occurs as thin seams.

Gold mineralisation in the VCR is largely associated with pyrite and also with lesser flyspeck carbon. The VCR exhibits a weak tendency to bottom loading, as significant gold is contributed by internal scour surfaces, which may occur throughout the reef horizon. This relatively even vertical distribution of gold results in a correlation between total gold content and reef thickness. Consequently the thicker and more robust terrace facies results in a higher accumulation at the planned stoping widths than the thinner slope and terrace facies.

The Elsburg Reefs are only exploited in conjunction with the overlying VCR where they sub-crop against it. This sub-crop forms a northeast trending band, south of and sub-parallel to the Buffelsdoorn Fault. The Elsburg Reefs comprise a series of conglomeratic sequences separated by finer-grained ortho-quartzites and grits as part of a wedge. The sedimentological characteristics of the Elsburg Reefs in the region of the sub-outcrop are similar with those exhibited by the VCR.

### 3.3

#### **Deposit Geology**

Most of the operations can be described as mature mining operations with good underlying geological models backed up with grade models based on vast amounts of historical mining and sampling data. The electronic capture of sampling data over the past ten-years has allowed a far greater understanding of the grade and payshoot characteristics of the orebodies than was possible previously. The quality and basis for the geological models has to be taken into account when looking in particular at the quantity of the Companies Indicated Mineral Resource and the Life of Mine plans being projected into the Inferred Mineral Resource areas.

#### **3.3.1**

##### ***Free Gold Operations***

The primary reef mined at Tshepong BU is the Basal Reef with minor contribution from the `B' Reef, which lays some 140m stratigraphically above the Basal Reef. The `B' Reef is highly channelised in nature with a much more erratic grade distribution than the Basal Reef. The relatively incompetent Khaki Shale overlies the Basal Quartzite, which occurs in the upper portion of the Basal Reef. The Basal Quartzite provides natural support to the Khaki Shale and where the thickness of this is less than 60cm, mining dilution can increase dramatically.

The Basal Reef dips at shallow angles to the east and is intersected by two significant north-south striking faults, the Dagbreek and the Ophir Faults. These faults dip at moderate angles to the west and have significant strike-slip and up-dip throws of the order of 1,000m to 2,000m and 200m to 300m, respectively.





Economic grades at Tshepong BU are constrained within a broad payshoot, which trends east- southeast. Currently a geological model of the Basal Reef facies variations is used as a basis for grade estimation. The method of assigning facies type is a scoring system developed in conjunction with Leeds University, UK. Scoring is based on geological type (Lorraine Facies or Black Chert Facies), presence of Waxy Brown Quartzite ("WBQ"), which is thought to trap fluids in the underlying reef, presence of microthrusting, which is thought to encourage fluid flow into the reef and evidence of reducing minerals such as sulphides and carbon, which are thought to encourage the precipitation of gold mineralisation.

Phakisa BU is situated immediately to the east of Tshepong BU where shaft-sinking operations ceased prior to completion. The resources at Phakisa BU comprise the Basal Reef and represent the down-dip extension from Tshepong BU.

The primary reefs mined at Bambanani include the Basal Reef and in particular the Steyn Facies which covers approximately 90% of the mine area. The Khaki Shale in the north and the Waxy Brown Quartzite in the south overlie the Basal Reef. Secondary reefs such as the Leader Reef have been mined on a small scale historically but has always been found to be low grade.

The whole package dips at angles of between 25 and 45 to the east and is generally 1m to 3m thick

The lease area is bound to the west by the Stuurmanspan Fault and to the east by the De Bron Fault. The Harrison Fault, parallel and to the west of the De Bron Fault demarcates the eastern mining limit. Both of these are significant north-south striking normal faults, which dip at moderate angles to the west and have throws of over 100m. Faults sympathetic to these occur with displacements of up to 50m, as do east-west faults with lateral shifts of up to 400m on the northern edge of the mining area.

Joel BU exploits two distinct forms of a single reef, developed on a single unconformity surface. These are known as the Beatrix Reef and the Beatrix-VS5 Composite Reef. The reefs dip to the northeast at 15 and the composite reef subcrops against the overlying Karoo Supergroup just to the north of Joel South BU, defining the southern limit of the orebody.

The Beatrix Reef conglomerates are found throughout the mine area and generally have multiple basal degradation and internal scour surfaces, often thinning to a single pebble lag on paleo-topographic highs. The Beatrix-VS5 Composite Reef represents a reworking of the Beatrix Reef accompanied by a mixing with lower grade VS5 material. This occupies a 500m to 1,000m wide channel running almost north south through the centre of the lease area, which is interpreted to widen to the northeast of Joel North BU.

A deep erosional channel of Waterpan sedimentary rock, known as the Klippan Channel, truncates the reef some 1.8km to the northeast of Joel South BU. This washout is wedge-shaped with its apex to the west and widens to the southeast. The estimated dimension from the apex to the eastern property boundary is approximately 1.8km. The reefs have been shown to be continuous to the north of this transgressive feature.

Where unaffected by the Klippan Channel, the reefs are bound to the east by the De Bron Fault, which strikes north-northeast. The CD Fault, which strikes northeast and is roughly halfway between the two shafts, has a 320m sinistral lateral displacement, which has moved ground south of the fault towards the northeast.

The complex nature of the reef, due to the multiple pulses of detrital influx and scouring, paleo- topographic highs and mixing between the Beatrix and Beatrix-VS5 Composite Reef, has resulted in a highly irregular distribution of gold throughout the mining area. There are broad low and high-grade zones on the scale of 100's of metres, which are likely to repeat beyond current development, however, the detailed grade distribution within these zones remains very unpredictable.

For the purposes of resource estimation, a detailed facies model is used and is based on detailed sedimentological observations and absence of well-mineralised reef at paleo-topographic highs.

Eland BU, Kudu & Sable BUs and Nyala BU are contiguous to the south and west of Tshepong BU and Basal Reef is mined almost exclusively at these shafts. The geological setting is similar to that described







for Tshepong BU, however, faulting in the mining lease is the most intense to be found at the Free Gold Operations (excluding Joel BU). The Dagbreek fault intersects Eland BU lease area and the Rheedersdam thrust fault forms the western boundary of the remaining three BUs. These and other generally north striking normal faults including the Eureka, Rietpan and Wesselia faults represent the dominant the structures in the area. The reef in the Rheedersdam fault zone has been multiply repeated by thrusting which has resulted in stacks of up to eight reef repeats.

Further variability in reef occurrence has been caused by changes in paleo-topographic slope, which controlled the nature of sedimentation and subsequent mineralisation potential.

The Basal Reef is particularly carbonaceous at Eland BU, Kudu & Sable BUs, and Nyala BU and the gold tends to concentrate strongly on the kerogen-rich footwall contact and visible gold has been observed in several areas. The best grades were historically mined at Kudu & Sable BUs. The Nyala BU area is characterised by marginal grades. Eland BU and Kudu & Sable BUs are predominantly remnant operations with short lives and the extensive historical mining and the nature of the remaining Basal Reef Mineral Resources minimise uncertainties regarding grade, structural complexity and loss of ground. Nyala BU has only recently re-opened and the LoM plan is focussed on exploiting the Basal Reef shaft pillar.

The St Helena BUs has a complex geological structure with faults generally trending north south with downthrows of up to 2,000m, and dips of between 30 and 50. Reverse and thrust faulting is present, sometimes resulting in local duplication of reef. Two economic reefs are present within the mine property with the Basal Reef being the most economically important unit and the Leader Reef, which lies some 15m above the Basal Reef.

St Helena BU is predominantly a remnant operation with extensive historical mining and the nature of the remaining Basal Reef Mineral Resources minimise uncertainties regarding grade, structural complexity and loss of ground.

Surface sources at the Free Gold Operations comprise numerous Waste Rock Dumps ("WRDs") and Slimes Dams, which in addition to various plant clean-up tonnages, are processed at FS1 Plant, FS2 Plant and to a lesser extent at Joel Plant. WRDs comprise both waste material and reef material, the latter of which is sourced from cross-tramming of mined ore. Typical grades range between 0.5g/t and 1.0g/t, which are either processed directly or pre-screened to ensure run of mine ("RoM") grades in excess of 1g/t.

Slimes Dams may also contain significant gold grades owing to occasional sub-optimal metallurgical performance, which resulted in gold being sent to tails. Grade distribution within WRDs and Slimes Dams can vary significantly owing to fundamental changes in mining, hoisting and processing methods, which have been implemented over prolonged years of mining.

### 3.3.2

#### *Harmony Free State Operations*

Mining in the area was originally established to exploit the rich Basal Reef, but, as reserves in this orebody became depleted, production is being increasingly sourced from the more erratically mineralised and lower grade Leader Reef, Middle Reef, `A' Reef and the `B' Reef. The Basal Reef is a high grade, generally thin (<100cm) reef, which has been payable across most of its exposed extent. In the south, at both Harmony and Unisel, the reef pinches out against elevated footwall and grades deteriorate. The Leader Reef, `A' Reef, `B' Reef and Middle Reef are only payable in distinctive and often extensive payshoots and discrete pods where these reefs overlie the Basal Reef. Where the Leader Reef truncates the Basal Reef east of the so-called "line of coalescence" at Harmony, it is more uniformly payable.

The mineralised meta-conglomerates mined at Masimong BUs are the Basal Reef, `B' Reef and `A' Reef. The Basal is mined at all three of the Masimong BUs while the `A' Reef is mined at Masimong 4 and the `B' Reef at Masimong BU No.5. At Masimong BU No.4 and Saaiplaas BU No.3 the Basal Reef is present as the Steyn facies, comprising three to four upward fining sedimentary cycles. The lower cycle, being the primary gold carrier comprises a basal conglomerate with an overlying protoquartzite. Carbon seams, which carry most of the gold, occur locally on the bottom contacts. Channel widths are





generally below 70cm but in places only the carbon contact between the hanging wall and footwall exists. A north-south trending payshoot extending through the Saaiplaas No.3 BU towards the north along the western side of Masimong BU No.4 forms the main target area for the Basal Reef.

The black chert facies Basal Reef at Masimong No.5 BU comprises two upward fining cycles, of which the lower carbonaceous unit is the primary gold carrier. Channel widths average 60cm. The target area for this facies is a northwest-southeast trending payshoot that cuts through the shaft and is truncated to the east by younger leader quartzites.

The `A' Reef at Masimong No.4 BU lies 140m to 160m above the Basal Reef and is characterised by a highly channelised series of conglomerate bands that are generally only payable in locations where one or more bands exist within the channel itself. These oligomictic conglomerates are dark in colour with abundant, mostly fine pyrite, and occasional carbon. Channel thickness is highly variable but can be up to 1.8m, with gold values highly dependent on the reef thickness and the presence of carbon.

The `B' Reef, lying 110m above the Basal Reef, comprises complex sedimentologically controlled gold mineralisation within a wide east-west trending channel that cuts through the Masimong No. 5 BU area. Within this channel very high grade lenticular gravel bars contain abundant visible gold, and form the targets for mining. Gold grades are erratic and extremely nuggety, while the channel widths also vary from zero to approximately 1.8m.

The two conglomerate horizons at Harmony No.2 BU, the Basal Reef and `A' Reef, are separated by 140m of mostly quartzites and conglomerate. The reefs dip 5 to 15 towards the west, becoming steeper to the west approaching the De Bron Fault. Numerous east-west trending dykes cut the reef, resulting in upthrow and lateral shift. The Basal Reef occurs as thin bands of upward fining conglomerates, with full channel widths of up to 120cm. The payable reefs are often associated with carbon. Weak shales overlie the Basal Reef and must either be undercut or removed with the reef. The footwall to the `A' Reef at Harmony No.2 BU is the 1-15m thick Big Pebble Marker, which, where thinnest, is associated with better developed `A' Reef. Better gold grades are associated with thicker channels greater than 1m thick.

Brand No.1 BU and Brand No.3 BU are characterised by large north-south trending faults with lateral movement. The `A' Reef is the predominantly targeted reef, and is found in wide fault displaced east- west pay trends. The Basal Reef belongs to the former `Basal Placer' facies and is predominantly found in the form of a thin reef, rich in carbon. Pebbles are not always present. The reef thickness seldom exceeds 20cm and is generally less than 10cm.

Brand No.5 BU is subdivided into fault blocks, with complex north-south structural trends intersected by normal north-northeast-south-southwest trending faults. Vertical fault displacements are minor, whereas right-lateral displacements are significant. The reefs on average, dip 40 to the East. The main reefs mined at Brand No.5 BU are the Basal Reef and Leader Reef. The Steyn Facies Basal Reef comprises four sedimentological conglomerate sub-facies, with gold best developed at the base of the conglomerates and associated with pyrite. The Leader Reef, lying between 7m and 16m above the Basal Reef is highly channelised with thickness increasing from east to west. This upwardly fining sequence comprises three sub-facies that can be up to 400cm thick. Gold is generally distributed evenly throughout the reef package.

The reefs at Unisel BU dip 30 to the East and are structurally complex due to fault intersections and the presence of sills in the vicinity of the Basal Reef. The principal reefs mined are the Basal Reef and the Leader Reef. The Basal Reef has been divided into three distinct sedimentological facies, with gold mainly associated with moderate-to-well developed buckshot pyrite. The Leader Reef is highly channelised with limited sedimentological information and shows an erratic grade distribution.

The Merriespruit area is structurally complex with extensive north-south and east-west trending faults, with vertical displacements of up to 650m. Igneous intrusives are associated with the structurally complex areas. The vertical throw of faults averages 60m. In general the reefs structures strike northeast southwest and dip 20 to the north. The Basal Reef is typically thin (<1m) and channelised, with payable grades located in northeast-southwest trending payshoots. This upwardly fining conglomerate is poorly to well mineralised with the local occurrence of buckshot pyrite. Locally mineralised Middle Reef, found above the Basal Reef in the hanging wall quartzites, is only payable when adjacent to Basal





Reef or overlying Leader Reef. The Leader Reef comprises a series of conglomerate bands separated by pebbly quartzite bands that are variably mineralised, with typically poor to moderate grades. Payable grades are often located in NE-SW trends. In general the gold is dispersed throughout the package, with gold associated with the pyrite. Surface sources at the Harmony Operations comprise numerous WRDs, Slimes Dams and Other Sources, which in addition to various plant clean-up tonnages, are processed at the Central, Virginia and Saaiplaas Plants. WRDs comprise both waste material and reef material, the latter of which is sourced from cross-tramming of mined ore. Typical grades range between 0.4g/t and 1.0g/t.

Slimes Dams may also contain significant gold grades owing to occasional and historical sub-optimal metallurgical performance, which resulted in gold being sent to tails. Grade distribution within WRDs and Slimes Dams can vary significantly owing to fundamental changes in mining, hoisting and processing methods, which have been implemented over prolonged years of mining.

### 3.3.3

#### *ARMgold Welkom Operations*

The ARMgold Welkom Operation lease area is centrally located within the Free State Goldfield in an area containing several other mature operations. The property is bounded to the south by the Free Gold Operation's St Helena, Harmony Free State Operation's President Brand and President Steyn Gold Mines Limited's President Steyn Mine and the property is bounded to the north by Free Gold Operation's Eland BU, Kudu & Sable BUs, Nyala BU and Tshepong BU.

The Basal Reef is the main reef exploited at ARMgold Welkom Operation. In addition to the Basal Reef, No.6 BU also exploits the Leader Reef, laying some 15m above the Basal Reef. No. 7 BU plans to exploit the Saaiplaas Reef or 'pyrite stringers' as it is commonly referred to at this mine. This consists of thick (up to 6m), low-grade channels superimposed on the Basal Reef.

The Basal Reef strikes north to north-northwest and generally dips to the east between 20 and 40. The reef is bounded on the west by the north trending Rheedersdam Fault system and subcrops against the Karoo Supergroup along a northward trending line representing the basin margin. To the east the north trending De Bron Fault bound the reef. Two major faults, the Dagbreek and Ararat further dissect the reef into three contiguous blocks.

No.1 BU and No.2 BU are situated within the easternmost of these three blocks, between the De Bron and the Ararat Faults. No.3 BU and No.4 BU are situated within the central block between the Dagbreek and Ararat Faults and No.6 BU and No.7 BU are situated within the western most block.

The Leader Reef also varies in thickness between 0.3m and 1.7m and comprises a well-packed, small- to-medium pebble conglomerate with white quartz and black chert clasts and a moderate percentage of buckshot and crystalline pyrite.

One other reef, the Middle Reef, has been exploited in a very small, opportunistic way. The Middle Reef is an impersistent, lensoid, cherty and/or quartz-pebble conglomerate unit within the Middling Quartzite of the Harmony formation. While sometimes of very high grade, individual lenses are typically less than 30m in planar dimensions and as such too small to systematically drill for, generally resulting in accidental discovery.

### 3.3.4

#### *West Wits Operations*

The economic horizons change from north to south along the length of the Doornkop-Cooke-Western Areas part of the Witwatersrand Basin, from a few lower Central Rand unconformities in the north to the development of multiple upper Central Rand unconformities in the south. This complicated pattern of stacked sub-cropping reefs, the syndepositional tectonics, the structural and depositional history of the goldfield is still not fully understood but the individual orebodies have detailed grade models to assist evaluation.

A key feature of reef development at Cooke Section is the thickening of the Westonaria Formation to the east of the anticline and importantly to the south. This wedging of formations indicates that syndepositional uplift along the Panvlakte trend (before the anticline developed) had an effect on reef formation. The area to the west of the crest of the current anticline is characterised by narrow single







band UE1A reef overlying a pronounced unconformity, whereas to the east the Elsburg A1 to A5 stacked package of conglomerate horizons forms a wedge interleaved with barren quartzites. This wedge opens out to the east and to the south with greater thicknesses of barren quartzites separating the individual reef horizons. To the east the conglomerates become increasingly distal in nature, to the south more individual horizons are developed.

The Main orebodies on the Cooke 1, 2 and 3 Section shafts of the West Wits Operations are the UE1A and the Elsburg A5 Reefs. Cooke 4 in the south mined 10 individual horizons including Elsburg Reefs and the VCR. On Doornkop the Kimberley Reefs and the South Reef are being mined. Moving further, the primary orebodies on the adjoining Central Rand goldfield were the Lower Central Rand Group orebodies the Main Reef Leader and the Main Reef.

A pronounced feature of the grade distribution at the Cooke shafts is the location of what were previously described as fan entry points into the basin. These pronounced fan shaped grade distributions on the grade plans are due in part to the presentation of the two different aged orebodies, the UE1A and A1, on the same plans; and the lack of palinspastic reconstruction of payshoots that terminate along these younger lateral movements.

The area covered by the original exploration pattern on the Cooke Shafts has now largely been mined out. Mining is now concentrating on pillars and areas on the periphery of the initial exploration area that are poorly explored from surface drilling.

Doornkop has been mining the Kimberley Reefs but attention is now focusing on the South Reef, which has been previously exploited on nearby operations. The South Reef comprises broad southeasterly trending shoots (palaeo-depressions) separated by lower grade zones (palaeo-highs). One of these ore shoots, indicated by surface drilling and confirmed by recent stoping, runs through the Doornkop area.

Elandsrand BU and Deelkraal BU exploit the VCR, which unconformably overlies the Mondeor and Elsburg Formations of the Central Rand Group. These footwall sediments primarily comprise siliceous quartzites there are four major polymictic conglomerate zones within the Mondeor, which have supported minor stoping on Deelkraal BU. The VCR is overlain by the lava of the Alberton Formation, which forms the basal unit of the Klipriviersberg Group of the Ventersdorp Supergroup. The dip of the VCR at Deelkraal BU is relatively consistent at 24 although there is some postulation of a slight flattening of dip at depth at Elandsrand BU.

The VCR sits on a highly incised unconformity surface exhibiting a marked palaeotopography. The unconformity (erosion) surface was covered with a residue of mature quartz pebble conglomerates (reef) preserved on fluvial terraces and slopes. These now reflect as local variations in the dip and strike of the reef. Terrace reef (being originally close to horizontal) has the attitude of the regional dip and it tends to be thicker and accompanied by higher gold accumulations. Terraces are preferentially mined. Slope reef is indicated where the attitude of the reef now departs significantly from the regional dip. Slope reef represents the inter-terrace slope areas, the reef is thin, has less conglomerate and less total gold. Slope reef gold values are generally below the paylimit.

The VCR is present throughout Elandsrand BU, but at Deelkraal BU there is a limit of deposition running roughly north south through the centre of the lease area. The VCR is poorly developed to the west of this line.

The facies and morphological models encompassing the Mining Assets have been developed through reef mapping in stopes and on-reef development mapping. They are used in the estimation of Mineral Resources to constrain the interpolation of grade into geologically homogenous areas.

Mondeor Conglomerate bands sub-crop beneath the VCR on the western side of Elandsrand BU and on Deelkraal BU. They have been mined in places underneath or close to their subcrop on Deelkraal BU.

Structures present at Deelkraal BU and Elandsrand BU include faults, dykes and sills. The sills occur in the footwall in many areas adjacent to dykes, however, these only affect the reef horizon in old, mined out areas near Elandsrand BU. The faults and dykes are classified according to the relative geological ages, and comprise Pre-VCR, Early Ventersdorp, Late Ventersdorp, Bushveld and Pilanesberg Structures.





The structural model at Elandsrand BU has been developed from information compiled over many years, however structural mapping of footwall haulages and crosscuts and on reef raises, winzes, drives and stopes. In contrast at Deelkraal BU, where the low angle faulting is more common, a relatively poor structural database exists, as it was previously not consistently recorded. Ongoing mapping and re-interpretation is rectifying this situation and enabling the development of a more detailed model.

### 3.3.5

#### *Evander Operations*

Within the Evander Operations lease area the Kimberley Reef dips predominantly northwards. There are several distinct fault styles developed within the mine lease. Earliest faults tend to have thrust movements, resulting in duplication of the reef. These faults strike northwards to westwards and generally are consistent with thrust movement into the basin. Throws of up to 150m have been encountered within the mine workings. The resulting shallow-dipping faults trend west-northwest and have up throws to the north. This is an extremely fortuitous situation as the successive up throws maintain the Kimberley Reef at a consistently shallow depth below surface throughout the main part of the Evander lease. Significant fault losses are, however, associated with these faults. There has been only minor lateral movement along these faults. Channels can normally be traced across them with only minor displacements.

Vertical and overturned Kimberley Reef is present in the No.6 BU area in the southeast corner of the mine. This structurally complex area represents a basin margin structure, in many ways analogous to the structural regimes observed on the Western Margin of Free State Goldfield. The vertically dipping reef sub-crops against the overlying Karoo Sequence rocks. Complex wrench faulting is also developed within the No.6 BU area.

Ventersdorp, Bushveld and Karoo age dykes and sills are present within the mining lease. Bushveld age intrusives occur as dykes and sills, Ventersdorp and Karoo intrusives occur as predominantly north trending dykes. By far the most problematic is a doleritic footwall sill that varies from 30m to 70m in thickness. In several areas this sill steps upwards and occupies the same stratigraphic position as the Kimberley Reef, in places splitting the reef into two separate components. Fortunately interference from the sill is generally localised in areas such as the southern portion of the previous Winkelhaak mine and specific areas in the western part of Kinross.

Gold in the Kimberley Reef is associated with heavy minerals on re-activation surfaces specifically associated with the more robust, clast supported oligomictic quartz pebble conglomerates, or in association with flyspeck carbon. The gold generally occurs in native form often associated with pyrite and carbon. Pyrite, chromite, rutile, zircon and leucoxene have been identified within the Kimberley Reef. Pyrite dominates the heavy mineral suite and displays several distinct forms. Pyrite grains displaying detrital characteristics are common. Rounded balls of porous pyrite are also recognised, as are secondary remobilised pyrites. These latter minerals may occupy fractures across pre-existing pebbles, as well as overgrowing existing detrital pyrites within the sand matrix. Uraninite is present within the Kimberley Reef, but in concentrations so low that routine sampling for uranium is not practiced.

Carbon is generally rare within the more robust Kimberley Reef, becoming common in the distal areas as flyspeck carbon on the footwall contact. This has an effect on gold grades. As the channel width of the reef decreases the gold accumulation (cmg/t) does not change significantly. This is attributed to high gold grades associated with the carbon.

### 3.3.6

#### *ARMgold Orkney Operations*

The ARMgold Orkney Operation mining area is bounded to the east and north by the North West Operations owned by Durban Roodepoort Deep, Limited ("DRD"), to the west by AngloGold's Tau Lekoa, and to the south by AngloGold's Vaal River Operations ("VRO") and the course of the Vaal River.

The major faults within the lease area held by ARMgold are: the Nooitgedacht and Buffelsdoorn faults occurring in No.6 BU and No.7 BU areas; the Witkop fault between No.6 BU and No.7 BU; the WK22 and No.3 BU Faults between No.7 BU and No.3 BU; the No.5 BU Fault; and the No.2 BU South Fault. The horsts and grabens are further disturbed by faults sympathetic to the major faults which typically







have throws of tens of metres and further divide the reef into blocks of up to 100m in width. Drilling from access development can identify these brittle faults, as the dip of the stratigraphy is reasonably constant (15 to 20). The Vaal Reef is by far the most significant reef mined at ARMgold Orkney Operations and is the major contributor to gold production. The reef strikes northeast, dipping to the southeast and is heavily faulted to form a series of graben structures. The dip is generally less than 30 but can vary locally in direction and magnitude to exceed 45. Gold is present throughout the reef horizon, however it tends to be concentrated close to the basal contact where carbon commonly occurs as thin seams. Well-mineralised carbon seams occur most commonly in three stacked sequences. The VCR is exploited solely at No.3 BU, No.6 BU and No.7 BU and, like the Vaal Reef, can occur as a composite reef consisting of several distinct sedimentary packages. In an attempt to improve grade estimation in such packages, a terrace and slope-based geological model was developed by AngloGold and has been retained by the geologists now employed by ARMgold. The model divides the orebody into a main channel; lower; middle and upper terraces, and also involves delineation of certain higher-grade reworked channels. The reef is clearly identifiable and its location at the contact between the overlying Klipriviersberg Lavas and the underlying Witwatersrand Supergroup Rocks renders the footwall and hangingwall rocks distinct from the reef, except in areas where Elsburg conglomerates sub-outcrop against the VCR. The contrasting lithologies aids fault negotiation and have facilitated the use of three-dimensional seismic survey techniques to image the gross reef topography in the past. The Elsburg Reefs are exploited at No.6 BU and 7 BU, usually in conjunction with the overlying VCR, against which it sub-outcrops along a northeast trending band, south of and sub-parallel to the Buffelsdoorn Fault. The sedimentological characteristics of the Elsburg Reefs in the region of the sub-outcrop are similar to those exhibited by the VCR.

#### 3.3.7

#### *Kalgold Operations*

The Kalgold Operation is situated on the Kraaipan granite-greenstone belt, which is a typical gold-bearing greenstone formation. It has undergone intense structural deformation that has led to its dislocation into separate units. Within the mining lease area six steeply dipping zones of mineralisation have been identified. The discrete mineralised ore zones are the result of the percolation of mineralised fluids into the Banded Ironstone Formation ("BIF") host rocks. The zones comprise the A, A-West, D, Mealie Field, Watertank and Windmill zones and the mineral resources of the A, D, Windmill and Watertank Zone have been comprehensively evaluated. The D-Zone is the first area to be exploited by open-pit mining over a strike length of 1,400m and an ore zone width of between 15m and 40m. Gold mineralisation is associated with pyrite and pyrrhotite, which was developed as a replacement mineral within a BIF and also within extensional, cross-cutting quartz veins within the ironstone.

#### 3.3.8

#### *Harmony Australian Operations*

Gold mineralisation at the Mt. Magnet operation occurs in the southern tip of the Mt. Magnet Greenstone Belt in the Murchison Province of the Achaean Yilgarn cratonic block. The belt consists of a series of tholeiitic and komatiitic volcanics and associated ultramafic volcanics and mafic tuffs. Several folding events led to the formation of the Boogardie Synform and, after a major period of ductile deformation, selective fracturing of brittle rocks introduced gold mineralisation synchronous with certain deformation events. Shearing of the country rock usually provided a conduit for mineralising fluids.

The majority of the gold mineralisation is hosted by BIF that are cross-cut by faults, at or near the contact of ultramafic and mafic rocks with felsic intrusions. Fault zones and shears are generally north-south to north-northeast trending and selective fracturing appears to form a major trap-site for gold mineralisation. Crossing of several shear directions appear to enhance mineralisation, which is often characterised by an epigenetic pyrrhotite-pyrite alteration.





At Hill 50, the bulk of the mineralisation is hosted in a thick sequence of intercalated sedimentary BIF with both komatiitic and tholeiitic volcanics and associated ultramafic volcanics and mafic tuffs. The mineralisation is characterised by pyrrhotite-pyrite wall rock alteration. The BIF's are locally offset by faults with offsets ranging from one to two metres to up to tens of metres.

At Morning Star, mineralisation is hosted within quartz-carbonate veins containing molybdenite, scheelite and stibnite in a series of pyritic, sericite-altered mafic and felsic schists. The gold mineralisation is strongly associated with large vein packages and detailed geological mapping has indicated that the mineralisation can be correlated from level to level with a high degree of confidence.

Mineralised zones are primarily defined on the basis of geological mapping while stope designs are also based on detailed sampling and mapping. Wire framing based on geological mapping and interpretation is routinely carried out and grade shells are then defined within the geological domains.

In the Cue area, approximately 85km north of Hill 50 and Morning Star, the Big Bell deposit is hosted in a steeply dipping and locally overturned northeast trending extension of the Achaean Meekatharra- Wydgee Greenstone belt. This belt forms the west limb of a north-plunging regional anticlinal structure. At Cue, towards the east of Big Bell, the anticlinal structure changes to a north-plunging regional synclinal structure. In the Big Bell area, three main zones are recognised in the regional volcano-sedimentary sequence, a lower sequence of ultramafics, graphitic sediments and BIF, gradationally overlain by a felsic volcanic sequence of andesitic, dacitic and rhyolitic rocks and then by a sequence of mainly submarine basaltic flows.

The free-milling gold mineralisation at Big Bell is mainly hosted by a sub-vertical series of potassium- altered metamorphic schists with some mineralisation occurring in hanging wall biotite schists. In the Cuddingwarra area, gold mineralisation is related to a major phase of porphyritic intrusive activity.

At South Kalgoorlie Operations gold mineralisation was discovered in the Archaean Norseman-Wiluna granite-greenstone terrain in the late 1890s consisting of extensive volcanic sedimentary rocks deposited in an extensional environment. The stratigraphy is characterised by mafic/ultramafic rocks and komatiitic basalt flows with intercalated sediments of the Kalgoorlie Group, conformably overlain by a thick series of felsic volcanics and intercalated sedimentary rocks of the Black Flag Group. The discovery of gold led to the exploitation of major historic gold mines in the Kalgoorlie "Golden Mile" and to the south at Jubilee.

Jubilee forms part of a major 4km strike length mineralised system that includes the Celebration, Mutooroo, Hampton Boulder, Mt. Martin, Dawns Hope, White Hope and Golden Hope open pit and underground mines. There are many sub-parallel northsouth trending tectonic zones in the granite- greenstone terrain with a multitude of deposits occurring further towards the west near Coolgardie.

Mineralisation is hosted along brittle-ductile shear contacts between biotite schist and ultramafics (Mt. Marion), in brittle shear in granite (Trojan open-pit), along the Boorara shear in felsic porphyry (GoldenRidge open-pit), in biotite-tremolite schist (Freddo open-pit), in shears in quartz dolerite and gabbro (Scrubby Tank) or quartz diorite (Rose Hill) or in Archaean basalts or paleo-channels (Lake Cowan open-pits).

At Mt. Marion, mineralisation is hosted in "lode gneiss" along the Kunanulling Shear, within a sub- vertical package of gneiss and ultramafics that is footwall as well as hangingwall lode and has a lower grade core. Mineralised zones are defined on the basis of geological mapping and drilling. Mineralisation occasionally extends from the hangingwall gneiss into the ultramafic hanging wall, and appears to be moving further into the hangingwall with increasing depth. The footwall contact of mineralisation generally coincides with the footwall contact of the gneiss and is most consistent.

### 3.3.9

#### *Harmony Canadian Operations*

The orebodies at Bisset are located within the Red lake Archaen greenstone belt and comprise two major sets of shear related quartz veins occurring within a steeply dipping intrusive host. One set of veins consists of stockwork breccias and the other narrower, fault-controlled veins cross-cutting the stockworks. Gold mineralisation occurs in both sets of veins but is enriched at the intersection of the two vein types.





**3.3.10 Exploration Potential**

The majority of the operations are mature and well explored and as such SRK consider there to be limited opportunity for discovering any new mineralised horizons or areas within the existing property boundaries within South Africa. Some potential does however exist for the Free Gold, Evander and Harmony Australia Operations:

- the southern extension in Basal Reef at Bambanani BU, the northern extension of certain facies at Tshepong BU and ongoing surface drilling at Joel BU, which is designed to delineate extensions to the Joel North BU area;
- the development of the Poplar and Rolspruit projects at the Evander Operations, where exploration has defined significant additional resources and are currently being investigated in the form of pre-feasibility and feasibility studies;
- at Harmony Australian Operations there is significant potential for new discoveries in the unexplored areas of the existing areas and an extensive conceptual exploration programme based on detailed regional geological mapping is underway. This potential is enhanced by the consolidation of all available information in the hands of one organisation. The ore in the South Kalgoorlie area can, however be less free-milling than the Mt. Magnet & Cue ores, signalling a potentially higher risk with regard to the maintenance of the current metallurgical recoveries; and
- the tenements in the South Kalgoorlie area are located just north of the well-known Kambalda nickel sulphide deposits where over a million tonnes of contained Ni metal has been produced to date. Portions of the tenements cover strike extensions of the Kambalda Dome stratigraphy and komatites along the Wildcatter's Shear Zone and are considered highly prospective for nickel sulphide deposits. A number of nickel sulphide deposits have been recognised on the Harmony South Kalgoorlie tenements.

**4.**

**MINERAL RESOURCES AND MINERAL RESERVES**

**4.1**

**Introduction**

This section summarises the methods used by Harmony and ARMgold to derive and classify the latest Mineral Resource and Mineral Reserve estimates for the Mining Assets. It also presents SRK's comments and opinions on the reasonableness of these estimates and presents a SRK Mineral Resource and Mineral Reserve statement, as appropriate. In addition this section sets out SRK's view regarding the potential for proving up of further Mineral Resources and Mineral Reserves at the Mining Assets.

**4.2**

**SRK Review Procedures**

SRK has not re-estimated the Mineral Resource and Mineral Reserve estimates as calculated by the Companies for each of the Mining Asset. SRK has, however, undertaken sufficient check calculations and, where appropriate, made necessary adjustments to the estimates to derive the statements presented herein and incorporated into the respective LoM plans.

The tables given in this section present SRK's Statements of Mineral Resources and Mineral Reserves. The terms and definitions are those given in the March 2000 South African Code for Reporting of Mineral Resources and Mineral Reserves. This is known as the SAMREC Code ("SAMREC") and is published by the South African Mineral

Resource Committee under the auspices of The South African Institute of Mining and Metallurgy. Harmony and ARMgold currently report Mineral Resources and Mineral Reserves in accordance with the SAMREC Code.

SAMREC terminology and guidelines are broadly applied with the following proviso. Resource estimates are categorised according to distance from current mining faces within geozones that are primarily defined by the grade characteristics of the orebody rather than purely by a geological model. Generally the Measured and Indicated Mineral Resource estimates are more conservatively derived than other South African gold mining companies. The limit of the Indicated Mineral Resource is 60m from current stoping, whereas certain other South African gold mining companies classify Indicated Mineral Resource utilising confirmed drill intersections which may be at a distance considerably further than 60m.

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Within the scale of current mining operations this approach does not affect short-term planning, nor does it impact on the long-term potential for the operations with large Inferred Mineral Resources based on sound geological models. But it does, however introduce a problem with respect to reporting SAMREC compliant financial valuations where only projections derived from Proved and Probable Mineral Reserve areas can be presented. For this reason it is necessary to stress the confidence in the underlying resource models and to include Inferred Mineral Resources into certain of the base case LoM projection and associated cash flow models.

Further, in presenting the audited Mineral Resource and Mineral Reserve statements the following

- the Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce Mineral Reserves. Accordingly Mineral Resource statements are sub-divided into those Mineral Resources which have been modified to produce Mineral Reserves (designated by the suffix 1) and those which have not (designated by suffix 2);
- Mineral Resources are quoted at an appropriate in-situ economic cut-off grade with tonnages based on the planned minimum mining width;
- all Mineral Reserves, except where noted, are based on a gold price of US\$350/oz and ZAR:US\$ rate of 8.26 (ZAR93,000/kg);
- all Mineral Resources and Mineral Reserves are quoted at 1 July 2003;
- unless otherwise stated all Mineral Reserves and Mineral Resources are quoted as 100% and net with respect to ownership;
- all Mineral Reserves quoted in terms of RoM grades and tonnage as delivered to the metallurgical processing facility and are therefore fully diluted;
- Mineral Reserve statements include only those Measured and Indicated Mineral Resources modified to produce Mineral Reserves and planned for extraction in the LoM plans;
- Mineral Reserve sensitivities have been derived from application of the relevant cut-off-grades to the underlying block listings. Accordingly, these have not been based on detailed depletion schedules and should be considered as incremental changes to the Base Case; and
- all references to Mineral Resources and Mineral Reserves relate to the SRK estimates stated in accordance with the SAMREC Code.

Surface sources at the Mining Assets comprise WRDs, Slimes Dams and Other surface sources such as spillage and small stockpiles. WRDs are notoriously difficult to sample, given the range of particle sizes commonly present and the heterogeneity of grade. In the majority of instances, SRK has classified those WRDs with sufficient information as Indicated Mineral Resources. In contrast to WRDs, slimes dams, in general tend to have more homogeneously distributed grades and the smaller particle size facilitates sampling. With adequate sampling and in-situ determinations, SRK considers that slimes dams as such may be classified as Measured Mineral Resources. In instances where the grade and/or the density are known with insufficient confidence, SRK has classified these as Indicated Mineral Resources.

#### 4.3

**Mineral Resources and Mineral Reserve Estimation Methodology**

Mineral Resource and Mineral Reserve estimation and classification is dependent upon the quality and quantity of data, block definition, grade and tonnage estimation, grade control and reconciliation. Such parameters are considered by SRK to be typical of Witwatersrand Basin gold mines.

Given the similar nature of the majority of the South African Mining Assets, the following sub-section summarises the general techniques commonly used by Harmony and ARMgold for estimation.

**4.3.1**

***Quality and Quantity of Data***

The resource estimation process at all of the underground operations is based on surface drilling, underground drilling and underground channel sampling. Unless cropping out the reefs are initially explored by drilling from surface on regular 500m to 2,000m grids. Once underground access is available, infill development drilling may be undertaken from access haulages and cross-cuts to provide a 30m by 60m grid of intersections. Evaluation is then by extrapolation from or interpolation between stoping and development sampling.

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In the case of surface drillholes, the core is halved using a diamond saw, one-half is retained as a geological record, and one-half is assayed. For underground drillholes, the core diameter is considered to be too small to allow the core to be split and to yield a sufficiently large sample to allow assaying and, in this instance, the entire core is assayed. Within the underground workings, exposures of the reef are channel sampled. Individual channels are cut from the wall rocks using a hammer and chisel or diamond saw and the cuttings are caught using steel pans. A detailed sampling record is kept showing the reef geometry at each section.

Current channel sampling standards comprise development sampling at 2m intervals, and stope face sampling at 5m intervals. Channels are defined perpendicular to the reef plane and individual sample lengths of 10cm to 30cm are taken to reflect the internal geometry of the reef. The sample size collected is in the order of 0.3kg. Two adjacent samples spanning the footwall contact may be taken in order to double the sample volume of this part of the reef that frequently contains the highest grades. This is important where the reef is 'bottom-loaded', providing more confidence in the high-grade values at the footwall contact.

The Evander and West Wits operations use private assay laboratories. All other operations rely on mine owned and managed laboratories.

Two different assaying techniques are utilised at the Mining Assets. The Aztec Analysis is an automated technique for analysing underground chip samples using non-destructive energy dispersive X-Ray analysis ("EDAX") that gives rapid quantitative analyses for gold and uranium. Check assaying is carried out on a proportion of the samples, which are analysed by fire assay with gravimetric finish. The fire assay method is used for the analysis of reef and waste dump samples as well as for checking Aztec analysis results. The samples are dried, sorted, crushed and pulverised then approximately 180g flux is used for a 50g-sample aliquot. A gravimetric finish is used for reef samples and atomic absorption finish is used for waste samples.

As part of Quality Control and Quality Assurance procedures checks are conducted on the assay laboratories and sample preparation plants. Blank samples and repeat assays are part of the external check process undertaken regularly which ensures that the laboratory adheres to assaying standards and procedures.

None of the assay laboratories carry any accreditation. However Performance Laboratories who are the assayists for the Evander and West Wits operations are in the process of applying for ISO17025 accreditation.

In SRK's opinion, the long mining history and the quantity and quality of data upon which the Mineral Resource estimates at the Mining Assets are based, is sufficient to support the Mineral Resource and Mineral Reserve estimates as derived. All of the current operations comprise mature operating BUs and consequently Mineral Resource and Mineral Reserve estimates are based largely on underground stope development and pillar sampling.

The Companies are in the process of rationalising and updating its mining software systems. Currently a mixture of computer systems are being used for survey pegs, sampling data, measuring, geological structure, facies, geozones, ore reserve management and mine planning. These systems comprise different versions of commercial packages and proprietary systems. The proprietary systems are being phased out (for support reasons) in favour of the commercial products.

The majority of the Mining Assets have their sampling data in digital format. MS Excel spreadsheets are used for Mineral Reserve and Mineral Resource data management. Specifically "Optimiser" which is used to calculate optimum grade cut-off, and "CLS" which is used to generate the Companies SAMREC compliant Mineral Resource and Reserve statements.

At Free Gold Operations, Joel uses a newly established computerised system, utilising a 3D mining software package allowing the completion of all blocking, statistics, geostatistics and grade and tonnage estimation in a fully integrated evaluation system. This system is currently being developed and managed centrally with specialised support staff. Bamabanani BU, West BU, Tshepong BU and Phakisa BU use more established 2D CAD computer systems, which have been developed to suit the tabular nature of the Witwaterand gold deposits. At all these operations all survey data and sampling information is captured digitally and stored in electronic database.







4.3.2

*Block Definition*

Once the geological structure of an area and Reef have been defined, the resource can be blocked out on 2-D plan projections using major geological features such as faults, facies boundaries, channel structures and payshoots to define zones of homogeneity. These initial macro-scale blocks are referred to as 'Geozones'.

Mining blocks are determined once the Geozones have been defined. Stopping is blocked out per panel in 30 metre-mining blocks; development will be blocked out for 10 metres. Major geological features such as faults, facies boundaries and payshoots are used to define zones of homogeneity and to terminate blocks. In some circumstances, the intersection line between the reef and a certain access elevation (e.g. a mine level) may also be used.

The geozones are used to define and separate data populations within the sampling database for further statistical and geostatistical studies. Once geozones and mining blocks have been defined they are digitised for use in computer aided grade and tonnage evaluation.

4.3.3

*Grade and Tonnage Estimation*

Resource estimation techniques at the Mining Assets follow the same basic principles, however different computer software packages are employed by the different companies.

At all of the following operations, Kudu and Sable BUs, Nyala BU, Eland BU and St Helena BU data capture and estimation is paper based.

**Statistics:** Where data is captured digitally each mine uses its defined geozones to sub-divide the Reef data into discrete data populations that have distinct grade distribution characteristics. Statistical analyses of the metal accumulation values are undertaken so as to substantiate the different grade populations in each domain. The data will often be log transformed to allow a lognormal or compound lognormal model to be applied. In some cases other parameters such as channel width and stope width will be analysed, to look for trends that could be investigated further with geostatistics and interpolated.

Data are checked and validated and any extreme values investigated to ensure there are no transcription errors and the data validated. Despiking and grade cutting techniques are used on some of the secondary Reef data to assist with further statistical and geostatistical studies.

**Geostatistics:** 'Point' variograms are constructed from underground channel sample metal accumulation values (and borehole data) for each domain. The data generally provide well-structured, two component spherical variograms with high nugget effects (50% to 80%) and ranges of 10m to 20m and 60m to 90m, these variograms are usually isotropic. This indicates a high random variability in sample grades and an underlying spatial control on sample grades whose zone of influence extends for up to 90m in all directions.

Further variography is carried out on data to be used in the macro-kriging process. These data are used to construct variograms comprised of regularised channel sample data, diamond drillhole intersections and underground drillhole intersections.

The variograms from these datasets provide a larger scale control on block grade estimation. The large- block regularised data tends to give excellent structure with little or no nugget effect and produces larger ranges, which can exceed 1,500m.

**Kriging:** At Tshepong BU, Phakisa BU, Bambanani BU and West BU kriging is undertaken separately for each geostatistical domain. Channel sample data is used to estimate grade into 10m by 10m blocks using ordinary kriging based on the point variograms and a search radius equivalent to the short range in the variograms. Only those blocks with a high statistical confidence (regression slope greater than 0.6) are evaluated by this method.

Next, 30m by 30m blocks are used to house values generated by a simple kriging process which incorporates the local area mean (based on the ordinary kriged values) into the estimate and therefore smoothes data more than the ordinary kriging, but gives more confidence to the kriged values in those





blocks which were not estimated by the ordinary kriging process. The search radius used is approximately 30m and therefore restricts the 30m by 30m block estimates to the vicinity of well-sampled areas. Again, only those blocks with a high statistical confidence within a 3-by-3 neighbourhood search range are evaluated by this method.

A third method is used to extrapolate grades much further using the large-block regularised channel sample data and incorporating the diamond drillhole intersection data which is more dispersed. This kriging is based on 250m by 250m blocks and a large search radius. The data is then co-kriged. The blocks from each of the three block models are combined so as to result in high confidence estimates in the vicinity of the channel sampling using 10m by 10m and 30m by 30m blocks which contribute to the measured resource and well-founded long range estimates which contribute to the indicated and inferred resource.

The kriging technique utilised by Harmony and Joel BU differs to that stated above. Three prototype block models are created prior to grade estimation, a 15m by 15m measured model, a 30m by 30m Indicated model and a 60m by 60m Inferred model. The kriged estimates of the measured model are restricted by the range of the semi-variogram and including a minimum of 15 sample points within the search radius. The kriged estimate of the Indicated model are restricted by two times the range with a minimum of two sample points. In general the Sitchel-t estimate technique and application of calculated additive constants is used for estimation of the inferred model. The three grade models are then combined to form one overall grade model. Channel widths are also estimated using the same technique.

**Block Listing:** Resource blocks are assigned grades from the block models using the respective software packages. Resource blocks are kept as an inventory listing with several attributes recorded for each. Availability and status record whether or not the ground has been abandoned, whether the area is currently accessible and the time required to access a currently inaccessible area.

Each block is assigned a stoping width, which is based on the expected mining width in virgin ground, or otherwise the stoping widths encountered historically in the vicinity of that block which accounts for the hangingwall dilution often incurred on these mines. In addition, the square metres of the block are corrected for dip and discounted for fault losses on the basis of previously encountered factors and incorporating the results of a fractal analysis of fault frequency and displacement. The volume described by the resultant square metres and the stoping width is multiplied by the respective tonnes per cubic metre in order to estimate the block tonnage.

ARMgold's operations, Eland BU, Kudu & Sable BUs, Nyala BU and St Helena BU do not use a computerised system for resource and reserve estimation. The Eland BU shaft pillar has been kriged using 30m by 30m blocks, using separate runs for each of the two facies identified in that area, namely the Geduld and the BCF. All other areas are estimated using either a weighting method or simple stretch averages. These methods are considered to be adequate given the high pillar content of the resource and therefore the high density of samples available. The virgin areas at Nyala BU have been estimated using a value contour technique.

Block listing data is generally managed using MS Excel, using company template spreadsheets that perform simple calculations and present data in common formats.

#### 4.3.4

##### *Classification*

The individual resource blocks have been classified as Measured, Indicated or Inferred as defined by the SAMREC Code.

Where paper estimation methods are employed resource blocks that are adjacent to sampled developments, including current production and ongoing sampling, are classified as Measured. Blocks that are generally close to sampled developments, but are themselves usually sampled by only a few underground drillholes, are classified as Indicated. The remaining blocks, remote from underground developments where the estimation of tonnage and grade is based upon extrapolation of known geological features such as payshoots/channels as well as faults, are thus classified as Inferred.





Classification of Indicated and Inferred Mineral Resources at Tshepong BU and Phakisa BU is based on the kriging variance applied to the resource block. This is used to derive percentage values, which represent the maximum theoretical difference between the estimated grade and the actual grade of a block at 95% confidence. The limit of the Measured blocks is determined by the extent of the simple kriged 30m by 30m blocks.

Harmony Freestate Operations, Joel BU, Bambanani BU, West BU, West Wits Operations and Evander Operations classify resource blocks according to the Harmony "franchise rules". Measured Mineral Resources are blocked out to 30 metres or against structures and payshoots and are adjacent to sampled stoping. Indicated Mineral Resources are blocked out to 60 metres from sampled stoping and within geozones. Inferred Mineral Resources are within large blocks defined by facies, structure and the mining lease boundaries.

SRK consider the Harmony interpretation of the Indicated and Inferred classification boundary to be conservative relative to the approach used at other Witwatersrand deep-level gold operations. This has particular impact where an operation has large areas of Inferred Mineral Resources, which are structurally simple and have high payability, such as Joel BU, Bambanani BU, Elandsrand BU and Evander Operations. As the SAMREC Code states that Inferred Mineral Resources cannot be converted into Mineral Reserves this approach may in turn lead to conservative estimates of the Mineral Reserve at these operations.

#### 4.3.5

##### *Selective Mining Units*

The choice of Selective Mining Units ("SMU") is dependent upon the mining method to be applied. In the case of narrow reef mining used at the Mining Assets, the SMU is an agglomeration of contiguous panels, each of dimension 30m by 30m. For practical reasons at this block size, mining of both pay and unpay material is unavoidable and the halting of stope faces is only triggered by unacceptably high levels of unpay ore being mined.

For remnant extraction, the pillar dimensions define the SMU. Due to the relatively small volumetric size of such remnant and/or pillar area, the sampling density available from previous mining activities facilitates a high degree of confidence for grade estimation.

#### 4.3.6

##### *Grade Control and Reconciliation*

Grade control and reconciliation practices follow similar procedures to those applied elsewhere in Witwatersrand Basin gold mining operations. The reefs and the hangingwall and footwall lithologies are visually identifiable and channel sampling ensures that the face grade is monitored accordingly. As part of the reconciliation exercises, physical factors, including stope widths, dilution, MCFs and BFs are monitored and recorded on a monthly basis. The results are used to reconcile Mineral Reserve estimates with actual mined tonnages and grades.

As stopes are mined, surveyors monitor the stope width and face advance to provide an accurate stope tonnage estimate. The channel samples taken within the stope are reconciled against the pre-mining grade estimate based on the kriging described above. The difference in gold metal is recorded as a BF, which is a combination of bias in the resource estimate and mining losses. BF's tend to approximate 100% and accordingly no further adjustment has been made.

Belt samplers at the shaft head also record grade and tonnage. These figures are compared back to the surveyed estimates on a monthly basis to give a Shaft Call Factor ("SCF"), which multiplied with the Plant Call Factor ("PCF") gives the MCF. Generally SRK consider that the underlying grade control and reconciliation processes are appropriate and do not materially affect the underlying Mineral Resource estimates as presented herein.

#### 4.3.7

##### *Reserve Estimation*

The procedure for estimating Mineral Reserves involves the definition of appropriate SMU's, the application of appropriate survey factors based on tonnage, volume and grade reconciliation exercises, the use of cut-off grade policies and technical-economic investigations leading through to the development of an appropriately detailed and engineered LoM plan.









Tables 4.1 through to 4.6 give the various mine planning parameters utilised in the derivation of cut- off-grades and the modification of Mineral Resources to Mineral Reserves for each BU separately. All factors relate solely to underground resources and primarily utilise Block Factor ("BF"), Mine Call Factor ("MCF"), Stopping Width ("SW") and Milling Width ("MW"). The block factor is a correction factor used to account for historical variance between the insitu estimate of the mining block and the average block grade post-sampling during block depletion. The mine call factor is the estimated historical discrepancy between the gold estimated to have been broken from the stoping faces to that back allocated post-metallurgical metal accounting as received at the plant as a head grade. The stopping width is the average in-stope mining width achieved during extraction. Finally the milling width is estimated as the total tonnage delivered to the plant from underground divided into the total stope area depleted over the same period. The difference between MW and SW expressed as a ratio to MW is the measure of dilution. Surface sources are processed directly and are generally not screened. As such no modifying factors are applicable for conversion to RoM grades. BUs supplying RoM material to the same metallurgical plant are assigned the same Metallurgical Recovery Factor ("MRF").

The modifying factors as given below are based on historical reconciliation exercises and as such are considered valid for the purpose of reporting Mineral Reserves for the Mining Assets.

**Table 4.1 Free Gold Operations: assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

(%)

(%)

(cm)

(cm)

Tshepong BU

100%

88%

102

143

Phakisa BU

100%

88%

102

143

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Bambanani BU

100%

72%

151

233

West BU

100%

72%

160

188

Eland BU

100%

73%

141

209

Kudu and Sable BU

100%

73%

167

214

Nyala BU

100%

80%

134

155

St Helena BU

100%

68%

137

177

Joel BU

100%

84%

139

167

**Table 4.2 Harmony Free State Operations: assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

(%)

(%)

(cm)

(cm)

Harmony No. 2 BU

100%

77%

178

188

Harmony No. 3 BU

100%

na

na

na

Harmony No. 4 BU

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100%

na

na

na

Merriespruit No. 1 BU

100%

72%

164

188

Merriespruit No. 3 BU

100%

71%

202

217

Virginia No. 2 BU

100%

na

na

na

Unisel BU

100%

77%

179

236

Saaiplaas No. 3 BU

100%

78%

158

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175

Brand No. 2 BU

100%

na

na

na

Brand No. 3 BU

100%

78%

193

223

Brand No. 5 BU

100%

75%

201

265

Masimong No. 4 BU

100%

78%

139

179

Masimong No. 5 BU

100%

78%

131

168

132







**Table 4.3 ARMgold Welkom Operations: assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

(%)

(%)

(cm)

(cm)

No. 1 BU

100%

64%

119

140

No. 2 BU

100%

64%

140

154

No. 3 BU

100%

70%

151

253

No. 4 BU

100%

60%

150

158

No. 6 BU

100%

65%

130

217

No. 7 BU

100%

75%

150

189

**Table 4.4 West Wits Operations: assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

**(%)**

**(%)**

**(cm)**

**(cm)**

Elandsrand BU

100%

87%

126

152

Deelkraal BU

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100%

93%

170

227

Cooke 1 BU

100%

83%

172

205

Cooke 2 BU

100%

72%

144

177

Cooke 3 BU

100%

73%

159

195

Randfontein No. 4 BU

100%

na

na

na

Doornkop BU

100%

70%

244

366

**Table 4.5 Evander Operations: assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

(%)

(%)

(cm)

(cm)

No. 2 BU

100%

75%

162

209

No. 5 BU

100%

75%

111

177

No. 7 BU

100%

75%

135

217

No. 8 BU

100%

70%

120

160

No. 9 BU

100%

65%

116

163

**Table 4.6 ARMgold Orkney Operations: historical and assumed modifying factors**

**Business Units**

**BF**

**MCF**

**SW**

**MW**

**(%)**

**(%)**

**(cm)**

**(cm)**

No. 2 BU

100%

85%

164

210

No. 3 BU

100%

84%

200

210

No. 4 BU

100%

78%

120

181

No. 6 BU

100%

84%

154

193

No. 7 BU

100%

91%

112

152

**4.4**

#### **International Operations**

##### **4.4.1**

##### ***Mineral Resources and Mineral Reserve Estimation Methodology***

The International Operations in Australia and Canada principally focus on small and shallow orebodies and orezones where the gold is hosted by banded iron formations and quartz veins and is steeply dipping. The Mineral Resource and Mineral Reserve estimation methodology is similar at these operations and it is therefore not described separately. It should be noted that the procedures and methodologies discussed below are current only for the Harmony Australian Operations as Bisset, the only asset of Harmony's Canadian Operations, is currently on care and maintenance.

##### **4.4.2**

##### ***Quality and Quantity of Data***

A large quantity of data exists at the various operations that comprise a combination of historic and current drilling and sampling data. Drilling and sampling methods include open-hole, reverse circulation, diamond drilling, face and stockpile sampling. Limited information is available on historic

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QA/QC procedures and Harmony normally performs ongoing data validation procedures when completing the geological modelling and resource estimation. In terms of underground sludge drillholes a check analysis is performed for every 20 sludge holes drilled or sludge samples taken. All current sampling takes place under geological control and, where applicable, older geological codes are converted to newer codes.

**4.4.3**

***Block Definition***

At the underground operations detailed high-quality underground geological and structural mapping is undertaken that forms the basis for geological modelling, the understanding of the ore genesis and the mapping of gaps within the sub-vertical ore shoots. In the open-pits, results from reverse circulation, diamond drilling and, if available, earlier open hole drilling are used to define geological wire-frames and grade shells that conform to the geological boundaries. As a standard, the reverse circulation and diamond drilling is composited to standard 1m or 2m lengths. Top-cutting of grades is used as a standard. Mineral Resource modelling procedures are well documented and include a system showing comprehensive listings of all the relevant estimation and block model parameters.

**4.4.4**

***Grade and Tonnage Estimation***

Mineral Resource estimation procedures were traditionally based on polygonal methods only but all current resource models are preferably estimated using ordinary block kriging or by using inverse distance methods. When using inverse distance methods for open-pits inverse distance squared or inverse distance cubed methods are used. It should be recognised that block models are based on information from different sampling and drilling support without extensive QA/QC control and monitoring. Where applicable, the search neighbourhoods for the inverse distance methods are based on the results of geological modelling.

In the open pit mines, optimised pit outlines are designed around the resource block models. In many of the open-pits considerable nugget effects occur, dense sampling grids are needed to estimate resources with a high degree of confidence and the search neighbourhoods employed during estimation are therefore of critical importance.

Tonnage modelling is based on average dry bulk density values that are, in places, based on a limited number of samples but have shown to be reliable when compared to density values obtained from mining reconciliation between underground and open-pits.

Mineral Resource models for many of the underground orebodies are not based on block models but on the projection of historical averages. At a number of the underground mines there is history of a large variation in the thickness of the undulating sub-vertical ore shoots in the vertical plane that is difficult to predict from the available drillhole spacing. It has been found that, in these cases, the downward projection of the average mine tonnages and grades obtained from extensive current mine development is more appropriate than generating a block model. In terms of the projection of tonnages, gaps in the mineralisation identified by geological mapping of current mine development, are taken into account in the model. SRK concurs that, at this stage, the method of downward plunge projection of tonnage and grade from well developed mine production levels provides the best method for resource modelling for the deeper portions of the mines.

**4.4.5**

***Grade Control and Reconciliation***

Grade control drilling in the open-pits consists of angled reverse circulation drilling and takes place at different drillhole spacing, locally down to a spacing of 5m by 5m. Reconciliation in the open-pits is carried out on each pit level and compared with grade control drilling or sampling. Channel samples are taken and used as the basis of grade control and reconciliation at the underground operations whilst grab samples are taken at the surface stockpiles. Reconciliation between production data and block models shows that tonnages and grade appear to reconcile reasonably well over longer periods but that gold grades, in places, appear to be over-estimated as well as under-estimated as is to be expected from inverse distance resource methods. The production results from open-pits is also compared with the grade from the upper underground levels (where possible) and confirms the average gold

grades indicated by the available sampling data.

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4.4.6

**Reserve Estimation**

In the underground mines, resources are converted to reserves by designing stopes on a panel-by-panel basis using different cut-off grades, determining a practical extraction and adding a percentage for mining dilution. Stopes and development outlines are designed using computerised mine design software. Cross-sections, long-sections and plans are generated as required that reflect a combination of drilling results, assays and geology and interpretations and are used to reflect the stopes, development ends and Mineral Reserves.

In the open-pit mines, an optimised pit outline is developed to represent the economically extractable reserves. The Mineral Reserves are further confirmed in places by infill drilling though it is understood that Harmony include confidence factors in financial evaluation to account for areas of lower confidence in Inferred Reserves.

4.5

**SRK Mineral Resource and Mineral Reserve Statements**

The Mineral Reserves quoted are sensitive to changing operating costs and gold price. Tables within each sub-section show the Mineral Reserves at eight different gold prices including the Base Case. These sensitivities are presented to give an indication of the changes relative to gold price. Note that this is an approximation only and accordingly at different gold prices alternative mining strategies may be pursued to exploit payable material in a more optimal manner. In turn, these may also affect the operating cost structure and cut-off grades owing to changes in scale of operation, reflecting the dynamic nature of the mining process.

Mineral Resources and Mineral Reserve statements as presented herein differ from that generated by the Companies due to the following:

- The Companies present Mineral Resources for the South African assets at an in-situ cut-off grade of 250cmg/t. SRK has reported Mineral Resources at in-situ cut-off grades which are reflective of cut-off parameters at each of the individual BUs;

- Mineral Reserve statements include only those Measured and Indicated Mineral Resources modified to produce Mineral Reserves and planned for extraction in LoM Plans;

In considering the following Mineral Resource and Mineral Reserve statements SRK note the following:

- With respect to the classification of Mineral Reserves SRK considers that at the majority of South African operations that the boundary between Indicated Mineral Resources and Inferred Mineral Reserves is conservatively defined and that for primary reef units reclassification would increase Indicated Mineral Resources and potentially the Probable Mineral Reserves;

- The LoM Plans in certain instances rely on significant contribution from the Inferred Mineral Resources category and reported at RoM tonnage and grades. Given the generally conservative classification of Mineral Resources exists to significantly increase the Indicated Mineral Resource and consequently Probable Mineral Reserves SRK has on a high level basis and reported as the Proven and Probable NPV (Section 14) , determining the relative impact on value should mining operations extract only the currently defined Mineral Reserves. The assessment assumes that all LoM plans mine Inferred Mineral Resources during the latter part of the operation. The resulting NPVs should be viewed on a comparative basis only and by definition reflect a lower level of technical planning than the LoM plans as presented by the Companies base case project.

- Mineral Resources classified by the suffix (1) represent those groupings of Mineral Resources that have not been used as a base for modification to produce Mineral Reserves. Conversion in this instance is based upon all modifying factors inclusive, of Mine Call Factors, Dilution, extraction and other planning considerations. In certain instances, specifically where this grouping of Mineral Resources contains

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portion of remnant pillars, only a relatively small proportion of this Mineral Resource grouping planned for extraction. Where this is the case (Freegold Operations) there is an apparent overall conversion to Mineral Reserves;

- The Mineral Resources not modified to produce Mineral Reserves as defined by the suffix (2) include:

- Reef horizons not currently planned to be extracted in the current LoM Plans,

- Groupings of pillars and other resource blocks for which insufficient technical work has been done to convert to Mineral Reserves.

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In such instances, opportunity also exists for future modification to Mineral Reserve status. In contrast, risks also exist that further technical assessments may also render portions of these Mineral Resources to be excluded from the Mineral Resource base on technical grounds;

- Vamping tonnages and grades are not currently included in the following statements SRK cons  
 be insufficient investigations to base continued contribution at current levels of production and  
 warrant inclusion in the Mineral Resource and Mineral Reserve statements as presented herein. Thi  
 represents further potential for increasing both the Mineral Resource and Mineral Reserve stateme
- The Mineral Resource statements as presented for Harmony Canada Operations has been reviewe  
 on a desk top basis alone. SRK, however note that the operation is currently under care and maint  
 with no near term intent to recommence operations.

**4.5.1**

**Free Gold Operations**

**Table 4.7 Free Gold Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

**(kt)**

**(g/t)**

**(koz)**

**(kt)**

**(g/t)**

**(koz)**

**Proved**

**Measured**

- u/g

(1)

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18,241

7.9

4,637

- u/g

(1)

30,447

12.6

12,372

- u/g

(2)

507

11.0

179

- s/f

(1)

2,694

0.5

44

- s/f

(1)

2,694

0.5

44

**Subtotal**

**20,935**

**7.0**

**4,681**

**Subtotal**

**33,647**

**11.6**

**12,595**

**Probable**

**Indicated**

- u/g

(1)

45,216

6.9

10,037

- u/g

(1)

63,355

10.5

21,391

- u/g

(2)

1,237

7.2

287

- s/f

(1)

9,664

0.8

256

- s/f

(1)

12,066

0.8

292

**Subtotal**

**54,880**

5.8

10,293

**Subtotal**

**76,659**

8.9

21,970

**Total Reserves**

**75,815**

6.1

14,974

**Total**

**110,306**

9.7

**34,565**

**Inferred in LoM**

- u/g

(1)

7,475

6.5

1,572

- u/g

(1)

122,126

9.1

35,551

- u/g

(2)

83,508

4.8

12,986

**Subtotal**

**7,475**

**6.5**

**1,572**

**Subtotal**

**205,634**

**7.3**

**48,538**

**Total in LoM Plan**

**83,290**

**6.2**

**16,546**

**315,940**

**8.2**

**83,102**

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period Free Gold Operations plan to deliver to the plant some 892kt of material recovered from vamping operations at an average grade of 4.5g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.

Table 4.8 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.







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**Table 4.8 Free Gold Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity**

**Gold Price**

(ZAR/kg)

46,500

69,750

93,000

116,250

139,500

186,000

232,500

279,000

**Mineral Resources Total**

Tonnage

(kt)

96,409

215,905

**315,940**

371,103

558,645

988,626      1,203,888      1,245,773

Grade

(g/t)

9.1

9.0

**8.2**

7.6

5.4

3.5

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3.1

3.1

Metal

(koz)

28,278

62,609

**83,102**

90,350

90,421

111,100

120,916

123,182

**Mineral Reserves Total**

Tonnage

(kt)

33,970

55,976

**75,815**

82,428

189,251

365,977

370,009

371,623

Grade

(g/t)

8.5

7.4

**6.1**

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5.9

2.8

1.6

1.6

1.6

Metal

(koz)

9,319

13,333

**14,974**

15,534

16,916

18,800

19,002

19,068

**LoM Plan Total**

Tonnage

(kt)

34,815

60,799

**83,290**

91,064

198,439

375,568

389,200

391,229

Grade

(g/t)

8.6

7.4

**6.2**

5.9

2.9

1.7

1.7

1.7

Metal

(koz)

9,577

14,506

**16,546**

17,237

18,671

20,587

21,031

21,116

**4.5.2**

*Harmony Free State Operations*

**Table 4.9 Harmony Free State Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

- u/g

(1)

13,897

4.6

2,039

- u/g

(1)

25,664

7.5

6,195

- u/g

(2)

981

7.6

239

- s/f

(1)

13,412

0.4

151

- s/f

(1)

13,412

0.4

151

**Subtotal**

**27,309**

**2.5**

**2,190**

**Subtotal**

**40,057**

**5.1**

**6,586**

**Probable**

**Indicated**

- u/g

(1)

12,100

4.6

1,797

- u/g

(1)

15,413

7.3

3,636

- u/g

(2)

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174

7.3

41

- s/f

(1)

6,729

0.6

131

- s/f

(1)

6,729

0.6

131

**Subtotal**

**18,829**

**3.2**

**1,927**

**Subtotal**

**22,317**

**5.3**

**3,808**

**Total Reserves**

**46,138**

**2.8**

**4,118**

**Total**

**62,374**

**5.2**



10,394

**Inferred in LoM**

- u/g

(1)

19,193

4.5

2,781

- u/g

(1)

37,980

6.3

7,645

- u/g

(2)

22,423

6.0

4,348

**Subtotal**

19,193

4.5

2,781

**Subtotal**

60,403

6.2

11,992

**Total in LoM Plan**

65,331

3.3

6,899

122,777

5.7

22,386

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period Harmony Freestate Operations plan to deliver to the plant some 1,431kt of material recovered from vamping operations at an average grade of 3.3g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.

Table 4.10 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.

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**Table 4.10 Harmony Free State Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity****Gold Price****(ZAR/kg)****46,500****69,750****93,000****116,250****139,500****186,000****232,500****279,000****Mineral Resources Total**

Tonnage

(kt)

6,055

32,807

**122,777**

199,934

318,105

649,268

824,718 1,000,645

Grade

(g/t)

14.1

7.4

**5.7**

5.3

4.7

3.3

2.9

2.5

Metal

(koz)

2,747

7,850

**22,386**

33,803

47,604

69,328

76,800

80,449

**Mineral Reserves Total**

Tonnage

(kt)

2,468

14,953

**46,138**

57,175

74,920

173,091

256,819  
262,342  
Grade  
(g/t)  
8.1  
4.5  
**2.8**  
2.7  
2.7  
1.5  
1.1  
1.1  
Metal  
(koz)  
640  
2,143  
**4,118**  
4,971  
6,451  
8,142  
9,242  
9,445  
**LoM Plan Total**  
Tonnage  
(kt)  
2,563  
16,947  
**65,331**  
98,465  
130,048  
268,140  
357,699  
374,268  
Grade  
(g/t)  
8.0  
4.4  
**3.3**  
3.2  
3.4  
2.0  
1.6  
1.6  
Metal  
(koz)  
662  
2,424  
**6,899**  
10,210  
14,385  
17,471

18,823

19,339

**4.5.3**

*ARMgold Welkom Operations*

**Table 4.11 ARMgold Welkom Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

**(kt)**

**(g/t)**

**(koz)**

**(kt)**

**(g/t)**

**(koz)**

**Proved**

**Measured**

u/g

(1)

1,780

4.4

249

u/g<sup>(1)</sup>

1,806

9.2

531

u/g<sup>(2)</sup>

5,825

9.1

1,700

**Subtotal**

**1,780**

**4.4**

**249**

**Subtotal**

**7,630**

**9.1**

**2,231**

**Probable**

**Indicated**

u/g

(1)

1,690

3.2

175

u/g<sup>(1)</sup>

1,585

5.8

297

u/g<sup>(2)</sup>

4,935

7.8

1,232

**Subtotal****1,690****3.2****175****Subtotal****6,520****7.3****1,529****Total Reserves****3,470****3.8****424****Total****14,151****8.3****3,760****Inferred in LoM**u/g<sup>(2)</sup>

1,307

7.1

298

**Subtotal****Subtotal****1,307****7.1****298****Total in LoM Plan****3,470****3.8****424****15,458****8.2****4,058**

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period ARMgold Welkom Operations plan to deliver to the plant some 97kt of material recovered from vamping operations at an average grade of 4.8g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.

Table 4.12 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.







**Table 4.12 ARMgold Welkom Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity**

**Gold Price**

(ZAR/kg)

46,500

69,750

93,000

116,250

139,500

186,000

232,500

279,000

**Mineral Resources Total**

Tonnage

(kt)

4,527

9,285

**15,458**

23,949

47,625

52,866

65,516

80,476

Grade

(g/t)

12.2

9.5

**8.2**

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6.8

5.4

5.1

4.5

3.9

Metal

(koz)

1,777

2,840

**4,058**

5,274

8,235

8,722

9,423

10,048

**Mineral Reserves Total**

Tonnage

(kt)

716

2,433

**3,470**

**3,719**

3,893

4,003

4,117

4,128

Grade

(g/t)

5.6

4.2

**3.8**

3.7

3.6

3.5

3.5

**3.5**

**Metal**

(koz)

130

**328**

**424**

443

452

457

460

460

**LoM Plan Total**

Tonnage

(kt)

716

2,433

**3,470**

3,719

3,893

4,003

4,117

4,128

Grade

(g/t)

5.6

4.2

**3.8**

3.7

3.6

3.5

3.5

3.5

Metal

(koz)

130

328

**424**

443

452

457

460

460

**4.5.4**

*West Wits Operations*

**Table 4.13 West Wits Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

u/g

(1)

12,068

6.3

2,452

u/g<sup>(1)</sup>

15,046

10.0

4,857

u/g<sup>(2)</sup>

10,435

9.8

3,288

s/f

(1)

440

2.7

38

s/f

(1)

729

2.4

55

**Subtotal**

**12,508**

**6.2**

**2,489**

**Subtotal**

**26,209**

**9.7**

**8,201**

**Probable**

**Indicated**

u/g

(1)

14,574

8.2

3,833

u/g<sup>(1)</sup>

18,947

11.7



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7,143

u/g (2)

5,540

9.1

1,624

s/f

(1)

3,681

0.8

95

s/f

(1)

7,990

0.7

176

**Subtotal**

**18,255**

**6.7**

**3,928**

**Subtotal**

**32,477**

**8.6**

**8,943**

**Total Reserves**

**30,763**

**6.5**

**6,417**

**Total**

**58,687**

**9.1**

**17,144**

**Inferred in LoM**

u/g (1)

39,712

6.1

7,734

u/g

(1)

66,724

8.3

17,744

u/g

(2)

3,063

4.4

430

**Subtotal**

**39,712**

**6.1**

**7,734**

**Subtotal**

**69,787**

**8.1**

**18,174**

**Total in LoM Plan**

70,475

6.2

14,151

128,474

8.6

35,318

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period West Wits Operations plan to deliver to the plant some 5,714kt of material recovered from vamping operations at an average grade of 5.2g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.

Table 4.14 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.

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**Table 4.14 West Wits Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity**

**Gold Price**

(ZAR/kg)

46,500

69,750

93,000

116,250

139,500

186,000

232,500

279,000

**Mineral Resources - Total**

Tonnage

(kt)

24,869

63,526

**128,474**

378,282

602,871

929,647      1,072,178      1,153,731

Grade

(g/t)

14.6

10.6

**8.6**

4.5

3.7

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2.9

2.7

2.6

Metal

(koz)

11,695

21,662

**35,318**

55,083

70,839

85,688

93,709

98,095

**Mineral Reserves Total**

Tonnage

(kt)

9,929

21,793

**30,763**

54,546

64,791

74,682

82,000

86,432

Grade

(g/t)

10.3

7.7

**6.5**

4.2

4.0

3.7

3.5

**3.3**

Metal

(koz)

3,298

5,415

**6,417**

7,410

8,279

8,833

9,155

9,308

**LoM Plan Total**

Tonnage

(kt)

16,230

37,327

**70,475**

133,984

189,641

236,265

270,723

285,008

Grade



(g/t)

9.8

7.5

**6.2**

4.3

3.7

3.3

3.1

3.0

Metal

(koz)

5,101

8,949

**14,151**

18,535

22,612

25,172

26,855

27,354

**4.5.5**

*Evander Operations*

**Table 4.15 Evander Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

u/g<sup>(1)</sup>

4,030

5.7

740

u/g<sup>(1)</sup>

5,494

10.7

1,898

u/g<sup>(2)</sup>

854

11.2

307

**Subtotal**

**4,030**

**5.7**

740

**Subtotal**

6,348

10.8

2,205

**Probable**

**Indicated**

u/g<sup>(1)</sup>

34,929

7.5

8,440

u/g<sup>(1)</sup>

37,159

14.2

16,926

u/g<sup>(2)</sup>

12,889

11.4

4,744

s/f<sup>(2)</sup>

210,398

0.3

2,259

**Subtotal**

34,929

7.5

8,440

**Subtotal**

260,446

2.9

23,929

**Total Reserves**

38,959

7.3

9,180

**Total**

266,795

3.0

26,134

**Inferred in LoM**

u/g<sup>(1)</sup>

4,559

5.4

786

u/g<sup>(1)</sup>

17,466

9.9

5,532

u/g<sup>(2)</sup>

43,337

10.2

14,232

s/f<sup>(2)</sup>

1,290

0.3

13

**Subtotal**

**4,559**

**5.4**

**786**

**Subtotal**

**62,093**

**9.9**

**19,777**

**Total in LoM Plan**

**43,518**

**7.1**

**9,966**

**328,887**

**4.3**

**45,912**

Table 4.15 includes Mineral Reserves for the Rolspruit Project amounting to 25,951kt at an average grade of 7.9g/t, which is contained in the Probable Reserve category. A final decision to proceed with the Rolspruit Project has not been made and as such the Mineral Reserves and associated capital are excluded from the Evander TEPs, Section 12 and TEMs, Section 13.

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period Evander Operations plan to deliver to the plant some 1,525kt of material recovered from vamping operations at an average grade of 6.2g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.





Table 4.16 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.

**Table 4.16 Evander Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity**

**Gold Price**

(ZAR/kg)

46,500

69,750

93,000

116,250

139,500

186,000

232,500

279,000

**Mineral Resources - Total**

Tonnage

(kt)

4,792

61,666

**328,887**

358,594

398,696

437,200

459,655

526,397

Grade

(g/t)

17.5

12.0

**4.3**



4.5

4.5

4.4

4.4

4.2

Metal

(koz)

2,694

23,885

**45,912**

51,572

57,796

62,345

64,957

71,061

**Mineral Reserves - Total**

Tonnage

(kt)

2,614

12,866

**38,959**

42,349

49,850

59,223

73,992

82,016

Grade

(g/t)

9.2

8.0

**7.3**

7.0

6.4

5.6

4.9

4.6

Metal

(koz)

774

3,324

**9,180**

9,520

10,198

10,756

11,732

12,064

**LoM Plan - Total**

Tonnage

(kt)

3,054

16,032

**43,518**

52,655

64,598

77,357

93,736

102,418

Grade

(g/t)

9.1

7.6

**7.1**

6.4

5.7

5.0

4.5

**4.2**

Metal

(koz)

892

3,939

**9,966**

10,826

11,810

12,559

13,611

13,968

**4.5.6**

***ARMgold Orkney Operations***

**Table 4.17 ARMgold Orkney Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

u/g

(1)

5,181

4.8

802

u/g<sup>(1)</sup>

6,729

6.8

1,471

u/g<sup>(2)</sup>

17,294

8.4

4,655

**Subtotal**

5,181

4.8

802

**Subtotal**

24,023

7.9

6,126

**Probable**

**Indicated**

u/g

(1)

1,192

5.9

227

u/g<sup>(1)</sup>

1,308

10.2

428

u/g<sup>(2)</sup>

95,932

3.6

11,219

**Subtotal**

**1,192**

**5.9**

**227**

**Subtotal**

97,240

3.7

11,647

**Total Reserves**

6,373

5.0

1,029

**Total**

121,263

4.6

17,773

**Inferred in LoM**

u/g<sup>(2)</sup>

1,041

8.3

279

**Subtotal**

**Subtotal**

1,041

8.3

279

**Total in LOM Plan**

6,373

5.0

1,029

122,304

4.6

18,052

In addition to the stated Mineral Resources and Mineral Reserves, over the LoM period ARMgold Orkney Operations plan to deliver to the plant some 90kt of material recovered from vamping operations at an average grade of 3.5g/t. This material is included in the LoM plan projections, however has not been classified as either Mineral Resources or Mineral Reserves.

Table 4.18 summarises the sensitivity of the Mineral Resources and Mineral Reserves at a range of gold prices. The results exclude the material projected from vamping operations.

141







**Table 4.18 ARMgold Orkney Operations: Mineral Resource, Mineral Reserve and LoM plan sensitivity**

**Gold Price**

(ZAR/kg)

46,500

69,750

93,000

116,250

139,500

186,000

232,500

279,000

**Mineral Resources Total**

Tonnage

(kt)

10,946

38,358

**122,304**

154,375

212,191

295,541

310,596

337,424

Grade

(g/t)

11.2

7.2

**4.6**

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4.2

3.8

3.4

3.4

3.3

Metal

(koz)

3,940

8,824

**18,052**

20,938

25,682

32,659

33,577

36,218

**Mineral Reserves Total**

Tonnage

(kt)

1,265

3,873

**6,373**

7,849

18,685

22,247

24,594

28,091

Grade

(g/t)

7.6

6.0

**5.0**

4.6

2.8

2.6

2.5

2.3

Metal

(koz)

308

744

**1,029**

1,160

1,661

1,856

1,953

2,087

**LoM Plan Total**

Tonnage

(kt)

1,265

3,873

**6,373**

7,849

18,685

22,247

24,594

28,091

Grade

(g/t)

7.6

6.0

**5.0**

4.6

2.8

2.6

2.5

2.3

Metal

(koz)

308

744

**1,029**

1,160

1,661

1,856

1,953

2,087

**4.5.7**

***Kalgold Operation***

**Table 4.19 Kalgold Operations: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

s/f

(1)

1,010

1.2

38

s/f<sup>(1)</sup>

1,113

1.3

45

o/p

(1)

5,762

2.3

421

o/p<sup>(1)</sup>

13,211

2.1

909

o/p<sup>(2)</sup>

11,334

1.1

413

**Subtotal**

**6,772**

**2.1**

**459**

**Subtotal**

**25,658**

**1.7**

**1,367**

**Probable**

**Indicated**

o/p<sup>(2)</sup>

4,485

1.5

217

**Subtotal**

**Subtotal**

**4,485**

**1.5**

217

**Total Reserves**

6,772

2.1

459

**Total**

30,143

1.6

1,584

**Inferred in LoM**

o/p<sup>(2)</sup>

14,804

1.8

851

**Subtotal**

**Subtotal**

14,804

1.8

851

**Total in LoM Plan**

6,772

2.1

459

44,947

1.7

2,435

142







4.5.8

*Harmony Australia Operations*

Table 4.20 Harmony Australia Operations Mt Magnet and Cue: Mineral Resource and Mineral

Reserve statement

Mineral Reserve Category

Mineral Resource Category

Tonnage

Grade

Gold

Tonnage

Grade

Gold

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

Proved

Measured

u/g

(1)

375

4.7

57

u/g<sup>(1)</sup>

4,035

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3.8

499

s/f

(1)

1,458

1.0

45

s/f

(1)

3,341

1.0

108

o/p<sup>(1)</sup>

o/p<sup>(1)</sup>

144

2.8

13

**Subtotal**

**1,834**

1.7

102

**Subtotal**

**7,520**

2.6

620

**Probable**

**Indicated**

u/g

(1)

3,943

5.6

706

u/g

(1)

8,960

5.6

1,603

s/f

(1)

1,236

0.9

37

s/f

(1)

1,330

0.9

38

o/p<sup>(1)</sup>

1,116

2.8

100

o/p<sup>(1)</sup>

18,014

2.3

1,311

**Subtotal**

**6,295**

**4.2**

**843**

**Subtotal**

**28,304**

**3.2**

**2,952**

**Total Reserves**

**8,129**

**3.6**

**945**

**Total**

**35,823**

**3.1**

**3,572**

**M + I + INF in LoM**

**Inferred**

u/g<sup>(1)</sup>

2,927

6.7

628

u/g

(1)

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10,310

5.5

1,834

o/p<sup>(1)</sup>

3,796

2.0

241

o/p<sup>(1)</sup>

10,798

1.9

663

**Subtotal**

**6,723**

**4.0**

**870**

**Subtotal**

**21,108**

**3.7**

**2,497**

**Total in LoM Plan**

**14,852**

**3.8**

**1,815**

**56,932**

**3.3**

**6,069**

Table 4.21	Harmony Australia Operations	South Kalgoorlie: Mineral Resource and Mineral Reserve statement
	<b>Mineral Reserve Category</b>	
	<b>Mineral Resource Category</b>	
	<b>Tonnage</b>	
	<b>Grade</b>	
	<b>Gold</b>	
	<b>Tonnage</b>	
	<b>Grade</b>	
	<b>Gold</b>	
	(kt)	
	(g/t)	
	(koz)	
	(kt)	
	(g/t)	
	(koz)	
	<b>Proved</b>	
	<b>Measured</b>	
	u/g	
	(1)	
	816	
	4.7	
	124	
	u/g	
	(1)	
	1,375	
	4.8	
	212	



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s/f

(1)

462

0.8

12

s/f

(1)

2,482

1.0

78

o/p<sup>(1)</sup>

105

2.1

7

o/p<sup>(1)</sup>

2,870

2.4

224

**Subtotal**

**1,383**

**3.2**

**143**

**Subtotal**

**6,727**

**2.4**

**514**

**Probable**

**Indicated**

u/g

(1)

720

4.3

99

u/g

(1)

1,753

4.0

226

s/f

(1)

s/f

(1)

937

0.7

22

o/p<sup>(1)</sup>

1,183

2.4

91

o/p<sup>(1)</sup>

35,849

1.7

1,987

**Subtotal**

1,903

3.1

190

**Subtotal**

38,539

1.8

2,234

**Total Reserves**

3,286

3.2

333

**Total**

45,266

1.9

2,749

**M + I + INF in LoM**

**Inferred**

u/g

(1)

277

4.9

43

u/g<sup>(1)</sup>

3,174

3.4

343

o/p<sup>(1)</sup>

271

1.9

17

o/p<sup>(1)</sup>

45,991

1.3

1,888

**Subtotal**

**548**

**3.4**

**60**

**Subtotal**

**49,341**

**1.4**

**2,235**

**Total in LoM Plan**

**3,834**

**3.2**

**394**

**94,607**

**1.6**

**4,984**

143





4.5.9

*Harmony Canadian Operations*

Table 4.22 Harmony Canadian Operations: Mineral Resource and Mineral Reserve statement

Mineral Reserve Category

Mineral Resource Category

Tonnage

Grade

Gold

Tonnage

Grade

Gold

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

Proved

Measured

u/g<sup>(1)</sup>

u/g

(1)

533

7.3

126

**Subtotal**

**Subtotal**

533

7.3

126

**Probable**

**Indicated**

u/g<sup>(1)</sup>

u/g

(1)

755

8.3

202

**Subtotal**

**Subtotal**

755

8.3

202

**Total Reserves**

**Total**

1,288

7.9

328

**M + I + INF in LoM**

**Inferred**

u/g<sup>(1)</sup>

u/g

(1)



817

9.2

241

**Subtotal**

**Subtotal**

817

9.2

241

**Total in LoM Plan**

2,105

8.4

569

4.5.10 *Harmony*

Table 4.23 **Harmony: Mineral Resource and Mineral Reserve statement**

**Mineral Reserve Category**

**Mineral Resource Category**

**Tonnage**

**Grade**

**Gold**

**Tonnage**

**Grade**

**Gold**

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

**Proved**

**Measured**

u/g<sup>(1)</sup>

40,307

6.0

7,730

u/g<sup>(1)</sup>

67,371

9.2

19,973

u/g<sup>0(2)</sup>

12,523

9.7

3,924

s/f<sup>(1)</sup>

18,129

0.5

306

s/f<sup>(1)</sup>

22,424

0.6

460

s/f<sup>(2)</sup>

o/p<sup>(1)</sup>

5,866

2.3

428

o/p<sup>(1)</sup>

16,225

2.2

1,146

o/p<sup>(2)</sup>

11,334

1.1

413

**Subtotal**

**64,303**

**4.1**

**8,464**

**Subtotal**

**129,876**

**6.2**

**25,916**

**Probable**

**Indicated**

u/g<sup>(1)</sup>

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88,874

7.0

19,894

u/g<sup>(1)</sup>

114,665

11.0

40,431

u/g<sup>(2)</sup>

19,222

10.6

6,552

s/f<sup>(1)</sup>

16,479

0.7

390

s/f<sup>(1)</sup>

23,020

0.7

513

s/f<sup>(2)</sup>

210,398

0.3

2,259

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o/p<sup>(1)</sup>

2,299

2.6

191

o/p<sup>(1)</sup>

53,862

1.9

3,298

o/p<sup>(2)</sup>

4,485

1.5

217

**Subtotal**

**107,652**

**5.9**

**20,475**

**Subtotal**

**425,652**

**3.9**

**53,271**

**Total Reserves**

**171,954**

**5.2**

**28,939**

**Total**

555,528

4.4

79,187

**M + I + INF in LoM**

**Inferred**

u/g<sup>(1)</sup>

70,405

5.6

12,758

u/g<sup>(1)</sup>

197,534

8.0

51,114

u/g<sup>(2)</sup>

110,578

7.2

25,503

s/f<sup>(1)</sup>

s/f<sup>(1)</sup>

176

0.7

4

s/f<sup>(2)</sup>

1,290

0.3

13

o/p<sup>(1)</sup>

4,067

2.0

258

o/p<sup>(1)</sup>

56,789

1.4

2,551

o/p<sup>(2)</sup>

14,804

1.8

851

**Subtotal**

**74,473**

**5.4**

**13,017**

**Subtotal**

**381,170**

**6.5**

**80,036**

**Total in LoM Plan**

246,427

5.3

41,956

936,699

5.3

159,223

144







4.5.11 *ARMgold*

Table 4.24 *ARMgold*: Mineral Resource and Mineral Reserve statement

Mineral Reserve Category

Mineral Resource Category

Tonnage

Grade

Gold

Tonnage

Grade

Gold

(kt)

(g/t)

(koz)

(kt)

(g/t)

(koz)

Proved

Measured

u/g<sup>(1)</sup>

16,081

6.5

3,370

u/g<sup>(1)</sup>

23,758

10.7

8,188

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u/g<sup>(2)</sup>

23,372

8.6

6,445

s/f<sup>(1)</sup>

1,347

0.5

22

s/f<sup>(1)</sup>

1,347

0.5

22

**Subtotal**

**17,428**

**6.1**

**3,392**

**Subtotal**

**48,477**

**9.4**

**14,655**

**Probable**

**Indicated**

u/g<sup>(1)</sup>

25,489

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6.6

5,421

u/g<sup>(1)</sup>

34,571

10.3

11,420

u/g<sup>(2)</sup>

101,485

3.9

12,595

s/f<sup>(1)</sup>

4,832

0.8

128

s/f<sup>(1)</sup>

6,033

0.8

146

**Subtotal**

**30,321**

**5.7**

**5,549**

**Subtotal**

**142,090**

5.3

24,161

**Total Reserves**

47,750

5.8

8,940

**Total**

190,567

6.3

38,815

**M + I + INF in LoM**

**Inferred**

u/g<sup>(1)</sup>

3,737

6.5

786

u/g<sup>(1)</sup>

61,063

9.1

17,776

u/g<sup>(2)</sup>

44,102

5.0

7,070

**Subtotal**

3,737

6.5

786

**Subtotal**

105,165

7.3

24,845

**Total in LoM Plan**

51,487

5.9

9,726

341,668

295,732

6.7

63,661

4.6

**Mineral Resource and Mineral Reserve Potential**

The majority of the deep-level gold operations are mature and other than for re-classification of Inferred and Indicated Mineral Resources together with conversion of Mineral Resources currently classified by suffix (2) to Mineral Reserves, SRK consider there to be limited opportunity for significant increases in Mineral Resources or Mineral Reserves. Some potential does however exist for:

outlining higher-grade components of areas currently classified as Inferred Mineral Resources and Indicated Mineral Resources;

focusing exploration activity on all of the secondary reef horizons such as the Leader Reef and the "A" Reef, specifically the "B" reef at Tshepong, and secondary reefs at the West Wits Operations;

exploration into the Jeannette area and the Basal Reef, directly northeast of Tshepong BU; and

further potential for increasing the Mineral Resource tonnage relies on the reductions in cut-

5.

**MINING**

5.1

**Introduction**

This section includes discussion and comment on the mining engineering and related aspects of the LoM plans associated with the Mining Assets. Specifically, comments are given on the mine planning process, mining methods, geotechnics, mine ventilation and the impact of the foregoing on future mining operations.

5.2

**Mine Planning**

The mine planning process at the Mining Assets is dependent upon input from the geology/resource management departments. Responsibility is assigned for addition/revision, and depletion sign-off on the Mineral Resource, which form the basis for subsequent design, planning and extraction sequencing incorporated into the LoM plan. In the majority of instances this is completed using a combination of computerised geological modelling, mine planning and production scheduling, utilising various in house and external software packages.

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The planning cycle commences with the ratification of key input parameters, prior to producing a SAMREC compliant Mineral Resource statement, adjusted for all resource depletion. On completion of the resource update, the planning process commences incorporating:

targets, objectives and guidelines that are defined by the Companies' respective corporate teams;  
detailed short-term (one-year) operating plans extending stoping and development layouts from current face positions. Reliance is placed on historically achieved production parameters such as development rates, mining widths and dilution together with metal accounting factors such as mine call factors and metallurgical recovery; and an extension to the short-term plan resulting in a three-year strategic plan detailing any planned production build-ups or mine expansion programmes. Beyond the three-year period, LoM projections are developed on a factorised depletion of the available resources.

In conjunction with the above, a detailed (one-year) operating and capital cost budget is subsequently projected, and where appropriate modified for the LoM production schedule. The one-year budget is generally prepared on a monthly basis, extending into quarterly periods and annually thereafter. Of critical importance is the utilisation of historically achieved data for productivity and operating costs against which operating business units are benchmarked. Where this is not available, zero-based costing is applied. Specific capital projects are evaluated on individual merits to demonstrate the anticipated return on investment.

SRK consider that, despite being in line with general industry practice, a more progressive approach to planning would better assist in assessing the risk profiles and project value drivers of the various operations. SRK consider that future assessment should extend the business planning window beyond the current three-years to ensure that due recognition of the longer-term risk environment is considered. Detailed planning generally only extends between one and three-years for assets where no specific project capital is anticipated, with detailed planning profiles extending over the capital spend profiles for the specific capital projects. The LoM projections for each business unit vary between three and twenty-years within the same Tax Entity. In the absence of detailed cost projections beyond the specific period, SRK has assessed the unit operating costs taking cognisance of increasing depth and distance from shaft infrastructure and a general allowance for age of infrastructure and associated additional maintenance costs. Labour (contributing between 40% and 50% of the total costs) has been assessed taking a view on the achievable productivity over the LoM period. Consumables have been split into a fixed and variable component and projected forward on that basis driven by cost drivers such as development meters and stoping area (accounting for variation in stoping width).

### 5.3

#### **Overview of Mining Operations**

##### **5.3.1**

#### ***Free Gold Operations***

Free Gold Operations: comprise a complex of nine mature operating underground mines, namely Tshepong BU, Phakisa BU, Bambanani BU, West BU, Eland BU, Kudu & Sable BUs and Nyala BU, Joel BU, St Helena BU, various surface sources and tailings re-treatment operations. The individual business units range in planned operational life between three-years and 19-years thus classifying the collective Free Gold Operations as a long-life asset.

Underground production is mainly sourced from shallow dipping tabular narrow orebodies, in particular, the Basal Reef supplemented by secondary orebodies such as the Leader Reef. The only exception to this is Joel BU, where production is sourced from the Beatrix-VS5 Composite Reef.

Access to and egress from the various reef horizons is via numerous surface shafts and various sub-vertical shafts at the deeper operations. The same access and egress is used for labour, material and production.

RoM ore is hoisted to surface and thereafter transported by conveyor, rail or road to one or more of the four metallurgical processing facilities (FS1 Plant, FS2 Plant, St Helena Plant and Joel Plant). At shafts where the infrastructure permits waste to be hoisted separately, then it is conveyed to WRDs, generally situated close to shaft heads.

Mining methods at Free Gold Operations include variations on conventional narrow reef mining methods, such as scattered breast, down dip and remnant extraction. The longer-life BUs, Tshepong, Phakisa, Bambanani, and Joel predominantly mine virgin ground at increasing depth with West, St Helena BUs, Eland BU, Kudu and Sable BUs, and Nyala BU extracting higher portions of remnants, including shaft pillars.

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Mine ventilation systems at the Free Gold Operations are well established and have been extensively planned and operated in the past. Operating conditions vary in accordance with the scattered nature of the working places, the operating depths and the virgin rock temperature ("VRT") and control of airflow. The VRT varies from the greatest value at Bambanani BU (62C) to the minimum value at Joel BU (35.6C). Refrigeration plants are installed at Bambanani BU, Tshepong BU and Joel BU. The control, containment and removal of fire generated toxins creates the greatest challenge to the ventilation team at Bambanani BU, this together with the sealing off old abandoned areas that no longer require cooling or ventilation but are currently getting both.

Geotechnical input at Free Gold Operations is typical of mining environments in the Free State Goldfield, where mining depths range from shallow-intermediate (Joel BU) to deep (Bambanani BU). Bambanani BU, Eland BU, Nyala BU, Kudu & Sable BUs are classed as seismically active operations with seismic monitoring systems installed, and activity generally located in the vicinity of remnant operations and/or geological structures. External consultants (ISSI) supply all seismic systems, which are managed by GeoHydroSeis. Localised ground control issues include the impacts of a weak hangingwall member, the Khaki Shale on exposure and scaling in main orepasses. In such instances mine specific strategies have been implemented, either through design modifications and/or remedial repairs.

**Tshepong BU:** Mining operations at Tshepong are conducted at average depths of 1,925m below surface and currently extend to 66L. The current LoM plan includes the sub-66L project, which involves the sinking of a twin decline system from 66L to 71L in order to access ground to the west of current operations. The sub-66L project is planned to commence during 2003 and be completed by 2007. Production build-up is the focal point of the latest LoM plan, following the introduction of Conops in the next two-years and the additional production on completion of the sub-66L project.

**Phakisa BU:** Phakisa was sunk to 79L and subsequently mothballed by AngloGold. Free Gold plans to complete the work and has initiated a project to complete sinking of the shaft by a further 178m to 81L. The shaft will be equipped to hoist men and material from surface to enable mining to be conducted to 77L and to effect additional rock hoisting to 55L via an underground Koepe hoist. The ore and waste will be transferred at this level to Nyala BU for hoisting to surface. Project capital expenditure over the life of the BU is estimated to be ZAR540m and planned to commence in the in the second quarter of 2004.

**Bambanani BU:** Bambanani's mining operations extend between 1,200m and 3,000m below surface. Access to the deeper levels is via a surface shaft and then by a sub-vertical shaft, which extends to the lowermost 107L. Mining conditions are considered to be difficult due to low mining flexibility, distance of workings from the shaft, seismicity, and high VRT's. The mine is prone to fires, a number of which are currently active and affecting production at Bambanani BU and West BU.

**West BU:** The West BU, which was mothballed by AngloGold during the latter half of calendar 2001, was re-commissioned in 2002. Mining operations at West are small scale and focused on Basal Reef pillars and some mining of the Leader Reef.

Eland BU, Kudu and Sable BUs and Nyala BU: The Eland BU and Nyala BU are interlinked on a number of levels and have connections with Tshepong BU, ARMgold Welkom Operations and President Brand. Mining operations occur at average depths of 1,700m below surface and are focused on the extraction of remnant pillars and shaft pillars. The tramming distance and production continuity from scattered remnants at these mines offers the most challenging aspects to counter against rising operating costs.

**St Helena BUs:** St Helena BUs comprise three operating BUs: No.2 BU, No.4 BU and No.8 BU. No. 2 BU is currently operating on a marginal basis and is undergoing investigation as to its sustainable contribution in the immediate future. Mining is principally focused on remnant mining operations from Basal Reef pillars and a small contribution from the Leader Reef at an average production rate of 50ktpm, this production is significantly below the shaft hoisting capacity. Mining is conducted at some 1,500m below surface.







The extensive historical mining areas, accessed via kilometres of interlinked tunnels, excavations and connections between the Free Gold and ARMgold Welkom BUs led to an elevated risk of fire and an increase in illegal mining activity. Management believe there to be a high number of illegal miners operating at the mine, which creates its own operational issues. Counter- measures are being given serious consideration, however due to the extensive nature of the abandoned underground workings in which the activities are taking place and taking cognisance a level of collusion, policing these activities is considered to be extremely difficult.

**Joel BU:** Joel BU has two shafts: South BU and North BU. Currently mining operations are conducted solely from South BU at an average depth of 1,000m below surface, where a three-barrel decline system extends to the 117L. A holing to North BU from 100L provides a second means of egress. North BU was partially sunk to 20m below 145L and the primary sinking equipment is still in place. The LoM plan assumes commencement of the installation of hoisting facilities in the North BU during 2004, to be operational by 2005. Access to ground below 121L is currently achieved via a winze from South BU in order to confirm grades. Although production is small the working places are far from the shaft and the transport of men, material and rock is complicated via the belted inclines.

Future execution of mining operations at Free Gold Operations, as planned, is dependent upon:

- minimising the risk of further underground fires at Bambanani and West and managing appropriate fire mitigation measures at the other highly scattered remnant operations, particularly where illegal mining is known to occur;
- timely completion of the four main capital projects, namely:
- the completion of the sub-66L project at Tshepong, which will enable access to ore from the deeper levels,
  - the completion of the Phakisa Project;
- the completion of the upgrade to the Nyala shaft to enable the extraction of the shaft pillar and the hoisting of rock to surface from the Phakisa Project; and the completion and commissioning of Joel's North shaft;
- continuation of infrastructure rehabilitation programmes, specifically to address ventilation conditions and orepass integrity at Bambanani. Development waste is hoisted with mined ore;
- continued vigilance with respect to minimising seismic activity, specifically with respect to:
  - remnant extraction at Bambanani; and
  - shaft pillar extraction programmes at the Nyala BU;
- the achievement of additional unit cost reductions at Free Gold Operations above those realised through post the formation of Free Gold; and
- the realisation of the planned productivity improvements associated with the introduction of Conops, which is still subject to negotiation with the NUM.

### 5.3.2

#### *Harmony Free State Operations*

Harmony Free State Operations comprise a complex of nine mature operating mines: Brand BU No. 1/3, Brand BU No. 5, Harmony BU No. 2, Merriespruit BU No. 1, Merriespruit BU No. 3, Masimong BU No. 4, Masimong BU No. 5, Saaiplaas BU No. 3 and Unisel BU No. 1, which are managed as individual business units. Collectively Harmony Free State Operations will continue for 15 years, thus classifying Harmony Free State Operations as a long-life asset. Underground production is mainly sourced from shallow dipping tabular narrow orebodies, principally the Basal Reef and Leader Reef, with increasing contributions from the `A' Reef, `B' Reef and Middle Reef as the mines near depletion. The RoM contribution from specific reefs plays an important role in achieving the planned cash flows taking cognisance of the variation in insitu grade and the highly channelised nature of the secondary reef horizons. Access to and egress from the reef horizons is from surface shafts. The shafts are utilised for men, materials and production. Mining operations are conducted at depths between 1,500m and 2,200m





below surface. Mining is undertaken at Harmony Free State Operations both in virgin areas and through the extraction of various remnants and pillars and the proportion of remnant to virgin mining varies between 20% and 40% at the different mines.

Current underground mining is being conducted at some 426ktpm. Access for rock hoisting and the provision of ventilation, services, men and materials is provided through each of the surface shafts although the ore from Brand No.3 BU is transported underground to Brand No.1 BU for hoisting to surface as mining is being conducted on the shaft pillar. Underground waste is generally separated from the ore however where this is not the case the proportion of waste is relatively low.

Mining operations at Harmony Free State Operations are conducted principally by conventional narrow stopeing methods with tracked haulages on a two-shift basis although a move to Conops is also being considered. Stope production is supplemented by vamping of old gold and contractors are typically employed for this and for other non-core activities such as the provision of permanent support. No mining is currently being conducted at Brand No.2, BU however contract mining is currently being considered.

The operations are mature and small-scale projects and investigations are predominately focused on extending mining life and/or lowering the cost of production at the various mines. Increased production is being planned from reefs considered to be secondary to the Basal Reef at certain BUs, these reefs include "A" reef, "B" reef, Leader Reef and Middle Reef.

The Masimong Expansion Project provides for the increase in production and grade at the Masimong No.5 BU through the development of a significant area of Basal Reef to the east and west of the current workings. No material increases to the primary infrastructure requirements are required and development of the new raise lines is anticipated in the next 2 to 3 years.

A limited number of surface sources of ore exist at the Harmony Free State Operations in the form of WRDs and tailings dams and these are processed at production levels dictated by economic conditions. Ore is transported by a number of modes to one of the three process plants, Central Plant, Virginia Plant and the Saaiplaas Plant.

Mine ventilation systems at Harmony Free State Operations are well established and have been extensively planned and operated in the past. Due to the low tonnages the ventilation infrastructure is considered adequate for the relatively shallow operations, thus SRK consider there to be no material ventilation issues.

Due to the shallow depths of operations, seismicity and rock mechanics aspects are, in general, not considered to be a serious concern and seismic events although experienced are infrequent. The extraction of the Harmony No.2 BU shaft pillar is in progress and total extraction is currently planned. Mining is being undertaken in conjunction with sufficient geotechnical consideration and design and the area is being monitored by an ISSI seismic system. Although the seismic impacts are adequately recognised by management and external consultants have audited the mining practice the high extraction ratio still presents a risk to the planned extraction.

Future mining operations at Harmony Free State Operations are dependent upon:

- achievement of planned production, which historically has fallen short at the operations where the contribution from remnant areas is material;
- maintaining the planned blend of primary reef extraction to secondary reefs, both in terms of ore tonnage and head grade; and
- achievement of planned development targets to ensure that sufficient flexibility is achieved, specifically for the highly channelised reefs, which have historically proven difficult to work in terms of sustaining the planned grade over the budgeted period.

### 5.3.3

#### **ARMgold Welkom Operations**

ARMgold Welkom Operations has six operating BUs: No. 1 BU, No. 2 BU, No. 3 BU, No.4 BU, No.6 BU, and No.7 BU. Mining operations at ARMgold Welkom Operations occur at average depths of between 1,000m and 1,200m below surface and collectively have a life of eight-years, thus classifying ARMgold Welkom Operations as a medium-life asset.





Underground production is mainly sourced from shallow dipping tabular narrow orebodies, in particular the Basal Reef with smaller quantities from the higher-grade channels of the Leader Reef located some 15m above the Basal Reef. Access to the reef horizons, including men, materials and production is currently from surface shafts and sub-vertical shafts. RoM ore at all operations is hoisted to surface and thereafter transported directly to Free Gold Operations FS1 Plant. Underground waste is not separated from the ore due to the economic viability of re-equipping waste handling facilities and the relatively low development tonnage. RoM ore delivered to the plant from contractor operations is treated separately for apportionment purposes. The trucks are weighed and the ore delivered is sampled on the conveyor belt to provide an estimate of the gold on surface for each BU.

Mining at ARMgold Welkom Operations is undertaken by variations on conventional narrow reef mining methods including breast and "undercut" mining. The latter is utilised by ARMgold Welkom Operations to enable mining in areas where the strong quartzite middling between the Basal Reef and the weak Khaki Shale is less adequate. At No.1 BU, where the majority of production is and will continue to be concentrated, the undercut mining method is responsible for some 60% of total production. Core mining activity at No.1 BU is conducted directly by ARMgold Welkom Operations, while at all other BUs contractors undertake mining and reclamation activities. Mine ventilation systems at ARMgold Welkom Operations are well established and have been extensively planned and operated in the past. Due to the low tonnages and the large volumes of air that are being circulated in the various sections, the air ratios are considerably greater than industry norms. In SRK's opinion, the installed ventilation and refrigeration infrastructure is adequate to meet all planned requirements.

Fires at ARMgold Welkom Operations are considered by SRK to represent a material issue and whilst causes are reported as being unknown, the presence of illegal miners is believed to increase the risk of fires. Illegal mining is an increasing phenomenon in Free State Goldfield and is particularly concentrated in high carbon rich remnant panels as found within the ARMgold Welkom Operations.

SRK and ISSI, which are retained on a contractual basis, provide geotechnical input at Welkom Operations. ISSI provide a seismic monitoring service and SRK is responsible for geotechnical input in all other respects. The main geotechnical issues at ARMgold Welkom Operations include those typically associated with remnant mining operations and the influence of the weak Khaki Shale.

Mining on the Basal Reef at ARMgold Welkom Operations is characterized by a largely mined-out orebody extending over vast areas, the extraction of numerous small and highly stressed remnant pillars, an environment of intense faulting and numerous intrusive features, the moderate depth of the workings and the concomitant high levels of induced stress. The primary rock engineering issues are thus those related to the protection of personnel and infrastructure and the maintenance of acceptable levels of production in the face of sometimes fairly adverse mining conditions.

A thin quartzitic layer and then weak Khaki shale, which varies in thickness from a few centimetres up to many metres, overlie the Basal Reef. This weak and talcose horizon has the capacity to yield, transferring stress away for immediate abutments. Depending on the thickness and integrity of the Basal quartzite middling this creates hangingwall control problems in the areas where it is undercut, which vary from moderate to severe. In such situations mining discipline is critical to ensure safe working conditions and sustained production with minimal dilution.

Future mining operations at ARMgold Welkom Operations are dependent upon:

- minimising the impacts of illegal miners and potential fire risks; and
- minimising economic risk through further cost control.

#### **5.3.4**

##### ***West Wits Operations***

West Wits Operations comprise a complex of six mature mines: Elandsrand BU, Deelkraal BU, Cooke No. 1 BU, Cooke No. 2 BU, Cooke No. 3 BU and Doornkop BU, which are managed as individual business units. Underground operations at the Cooke No. 4 BU and the open-pit mining at Lindum have been ceased. The West Wits Operations have a collective life of 19-years, thus classifying West Wits Operations as a long-life asset.







Underground production is mainly sourced from shallow dipping tabular narrow orebodies, including the Elsburg Reef and Upper Elsburg Reef, VCR and Kimberley Reef. Mining operations at Elandsrand BU and Deelkraal BU focus on extraction of VCR, those at the Cooke BUs are principally on the Elsburg and Upper Elsburg Reefs and the Kimberley Reef and South Reef at Doornkop BU. Access to the reef horizons including men, material and production is from surface shafts. Mining operations at the Elandsrand have been conducted at depths between 1,600m and 2,800m below surface with future production planned at some 3,300m below surface and 2,750m below surface at Deelkraal BU. At the Cooke BUs and Doornkop BU, mining has historically been conducted between some 600m and 1,260m below surface. Mining is undertaken at West Wits Operations both in virgin areas and through the extraction of various remnants and pillars, although the proportion of remnant to virgin mining varies between 50% and 80% at the different mines.

Current underground mining is being conducted at some 433ktpm. Access for rock hoisting and the provision of ventilation, services, men and materials are provided through each of the surface shafts. Underground waste is generally separated from the ore, although waste development in the remnant mining areas is relatively low. Mining operations at West Wits Operations are conducted principally by conventional narrow stoping methods with tracked haulages on a two-shift basis. A move to continuous operations ("Conops") is being considered at a number of mines and negotiations are currently being conducted with the NUM. A semi-trackless mining method is practiced at Cooke No.3 BU, which accounts for only some 10% of the production at this BU. The method combines conventional stoping with LHD and truck cleaning on reef drives as opposed to tracked haulages. It is reported that the method is being phased out for cost reasons. A trackless and semi-trackless mining method is practiced at Doornkop BU which in total accounts for some 40% of the mine's production. Stope production is supplemented by vamping of old gold and contractors are typically employed for this and for other non-core activities, such as the installation of permanent support.

A number of projects exist to extend mining life and/or lower the cost of production at the various mines including: a shaft deepening project at Elandsrand BU; the development to the Kimberley Reef at Cooke No.1 BU in three target areas with expected raise development in the next six months; and the Doornkop feasibility study. The Sub-Shaft Deepening Project at Doornkop BU involves the deepening of the main shaft from 132L to 212L; this following the completion of a raise bore hole and the re-equipping of the sub-vertical shaft. The project is anticipated to take between 4 and 5 years to complete.

A number of surface sources exist at the West Wits Operations in the form of WRDs and tailings dams. Production from surface sources typically accounts for a third of the total rock currently processed and contributes 10% of the total gold produced. The Deelkraal Plant is dedicated to processing the surface sources and certain waste development from the underground operations at West Wits Operations. Ore is transported by a number of modes to one of the three process plants dedicated for ore treatment: Elandsrand Plant, Cooke Plant and the Doornkop Plant.

Mine ventilation systems at West Wits Operations are well established and have been extensively planned and operated in the past. Due to the low tonnages the ventilation infrastructure is considered adequate, however the depth at a number of the shafts and the scattered nature of the remnant mining activities requires that ventilation and refrigeration management remains a core activity.

Seismicity and rock mechanics aspects are of a particular concern at Elandsrand BU and Deelkraal BU due principally to the greater depth of mining. Mining at Elandsrand BU is being conducted on a sequential grid basis, which has successfully improved regional stability. Current stope support consists of pre-stressed elongated timber props and approximately 50% of all stopes are backfilled. The width of stabilising pillars for future mining is based on the assumption that all stopes will be backfilled, although it is not apparent that there is sufficient backfill to achieve this objective. The staffing level and qualification appears adequate at Elandsrand BU and a system of geophones is used to monitor seismicity at the mine. Although a sequential grid design should be fully utilised at Deelkraal BU scattered and long-wall mining is still being used in conjunction with large mining spans. SRK consider





that inadequate regional support is the main cause for an increase in seismicity at the mine. On certain levels on the VCR footwall, SRK consider the development is too close to the reef and this is likely to lead to a deterioration of the excavations during over stoping activities. Precautions need to be taken.

Future mining operations at West Wits Operations are dependent upon:

- the lowering of working costs, improvement in productivity and increased mining flexibility;
- the realisation of the planned productivity improvements associated with the introduction of Conops which is subject to negotiation with, and approval by the NUM;
  
- ensuring that sufficient backfill is able to be placed in the stopes at Elandsrand BU to adhere to the planned mine design with regard to regional stability when mining at increased depth. If insufficient backfill is placed then SRK consider that the width of the stabilising pillars should be reviewed;
  
- ensuring that the move to a sequential grid mining is made at Deelkraal and a greater emphasis is placed on the incorporation of geotechnical considerations with regard to the planning and design is made; and
  
- controlling capital expenditure and the timely completion of the sub-Shaft Deepening Project at Doornkop BU and other projects.

#### 5.3.5

##### *Evander Operations*

Evander Operations comprise a complex of six mature shafts: Evander No.2 BU, Evander No.5 BU, Evander No. 7 BU, Evander No.8 BU and Evander No.9 BU, which are managed as business unit and the Rolspuit and Poplar Projects. Operations at the Evander No.3 BU have been ceased and any remaining mining from the No.1 BU and No.3 BU areas is affected through No.2 BU. The Evander Operations have a combined life of 15 years, thus classifying Evander Operations as a long-life asset.

Underground production is sourced from the shallow dipping tabular narrow orebodies comprising the Kimberley Reef. Numerous sills and dykes complicate mining layouts, whilst the reef dips typically at some 20 to 25 at most of the BUs increasing to some 40 in certain areas at Evander No.8 BU. Mining at Evander Operations, in general, is relatively shallow and conducted at depths between 500m and 2,000m below surface. The deepest mining is principally undertaken at Evander No.8 BU from the No.2 BU decline area. Mining is undertaken at Evander both in virgin areas and through the extraction of various remnants and pillars. The proportion of remnant to virgin mining varies between 30% and 60% at the different BUs.

Current underground mining is being conducted at some 185ktpm (ore and waste) with production from No.8 BU contributing the most at some 60ktpm of ore. Access for rock hoisting and the provision of ventilation, services, men and materials is provided through each of the surface shafts although rock from No.8 BU is transported underground on 15L for hoisting at No.7 BU, located adjacent to the process plant. Underground waste is generally separated from the ore, although waste development in the remnant mining areas is relatively low.

Mining operations at Evander Operations are conducted by conventional narrow stoping methods with tracked haulages on a two-shift basis, although a move to Conops is also being considered at a number of the sections. Stope production is supplemented by vamping of old gold and contractors are typically employed for this and for other non-core activities such as the provision of permanent support. Mining is characterised by scattered workings often a long distance from the shaft stations and in general, old and poorly maintained shaft and engineering infrastructure and insufficient engineering spares. At a number of BUs there is a reliance on single pumping columns and systems. A principal project at Evander Operations is the Rolspruit Deep's Project, which considers the exploitation of deeper resources of the Kimberley Reef adjacent to No.8 BU, through either the installation of a twin shaft system, from

surface or a twin sub-vertical shaft system at No.8 BU. Harmony undertook a feasibility study commencing July 2002, based on the provision of a men and material shaft and a rock and ventilation shaft to 267L, some 2,670m below surface, to exploit eight ore zones between 1,890m and 2,590m below surface at some 200ktpm (ore and waste) over some 15 years. The study estimated capital expenditure of some ZAR5,200m and projected an IRR of some 9% and

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12% post and pre-tax respectively. The project is considered to be marginal, but of relatively low technical risk, hence the consideration of the twin sub-vertical shaft alternative from No.8 BU as an optimisation. The incremental value at the Base Case discount factor to the Evander Tax Entity is negligible and the project go-ahead will be directly linked to the availability of funding.

The Poplar Project considers the greenfields development through installation of a twin shaft system to some 1,200m below surface to access ore some 20km from the existing Evander Operations. The level of this study is considered, by SRK, to be conceptual.

Surface sources at Evander Operations are only processed to enable the plants to operate efficiently. Ore is transported to either the Kinross or Winkelhaak process plants for treatment.

Mine ventilation systems at Evander Operations are well established and have been extensively planned and operated in the past. Due to the low tonnages the ventilation infrastructure is considered adequate and in conjunction with the relatively shallow operations, ventilation concerns are considered limited.

Seismicity and rock mechanics aspects are in general, due to the shallow depths, not considered to be a serious concern and seismic events, although experienced, are infrequent. The partial extraction of the Evander BU No.8 shaft pillar and the over-stoping of the decline area to the north can be considered to be a risk in terms of seismicity at the mine. A risk assessment has been conducted on the overall strategy and SRK consider that in order to ensure that the planned extraction is achieved a greater emphasis needs to be placed on the individual stope sequencing.

Future mining operations at Evander Operations are dependent upon:

- improving profitability through the lowering of working costs and improvement in productivity;
- the realisation of the planned productivity improvements associated with the introduction of Conops, which is subject to negotiation with and approval by the NUM;
- a more detailed strategy with regard to the partial mining of the shaft pillar at Evander No.8 BU and the influence of geological structures on ground control and seismicity;
- the commitment of sufficient funds to improve the spares and maintenance situation at the various shafts and a focus on improved maintenance practices, particularly with respect to No.2 BU, No.5 BU and No.8 BU; and
- a positive decision on the development of the Rolspruit and Poplar projects subsequent to the completion of the necessary feasibility studies.

#### 5.3.6

#### *ARMgold Orkney Operations*

ARMgold Orkney Operations comprise a complex of six mature BUs: No.1 BU, No.2 BU, No.3 BU, No.4 BU, No.6 BU and No.7 BU, which are managed as a business unit. No.5 BU was closed July 2002, principally due to depletion of reserves and for seismic reasons. These operations have a combined life of eight years, thus classifying ARMgold Orkney Operations as a medium-life asset.

Underground production is mainly sourced from shallow dipping tabular narrow orebodies, including the Vaal Reef, VCR and Elsburg Reefs. Mining operations at No.1 BU, No.2 BU and No.4 BU focus on extraction of the Vaal Reef, the VCR at No.3 BU and the VCR and Elsburg Reefs at No.6 BU and No.7 BU. Access to the reef horizons for men, material and production is via surface shafts. Production at ARMgold Orkney Operations, particularly on the Vaal Reef, is mainly derived from the extraction of a host of remnant pillars. By their nature these are small, isolated, scattered and difficult pieces of ground situated at great depth and surrounded by significant mined-out areas.

Mining is undertaken at average depths of between 1,600m and 2,000m below surface. Access for rock hoisting and the provision of ventilation, services, men and materials is provided through each of the surface shafts. Underground waste is not separated from the ore due to the economic viability of re-equipping waste handling facilities and the relatively low development tonnage. ARMgold Orkney Operations currently has no surface rights to dump waste material and as such would have to seek permission from AngloGold to utilise their WRDs in the event of ARMgold Orkney Operation's management implementing waste separation.





ARMgold Orkney Operations and VRO's BUs are interlinked on a number of levels and as a consequence share access ways. In certain instances VRO supply other production services including, compressed air, water and power. RoM ore is transported from the individual shafts to the No. 1 Gold Plant via VRO's surface transport network. RoM ore from No.6 BU areas is hoisted at the No.7 BU where it is fed directly by conveyor into the plant.

At ARMgold Orkney Operations ARMgold has entered into various agreements with VRO, which govern right of access, in addition to toll treatment the supply/sharing of production services. Further, major critical spares are pooled between the two groups, however both parties maintain, at their own cost, monitoring systems for emergencies such as fire, flood and seismic events.

Mining methods at ARMgold Orkney Operations include scattered breast mining methods, up-dip mining, remnant extraction, pillar mining and vamping. Contractor operators are utilised for non-core activities such as development, support and vamping, with stoping undertaken by ARMgold Orkney Operations personnel. Stope support is with conventional sticks and packs, however at No.2 BU backfill is utilised which is supplied by VRO.

Mine ventilation systems at Orkney Operations are well established and have been extensively planned and operated in the past. Due to the low tonnages and the large volumes of air that are being circulated in the various sections, the air ratios are considerably greater than industry norms. In SRK's opinion, the installed ventilation and refrigeration infrastructure is adequate to meet all planned requirements.

GeoHydroSeis, Rockcon Services and SRK are retained on a contractual basis to provide geotechnical input at Orkney Operations. GeoHydroSeis provide a seismic monitoring service. Rockcon Services are responsible for geotechnical input to No.6 BU, No.7 BU and a portion of No.3 BU. SRK is responsible for geotechnical input in all other areas. The main strategic rock engineering issue faced by management at ARMgold Orkney Operation's is the maintenance of acceptable levels of production out of highly stressed, seismically active pillars and remnants. Shaft pillar extraction is in progress at No.2 BU and No.4 BU.

Future mining operations at ARMgold Orkney Operations are dependent upon:

- continued vigilance with respect to minimising seismic activity;
- ensuring economic viability during the latter half of the LoM plan at significantly reduced production rates when only BU No. 6 and BU No. 7 are operating; and
- continuation of and adherence to the current agreements between ARMgold Orkney Operations and VRO so as to ensure uninterrupted production.

Other than increases in Mineral Reserves due to reduction in operating costs and increased extraction, SRK do not consider there to be any other significant opportunities at Orkney Operations.

#### 5.3.7

#### *Kalgold Operation*

Kalgold Operations comprise an open-pit mine that has a life of 4.3 years, thus classifying Kalgold Operations as a short-life asset.

Several steeply dipping ore zones exist at Kalgold Operations and current mining operations are focused on the D-Zone, which has a strike length of 1,400m and a width between 15m and 40m. Mining operations are conducted by normal open-pit methods by the use of excavators and trucks. The ore mining and waste stripping is undertaken by a contractor. The current term of the contract is for five-years from 2001 and the contractor is reimbursed on a rate per cubic meter basis. Ore is trucked to the plant from either the North-pit or South-pit and stockpiled according to various grade categories before being blended for treatment. The short-term and strategic stockpiles are re-handled using a wheel loader.

The business plan is based on a pit optimisation that seeks to maximise the NPV of the D-Zone. A steepening of the high-wall is planned through the installation of support anchors enabling access to more high-grade ore. Waste stripping requirements are elevated in the first six-months of the plan beyond which stripping requirements will reduce to levels comparable with historical values. A number of ramp modifications to the pit exits and location of switchbacks are planned by Kalgold





Operations in order to reduce waste hauling costs. The final pit depth is currently planned at some 155m and 235m below surface for the North-pit and South-pit, respectively and further mining of the orebody by underground methods may be considered.

Future mining operations at Kalgold Operations are dependent upon:

- improvement in working costs and productivity;
- maintenance of slope stability and ensuring a continuous supply of ore at the planned grade; and
- the observance to strict grade control guidelines and ore reserve management.

### 5.3.8

#### *Harmony Australian Operations*

Harmony Australian Operations comprises two principal operations, namely Mt. Magnet & Cue and South Kalgoorlie, mining from various underground and open-pit mines. The Mt. Magnet operations comprise a number of open-pits, decline operations at Morning Star and Hill 50 and the processing of surface stockpiles. Open-pit, underground and surface stockpiles are treated at similar production rates. The Cue operation comprises a number of open-pits at Big Bell, Cuddingwarra, Golden Crown and Tuckabianna. The Big Bell underground operation was recently closed. These operations have a combined life of 7.3-years, thus classifying Mt. Magnet & Cue operations as a medium-life asset. The South Kalgoorlie operations comprise the Jubilee and New Celebration facilities, the Mt. Marion underground mine, and various open-pits. These operations have a combined life of three-years, thus classifying South Kalgoorlie operations as a short-life asset.

At Mt. Magnet underground mining is the principal contributor to gold production with open-pit mining restricted to the near surface oxidised resources. The underground and open-pit mines are contractor operated, however mine personnel undertaken the planning and mine design. The side slopes of the open-pit range between 60 and 70. A divergence in plan has resulted through problems with the licensing and approvals at one of the open-pits although alternative production has been sourced. Underground access is via separate declines at the Morning Star and Hill 50 mines, installed at a gradient of 1 in 7 and accessed from portals close to the base of the open-pits. The pit bottoms are 900m and 1,000m deep, respectively. An up-hole benching method is employed at both mines in the steeply dipping orebodies from levels installed at 25m vertical intervals at Morning Star and 30m at Hill 50. The ore is loaded by LHDs into trucks that transport the ore to surface, which is then stockpiled before treatment. The depleted stopes are then backfilled with development waste. Operations at Hill 50 are currently restricted due to a collapse of a main return airway and this together with a planned vertical advance rate of 100m per year results in underground production remaining below budget.

The numerous open-pit mines at Cue are considered small and have short lives. Contractors are employed to mine the ore and waste and RoM ore is transported from the mine to the plant using road trains.

The Jubilee and New Celebration operations have been combined to form South Kalgoorlie Operations. Ore contribution is split: 75% from open-pit mining; 20% from underground mining; and the remainder from the low-grade surface stockpiles. The underground steeply dipping orebody at Mt. Marion is accessed via a decline from surface and extends along strike some 250m to 300m. A sub-level caving system has recently been introduced utilising mechanised drilling and loading equipment producing at 45ktpm. The average mining depth is relatively shallow at some 500m below surface, however mineralisation has been demonstrated to some 1,000m below surface. The planned future conditions and production rates are comparable to that currently achieved and no material concerns are noted by SRK.

Open-pit mining at South Kalgoorlie is concentrated at the Trojan and Golden Ridge. Mineral Reserves at Trojan will be depleted during 2003. Numerous un-planned slips and failures at Golden Ridge are resulting in significant under-performance in terms of ore production and flatter slope angles, necessitated by the failures, have resulted in significant additional stripping.







Mine ventilation systems at the underground operations at Mt Magnet and Mt Marion are well established and have been extensively planned and operated in the past. Apart from unexpected airway failures, thought to be associated with seismicity, no material ventilation concerns are anticipated by SRK. The increasing depth of operations coupled with high extraction ratios and massive mining methods have led, it is reported, to a number of seismic events at the underground operations and a focus on control and monitoring is being made in an effort to limit adverse production impacts. Seismicity and rock mechanics aspects are, considered by SRK to be, of a low risk although the costs of increased support may impact on profitability.

Future mining operations at Mt. Magnet & Cue and South Kalgoorlie are dependent upon:

- the management of production, cost, safety and dilution aspects at the Mt Magnet underground operations at the deeper mining levels experienced at this operation; and
- the identification and replenishment of sufficient open-pit reserves at the Mt Magnet & Cue and South Kalgoorlie open-pit operations.

5.3.9

***Harmony Canadian Operations***

Harmony Canadian Operations were closed in 2001 due to economic reasons. Mining was conducted by underground methods between depths of 1,200m to 1,500m below surface at some 1,000tpd. Mining was focused on two steeply dipping quartz veins where mineralisation was present and concentrated at points of the intersection of the two veins. Long-hole drilling and shrinkage stoping methods were practiced at the mine, however the mine is currently on care and maintenance and no production is currently planned to take place.

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5.4

Contribution to LoM Production

The following table presents the projected contribution of various production sources to the individual LoM plans for each operation.

Table 5.1 Mining Assets: contribution to LoM plan production

MINING ASSETS

Tonnage

Grade

Content

(kt)

(g/t)

(koz)

Total Free Gold Operations

LoM Ore ug

71,020

7.1

16,257

LoM Vamping

892

4.5

129

LoM SS

12,358

0.8

300

Total to Plant

84,270

6.2

16,686

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**Total Harmony Free State Operations**

LoM Ore ug

45,190

4.6

6,617

LoM Vamping

1,431

3.3

152

LoM SS

20,141

0.4

282

Total to Plant

66,761

3.3

7,051

**Total ARMgold Welkom Operations**

LoM Ore ug

3,470

3.8

425

LoM Vamping

31

2.5

2

Vamping

97

Edgar Filing: HARMONY GOLD MINING CO LTD - Form 6-K

4.8

15

Total to Plant

3,598

3.8

442

**Total West Wits Operations**

LoM Ore ug

66,354

6.6

14,019

LoM Reclamation

93

6.0

18

LoM Vamping

5,621

5.2

938

LoM SS

4,121

1.0

133

Total to Plant

76,190

6.2

15,108

**Total Evander Operations**



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LoM Ore ug

17,568

5.9

3,338

LoM Vamping

1,525

6.2

305

LoM SS

1,648

0.9

49

Total to Plant

20,740

5.5

3,691

**Total ARMgold Orkney Operations**

LoM Ore ug

6,373

5.0

1,029

LoM Reclamation

59

3.7

7

LoM Vamping

31

3.0

3

Total to Plant

6,463

5.0

1,039

**Total Kalgold Operations**

LoM Ore op

5,762

2.3

421

LoM SS

1,010

1.2

38

Total to Plant

6,772

2.1

459

**Total Mt. Magnet & Cue Operations**

LoM Ore ug

7,246

6.0

1,391

LoM Ore op

4,912

2.2

341

LoM SS

Edgar Filing: HARMONY GOLD MINING CO LTD - Form 6-K

2,694

0.9

82

Total to Plant

14,852

3.8

1,814

157





**Table 5.1 Mining Assets: contribution to LoM plan production (continued)**

**MINING ASSETS**

**Tonnage**

**Grade**

**Content**

**(kt)**

**(g/t)**

**(koz)**

**Total South Kalgoorlie Operations**

LoM Ore ug

1,813

4.6

267

LoM Ore op

1,559

2.3

115

LoM SS

462

0.8

12

Total to Plant

3,834

3.2

394

**6.**

**METALLURGY**

**6.1**

## **Introduction**

This section includes discussion and comment on the metallurgical processing aspects associated with the Mining Assets. Specifically, detail and comment is given on the process metallurgy and process engineering aspects relating to plant capacity, metallurgical performance and metal accounting practices as incorporated in the LoM plans.

### **6.2**

#### **Processing Facilities**

Metallurgical processing facilities at the Mining Assets include thirteen operating plants in South Africa with a combined milling and treatment capacity of 2,570ktpm and 2,670ktpm, respectively, plus four operating plants in Australia with a combined milling capacity of 660ktpm. The plants currently process ore from underground and open pit mining operations, low-grade stockpiles, WRDs, reclaimed slime and a variety of other surface accumulations.

##### **6.2.1**

#### **Free Gold Operations**

FS1 Plant processes underground ore, waste rock and various surface accumulations, delivered by either road or rail. The plant was commissioned in 1986 and comprises three independent modules, each consisting of four feed silos, two RoM mills, two conventional thickeners, cyanide leach, carbon in pulp ("CIP") adsorption, AARL elution, zinc precipitation and smelting. Loaded carbon is also received from Joel for elution and regeneration.

The fully autogenous reef milling capacity is 420ktpm. It is proposed to increase mill throughput to 402ktpm through the addition of steel ball grinding media, at which stage leach / CIP becomes limiting. Projected gold recoveries from metal contained in reef and waste of 97% and 88%, respectively, with due consideration for head grade effect over the LoM period, are in line with recent performance.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements. FS1 plant is projected to be in use until 2022 when underground operations cease.

FS2 Plant is largely dedicated to the treatment of surface sources, although it does toll treat reef on behalf of ARMgold Welkom Operations and also processes ore from Eland BU, Kudu & Sable. The plant was commissioned in the early 1950s and employs conventional technology of that era comprising crushing, ball and pebble milling, thickening, leaching, filtration, zinc precipitation and smelting.

FS2 has a reef milling capacity of 300ktpm, which reduces to its current operating capacity of approximately 300ktpm when processing reef and waste. Overall recovery is a function of the mix of feed ore, as surface sources tend to have a lower recovery than underground reef. SRK consider that the projected recoveries of approximately 95%, waste recoveries of approximately 80% and slime recoveries of approximately 60% are appropriate considering the recent operating performance.

Considering its age, FS2 appears to be in a fair condition, both mechanically and structurally. Filter maintenance is good but this will have to be sustained if current efficiencies are to be maintained. FS2 is projected to be in use until 2007 when surface operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.







Joel Plant processes underground ore and waste rock both of which are delivered to the plant by road. Joel Plant was commissioned in 1987 with a circuit comprising conventional RoM milling, leach, CIP adsorption, elution, electrowinning and smelting. Due to the observed "preg robbing" characteristics of the ore, the leach and adsorption circuit was reconfigured as a CIL circuit to realise improved metallurgical recoveries. In a recent development, elution has been discontinued at Joel and loaded carbon is transported to FS1 for elution.

Joel Plant was originally designed as a fully autogenous reef mill with a capacity of 120ktpm. Following certain modifications the reef capacity was increased to 150ktpm with the mills running semiautogenously. Current operating capacity, including waste, is approximately 72ktpm with the potential to increase to 135ktpm. Projected reef and waste recoveries of approximately 95% and 87%, respectively are in line with recent performance with due allowance for the impact of head grade variation over the LoM period.

Generally the plant is considered to be in good condition both mechanically and structurally although the level of housekeeping offers room for improvement. Joel Plant is projected to be in use until 2014 when underground operations cease.

St Helena Plant was commissioned in 1978. Older plant facilities, which began operating in the 1950s, have since been demolished. The current circuit comprises RoM milling, thickening, leaching, filtration, zinc precipitation and smelting.

Presently only two of the five original milling circuits are operational. On the basis of semi autogenous operation, current reef milling capacity is approximately 100ktpm, which reduces to the present operating capacity of approximately 93ktpm processing reef and waste. St Helena will process a range of surface sources in its remaining life, for which varying recoveries projected to be between 50% and 90% are considered appropriate by SRK.

The plant is generally in a good condition although there are signs of corrosion, particularly in the leach area. Planned filter overhauls have fallen behind schedule and will have to be reinstated if current efficiencies are to be maintained. St Helena Plant is planned to be in use until 2006 when surface operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

#### 6.2.2

#### *Harmony Free State Operations*

Central Plant processes underground ore and it is planned to utilise spare treatment capacity to process reclaimed slime in the future. The plant was commissioned in 1986 and comprises RoM milling, thickening, cyanide leaching, CIP adsorption, elution and electrowinning. Loaded carbon is received from Virginia and Saaiplaas mines for elution and regeneration. Following commissioning of the Harmony refinery, smelting was discontinued and cathode slime is now processed at Central Plant to refined gold products.

The plant was designed to mill 150ktpm of reef at moderate steel addition and has demonstrated an operating reef milling capacity of 180ktpm at higher steel addition. Installed treatment capacity equates to 240ktpm and this differential will be used to process reclaimed slime. Projected reef recoveries of approximately 95% are in line with recent performance. Recoveries of 55% are anticipated on the reclaimed slime component of the feed and SRK consider this recovery to be achievable.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements. Central Plant is planned to be in use until 2014 when underground operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

Saaiplaas Plant processes underground ore and it is planned to utilise spare treatment capacity to process reclaimed slime in future. The plant was commissioned in the late 1950s employing conventional technology of that era. In the early 1980s RoM milling was introduced and part of the leach was converted to a carousel CIL circuit earlier this year. Loaded carbon is transported to Central Plant for elution and regeneration.





Saaiplaas Plant has a reef milling capacity of 150ktpm and installed treatment capacity of 220ktpm. Spare treatment capacity will be used to process reclaimed slime. Projected reef recoveries of 95% to 96% are in line with recent performance. Recoveries of 55% are anticipated on the reclaimed slime component of the feed and 88% on the waste rock. SRK consider these recoveries to be achievable.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements. Saaiplaas Plant is planned to be in use until 2018 when underground operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

Virginia Plant processes underground ore and waste. The plant was commissioned in 1986 and comprises RoM milling, thickening, cyanide leaching and CIP adsorption. Local elution and electrowinning facilities have been decommissioned and loaded carbon is transported to Central Plant for elution and regeneration.

The plant was designed to mill 150ktpm of reef at moderate steel addition and has demonstrated an operating reef milling capacity of 180ktpm at higher steel addition. Virginia has a current operating capacity of approximately 162ktpm processing reef and waste. Projected reef and waste recoveries of approximately 96% and 85%, respectively, are in line with recent performance.

The mills are generally in good condition although certain structural steelwork is showing signs of corrosion. Leach tanks are not in good condition and there have been recent failures. The installation of in-house leach reactors has consequently been necessary to enhance leach kinetics and maintain dissolution. The CIP circuit, being a converted uranium leach circuit, is showing its age and is not in good condition. Both the leach and CIP circuits will have to be refurbished or replaced if extended operations are intended. A capital allowance of ZAR10m has been included to complete the work deemed necessary by SRK to sustain the projected plant performance. Virginia Plant is required until 2012 when underground operations cease, providing that routine maintenance is sustained and the capital is expended as provisioned, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

#### 6.2.3

#### *West Wits Operations*

Ore delivered to Elandsrand Plant by conveyor from Elandsrand BU and by road from Deelkraal BU. Elandsrand Plant also operates a waste washing section, with washed fines joining the reef feed and oversize being stockpiled. The plant was commissioned in 1978 and comprises RoM milling, thickening, cyanide leaching and CIP adsorption. A pumpcell CIP circuit was commissioned as an upgrade in 1999. Loaded carbon is transported some 50km to the Cooke Plant for elution and regeneration. A portion of the tailings is cycloned ahead of disposal to produce backfill. Elandsrand Plant has a maximum reef milling capacity of 190ktpm. Projected reef recoveries of 96% are in line with recent performance and taking cognisance of the projected increase in head grade over the LoM period.

Generally the plant is in excellent condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements. Elandsrand Plant is required until 2023 when underground operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

Deelkraal Plant was commissioned in 1978 with a circuit comprising RoM milling, thickening, leaching, filtration, zinc precipitation and smelting. A portion of the tailings is cycloned ahead of disposal to produce backfill.

Deelkraal Plant has a design reef milling capacity of 135ktpm and a current operating capacity of 105ktpm when processing waste, largely limited by the condition of the filter plant. In recent years, Deelkraal Plant has primarily treated waste, with Deelkraal underground ore having been transported to the Elandsrand Plant for treatment. It is planned to commission a new 60ktpm pumpcell CIP plant to process Deelkraal BU underground ore from 2004. This decision is partly motivated by the need for





backfill at Deelkraal BU. An appropriate capital allowance has been included in the strategic plan for the CIP conversion. Projected reef recoveries of 92% should be achievable following the conversion to CIP.

The plant is generally in a fair condition, with the exception of the filter plant however general maintenance will have to be reviewed/improved to prevent disruptions over the LoM period. The Deelkraal Plant is required until 2009 when underground operations cease, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

Cooke Plant processes only underground ore delivered from Cooke No.1 BU, No.2 BU and No.3 BU and the Doornkop BU. The plant was commissioned in 1977 as a Gold and Uranium plant. Uranium operations ceased in 1989 and parts of the Uranium plant were utilised to convert from filtration and zinc precipitation to CIP/ CIL. The current operation comprises RoM milling, thickening, and cyanidation in a hybrid CIP/CIL circuit, elution and electrowinning. Loaded carbon at Doornkop Plant is added to the CIL circuit for further loading and loaded carbon at Elandsrand Plant is separately eluted and regenerated. Electrowon gold slime is transferred to the Harmony refinery. The plant was designed as a 250ktpm gold and uranium plant, the capacity of which was increased to 300ktpm in 1982 with 280ktpm mill capacity as the current limit. Projected reef recoveries of 96% to 97% are in good agreement with current performance. Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements. The Cooke Plant is planned to be used until 2022 when underground operations cease.

Doornkop Plant is currently dedicated to processing waste rock and other surface accumulations. The plant was commissioned in 1985 and comprises RoM milling, thickening, cyanide leaching and CIP adsorption. Loaded carbon is transported to Cooke Plant for further loading ahead of elution and regeneration.

Doornkop Plant was commissioned with an initial reef milling capacity of 100ktpm. This was expanded to its current reef milling capacity of 225ktpm in 1987, which equates to a waste milling capacity of around 200ktpm. In line with recent performance, recoveries are projected at approximately 90%.

The plant is required until the final quarter of 2005.

Generally the plant is considered to be in very good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements, providing that routine maintenance is sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.

#### 6.2.4

#### *Evander Operations*

Winkelhaak Plant was commissioned in 1958. Only two RoM mills, a thickener and transfer pumping facilities to pump pulp to Kinross Plant are still operational. The Kinross Plant was commissioned in 1967 and comprised three RoM mills followed by conventional leach, filtration and zinc precipitation. In the early 1980s, two further mills were added and the treatment section was modified to incorporate CIP adsorption, elution and electrowinning.

The Winkelhaak Plant and Kinross Plant largely treat underground reef with minor waste inclusion. The Winkelhaak Plant has a reef milling capacity of 68ktpm whilst the reef milling capacity of the Kinross Plant is 160ktpm. The Kinross Plant treatment capacity of 200ktpm limits overall throughput. Projected reef recoveries of 96% to 97% are in line with recent achievements.

Both Winkelhaak Plant and Kinross Plant require some attention in the shaft conveyor and mill feed silo areas if continued operation is intended. The Kinross Plant is otherwise showing its age and will require ongoing attention, providing that increased maintenance is undertaken and sustained, SRK consider the plant is in adequate condition to meet the requirements of the LoM projections.







Winkelhaak Plant and Kinross Plant are planned to be used until 2013 and 2018, respectively and are planned to operate close to capacity. Some ZAR6m has been budgeted in the next financial year to cover the needed repairs, however the plant will still need to be better maintained if planned operations are to be met when running at full capacity.

6.2.5

*Kalgold Operations*

Kalgold Plant processes open-pit ore. The plant was commissioned in 1998 and comprises three-stage crushing, ball milling, thickening, leaching, CIL adsorption, elution, electrowinning and smelting.

Kalgold Plant was designed to treat 85ktpm, however a third ball mill and additional leach tanks are currently being commissioned, which should increase capacity to 135ktpm. Variable recovery is experienced in treating the open-pit ore and the trend in recent years has been for recoveries to drop to approximately 81%. The recent expansions will result in similar mill product size distribution but will increase the leach residence time. Recoveries are expected to improve slightly to 82% based on performance over the past three years.

Kalgold Plant is generally in good condition, both mechanically and structurally and subject to adequate ongoing planned maintenance should meet the LoM requirements.

6.2.6

*Harmony Australian Operations*

Checker Plant processes underground ore, open pit ore, low-grade ore from surface stockpiles and tailings from previous operations at Hill 50. Ore from the various sources is separately stockpiled on the RoM pad and reclaimed by a front-end loader to a blend specification, usually on the basis of hardness. The process route comprises two-stage jaw crushing, ore blending, primary SAG milling with recycle pebble crushing, closed circuit secondary ball milling, closed circuit tertiary ball milling, cyanide leach enhanced by oxide injection, CIP adsorption, split AARL elution, electrowinning, smelting and tailings disposal. The milling circuit includes centrifugal gravity concentration, the concentrates of which are forwarded to intensive cyanidation in an InLine Leach Reactor ahead of solution electrowinning.

Checker Plant was commissioned in 1989 and designed to treat 125ktpm, however the capacity was increased to 225ktpm in 1999. Projected reef recoveries of 93% are in good agreement with current performance.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing planned maintenance should meet the LoM requirements.

Big Bell Plant is planned to discontinue operation during the third quarter of 2003. Big Bell Plant presently processes underground and open-pit ore. Ore is stockpiled on the RoM pad and reclaimed by a front-end loader to achieve the desired blend on the basis of grade and ore type. The process route comprises gyratory crushing, primary SAG milling with recycle pebble crushing, secondary ball milling closed by hydroclones, cyanide leach enhanced by oxide injection, CIP adsorption, pressure Zadra elution, electrowinning, smelting and tailings disposal.

Plant capacity is 250ktpm on softer oxidised ore and 170ktpm on harder primary ore. Gold recovery is typically 85%. New Celebration Plant processes underground ore, open-pit ore and low-grade ore from surface stockpiles. Ore from the various sources is separately stockpiled on the RoM pad and reclaimed by a front-end loader to achieve a required blend. The process route comprises primary jaw crushing, secondary and tertiary cone crushing closed by screens, ball milling closed by hydrocyclones, thickening, cyanide leaching, CIP adsorption, split AARL elution, electrowinning, smelting and tailings disposal.

New Celebration Plant was commissioned in 1986 and has a design treatment capacity of 125ktpm on blended ore. Projected reef recoveries of 92% are in good agreement with current performance.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing maintenance should meet the LoM requirements.





Jubilee Plant processes underground ore, open-pit ore and low-grade ore from surface stockpiles. Ore from the various sources is separately stockpiled on the RoM pad and reclaimed by a front-end loader to achieve a required blend. The process route comprises primary jaw crushing, secondary and tertiary cone crushing closed by screens, primary SAG milling, closed circuit secondary ball milling, cyanide leaching, CIP adsorption, split AARL elution, electrowinning, smelting and tailings disposal.

Jubilee Plant was commissioned in 1987 and has a design treatment capacity of 110ktpm on blended ore. Projected reef recoveries are slightly below the 92% achieved at the New Celebration Plant.

Generally the plant is considered to be in good condition both mechanically and structurally and subject to adequate ongoing planned maintenance should meet the LoM requirements.

### 6.3

#### **Sampling, Analysis, Gold Accounting and Security**

Generally adequate attention is given to sampling and sample preparation. Whilst there are accounting anomalies that require further investigation, good accounting procedures are largely in place. All plant feed sources is individually sampled. Underground ore is generally sampled at the shaft head or on the main plant feed conveyor with the aid of Go-Belt samplers. Waste rock is generally sampled from a plant feed conveyor with Go-Belt samplers. Where manual samples are taken, particularly in the case of third party samples, detailed procedures have been laid down and are followed. Daily composites of Go-Belt and other bulk samples are prepared in dedicated sample preparation plants. Plant head and residue samples are almost exclusively taken automatically with cross-stream pulp cutters or in-stream poppet samplers, composites are accumulated and prepared in the standard way. In most cases, actual gold recovered is apportioned to the various sources in proportion to the estimated content in each source after allowance has been made for any differential metallurgical recovery. The latter is determined from bottle roll tests on monthly composite samples.

Because of the fact that many of the plants treat numerous ore types from different sources, metal accounting is often the subject of some debate, specifically when final gold allocations are made back to each source. SRK consider that there may be inherent inaccuracies in gold allocation which may ultimately impact on the planning factors such as MCF. At a collective tax entity level, however the allocated gains and losses cancel each other out and over extended time periods the individual BUs feeding the plants will be allocated with the appropriately estimated recovered gold. A full security audit was beyond the scope of this review. SRK notes that whilst security measures are in place at the Mining Assets, these vary in both management focus and the applied technology. In general, however, mine management is continuing to refine security measures.

### 6.4

#### **Plant Clean-Up**

There are two aspects to gold lock up that need to be considered. First any change in the in-plant gold inventory and secondly the recovery of lock up gold when the plants are finally closed and cleaned up. The quantity of clean-up gold that can be anticipated on closure of a plant is uncertain. Reported figures for South African plants have shown an order of magnitude difference, varying between 0.04% and 0.40% of the total gold produced through the plant during its life. The following factors affect the quantity of gold that is eventually recovered: plant age; process treatment route installed; plant layout and detailed design features; plant housekeeping during operations; and the procedure and efficiency of the plant clean-up.

The recorded figures confirm that plants incorporating large crushing and milling circuits will release more gold on closure than compact RoM milling plants. Prediction of the quantity of gold that is likely to be recovered is difficult and will always be subjective. As a guideline, SRK has assumed 0.15% for older crushing and milling plants, 0.10% for more recent, relatively clean plants and 0.04% for RoM milling plants. Where low-level waste has been processed in the latter years of a plants life, significant gold purging is likely to have occurred and lower gold accumulations can be expected.

It is considered that parameters derived from South African experience would considerably overstate the clean-up gold potential of Western Australian processing plants, largely due to their more recent design, shorter operating

history and more compact plant layout. SRK has accordingly made no allowance for the recovery of lock up gold in these instances. Estimated clean-up gold for the Mining Assets operations is shown in Table 6.1.

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**Table 6.1 Mining Assets: clean-up gold estimates**

**Operation**

**Clean-up gold**

**(koz)**

Free Gold Operations

103

Harmony Free State Operations

22

ARMgold Welkom Operations

0

West Wits Operations

76

Evander Operations

19

ARMgold Orkney Operations

0

Kalgold Operations

1

Mt. Magnet & Cue Operations

0

South Kalgoorlie Operations

0

**Total**

**217**

**Harmony**

**167**

**ARMgold**

**50**

7.

## **TAILINGS**

7.1

### **Introduction**

This section includes discussion and comment on the tailings engineering aspects associated with the Mining Assets. Specifically, detail and comment is focused on the design, construction, geotechnical integrity, remaining capacity and management practices governing the tailings facilities. Key source data for the review comprised the engineering design constraints, where available, as prepared by the appointed tailings dam review consultants at each of the operations (including in certain cases SRK). Site-specific issues are summarised below.

7.2

### **Free Gold Operations**

Free Gold Operations currently include four tailings dam complexes, namely FS North, FS South, St Helena and Joel Slimes Dams, which facilitate deposition of residue from FS1 Plant, FS2 Plant, St Helena Plant and Joel Plant. FS North includes seven tailings dams, two of which are operational (FS North 1 and FS North 2), with the other five (FS North 3B, FS North 4, FS North 5 and FS North 6) being dormant. FS North facilitates tailings deposition from FS2 Plant, which includes material treated on behalf of Free Gold Operations and ARMgold Welkom Operations. FS South includes nine tailings dams, five of which are operational (FS South 1, FS South 2, FS South 4, FS South 8W and FS South 8E), with the other four (FS South 3, FS South 5, FS South 6, FS South 7 and President Brand C) being dormant. FS South facilitates tailings deposition from FS1 Plant and also toll deposition from President Steyn.

The St Helena tailings dam comprises a single facility known as Dam 4, although very little deposition is taking place on the dam at present, St Helena plant is planned to treat surface sources for the next three-years.

Joel Slimes Dam is also a single facility, which is currently operational, comprising an unlined facility where deposition occurs in accordance with appropriate rates of rise and design specifications.

The current LoM plans for collective Free Gold Operations require a total placement of approximately 93.3Mt. The total remaining capacity at 30 June 2003, is projected at some 130.7Mt, which is adequate to meet the overall requirements of the LoM plan. At the individual facilities this may require certain re-routing of tailings from the current configuration incurring additional costs for pipes, valves and pumping.

The tailings dam complexes are currently operated, managed and controlled in a responsible and diligent manner, although maintenance is needed to the solution trenches and paddocks of a number of dams. Noticeable seepage was observed along the common contact and southern sides of South 8E and South 8W dams, as well as along the perimeter toe-line of the St. Helena tailings dam, both should be investigated. No impairment to the integrity of the dams is anticipated, provided that practices, levels of management and control are maintained at a high-level of diligence with all necessary remedial measures undertaken in a timely manner.

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7.3

**Harmony Free State Operations**

The Harmony Free State Operations comprise the Harmony, Saaiplaas and Merriespruit tailings facilities. The Harmony facility comprises three dams, the H1, H2 and H4 tailings dams, of which only H4 is currently active. The Saaiplaas tailings facilities principally comprise two complexes, which include a total of six dams situated to the east of Welkom of which only three are currently active. The Merriespruit tailings facilities principally comprise five active tailings dams, No. 30 (V10), No. 30A (V10), No. 4b, No. 5b, No. 5a, situated to the south-east and south-west of Virginia of which only five are currently active.

The current LoM plan for Harmony Free State Operations requires a total placement of some 66.8Mt. The remaining capacity at 30 June 2003, is projected at some 69.6Mt, which is adequate to meet the overall requirements of the LoM plan. At the individual facilities this will require some re-routing of tailings from the current configuration, specifically from the Saaiplaas Plant and is likely to lead to additional costs for pipes, valves and pumping.

The tailings dam complexes are currently operated, managed and controlled in a responsible and diligent manner, although maintenance is needed to the solution trenches and paddocks of a number of dams. No impairment to the integrity of the dams is anticipated, provided that practices and levels of management and control are maintained at a high-level of diligence with all necessary remedial measures undertaken in a timely manner.

7.4

**West Wits Operations**

The West Wits Operations comprise the Elandsrand, Deelkraal, Cooke and Doornkop tailings facilities. The Elandsrand facility comprises two dams located on a hillside with one down slope from the other; both are currently active. The Deelkraal tailings facility also comprises two dams located on a hillside with one down slope from the other; and both are currently active. The Cooke and Doornkop facilities each comprise a single dam both of which are active.

The current LoM plan for Elandsrand and Deelkraal requires a total placement of some 28.4Mt. The remaining capacity at 30 June 2003, is projected at some 40.3Mt, which is adequate to meet the overall requirements of the LoM plan.

The current LoM plan for Cooke and Doornkop operations requires a total placement of some 47.8Mt. The remaining capacity at 30 June 2003, is projected at some 68.7Mt, which is adequate to meet the overall requirements of the LoM plan. The rate of rise for the Doornkop dam is forecast in excess of 2m/yr however considering that the LoM for the Doornkop facilities is less than two-years SRK consider that this can be managed.

The tailings dam complexes are currently operated, managed and controlled in a responsible and diligent manner, although maintenance is needed to the solution trenches and paddocks at some of dams. No impairment to the integrity of the dams is anticipated, provided current practices and levels of management and control are maintained with all necessary remedial measures undertaken in a timely manner.

7.5

**Evander Operations**

The Evander Operations comprise the Winkelhaak and Kinross tailings facilities. The Winkelhaak facility comprises four dams, No.1, No.2, No.3 and No.4, located in a cluster of which two dams, No.3 and No.4, are currently active. The Kinross tailings facility comprises three dams located on a gently sloping hillside and all are currently active. The current LoM plan for Evander Operations requires a total placement of some 20.7Mt. The remaining capacity at 30 June 2003, is projected at some 36.0Mt, which is adequate to meet the overall requirements of the LoM plan. A high rate of rise in excess of 2m/yr is forecast at the Winkelhaak No.4 dam although SRK consider that, in conjunction with sufficient monitoring, this can be managed.

The tailings dam complexes are currently operated, managed and controlled in a responsible and diligent manner, although maintenance is needed to the solution trenches and paddocks at some of dams. No impairment to the integrity of the dams is anticipated, provided current practices and levels of management and control are maintained

with all necessary remedial measures undertaken in a timely manner.

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7.6

**Kalgold Operation**

The Kalgold Operation comprises a single tailings dam that was commissioned in 1998 subsequent to the replacement of the heap leach operation with a CIL plant. The current LoM plan for Kalgold Operations requires a total placement of some 6.2Mt. The remaining capacity at 30 June 2003, is projected at some 7.0Mt, which is adequate to meet the overall requirements of the LoM plan.

The tailings dam complex is currently operated, managed and controlled in a responsible and diligent manner and no impairment to the integrity of the dam is anticipated, provided current practices and levels of management and control are maintained with all necessary measures undertaken in a timely manner.

7.7

**Harmony Australian Operations**

Checker Plant unthickened tailings is pumped to one of two operating tailing storage facilities. Both use the paddock system where tailings is deposited by spigotting around the perimeter to form a beach with supernatant water reclaimed by a central decant tower. An underdrain in the new dam is also used for water collection. Walls are raised by upstream lifts using waste rock as the construction material. Analyses of water from bores around the periphery of the dam are reported to be within applicable limits for pH, total dissolved solids, weak acid dissociable cyanide and prescribed heavy metals. The first tailing storage facility at the modern Mount Magnet operations has finished its service life with trials underway on capping the surface to test methods for rehabilitation.

The current LoM plan for the Checker Plant requires a total placement of some 14.2Mt. Cell No.3 of the current tailings storage facility, at 30 June 2003, is projected to have a service life until 2009 when raised to its design height. This is marginal to meet the overall requirements of the LoM plan.

Big Bell Plant is planned to discontinue operations shortly though the tailings design is based on the underflow from the tailings screen being pumped to the tailings storage facility which is divided into two cells, for deposition of solids and reclamation of water for re-use in the plant.

New Celebration Plant and Jubilee Plant unthickened tailings are pumped to separate operating tailings storage facilities. Both use the paddock system where tailings are deposited by spigotting around the perimeter to form a beach with supernatant water reclaimed by a central decant tower. Mine waste was used for the initial starter walls with upstream construction using dried tailings.

The current LoM plan for New Celebration requires a total placement of some 0.2Mt. The remaining capacity of the tailings dams, at 30 June 2003, is adequate to meet the overall requirements of the LoM plan.

The current LoM plan for Jubilee requires a total placement of some 3.7Mt. The remaining capacity of the tailings dams at 30 June 2003, is projected at some 5.7Mt when using the Golden Hope North pit, which is adequate to meet the overall requirements of the LoM plan.

The tailings storage facilities are currently operated, managed and controlled according to standard gold mining industry practice in Western Australia. No impairment to the integrity of the dams is anticipated, provided acceptable levels of management and control are maintained with all necessary remedial measures undertaken in a timely manner.

7.8

**Mining Assets - LoM Tailings Deposition Assessment**

Table 7.1 summarises the LoM deposition projections and comparable available capacities for each of the Operations. Cognisance should be taken that the total deposition includes material that is treated on toll basis; this material is not included in the Companies total LoM projections. Collectively, the Companies toll treats some 10.2Mt from external sources.





**Table 7.1 Mining Assets: LoM Tailings Storage Facility Assessments**

**Operations**

**LoM Deposition**

**Available Capacity**

**Surplus/Shortfall**

**Free Gold Operations**

FS1 Plant and Active Dams

64.15

86.27

34%

FS2 Plant and Active Dams

14.40

25.59

78%

St Helena Plant and Active Dams

2.47

5.10

106%

**Subtotal Free Gold Operations**

**81.02**

**116.96**

**44%**

**Joel Operations**

Joel Plant and Active Dams

12.29

13.72

12%

**Subtotal Joel Operations**

12.29

13.72

12%

**Harmony Free State Operations**

Central Plant and Active Dams

23.99

23.26

-3%

Virginia Plant and Active Dams

11.99

26.27

119%

Saaiplaas Plant and Active Dams

30.78

20.05

-35%

**Subtotal Harmony Free State Operations**

**66.76**

**69.58**

**4%**

**West Wits Operations**

Cooke Plant and Active Dams

44.27

15.88

-64%

Doornkop Plant and Active Dams

3.49

52.87

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1414%

Elandsrand Plant and Active Dams

24.14

22.25

-8%

Deelkraal Plant Active Dams

4.28

18.04

321%

**Subtotal West Wits Operations**

**76.19**

**109.04**

**43%**

**Evander Operations**

Kinross Plant and Active Dams

20.74

26.77

29%

**Subtotal Evander Operations**

**20.74**

**26.77**

**29%**

**Kalgold Operation**

Kalgold Plant and Active Dams

6.77

7.02

14%

**Subtotal Kalgold Operations**

6.77

7.02

14%

**International Operations**

Checker Plant and Active Dams

14.85

14.17

-

Big Bell Plant and Active Dams

na

na

na

Jubilee Plant and Active Dams

3.71

5.70

54%

New Celebration Plant and Active Dams

0.13

0.13

-

Where additional capital expenditure is required to sustain tailings operations in relation to the LoM projections as presented, such capital expenditure has been allowed for in the individual tax entity valuations.

8.

**ENGINEERING INFRASTRUCTURE AND CAPITAL PROJECTS**

8.1

**Introduction**

This section includes discussion and comment on the infrastructure and related aspects of the LoM plans associated with the Mining Assets. Specifically, detail and comment is focused on the existing on-mine infrastructure and capital expenditure programmes necessary for execution of the LoM plans, as presented.

8.2

**Engineering Infrastructure of the Mining Assets**



Engineering infrastructure at the Mining Assets includes a wide range of operating technology, which varies in age and extent of mechanisation.

Underground mining operations comprise access infrastructure to convey personnel, materials and equipment to and from the working areas and associated services to support mining operations. Horizontal infrastructure include cross-cut haulages, footwall haulage levels and declines / inclines. Infrastructure required for ore flow and services including ore and waste passes, conveyor belts, high speed rail conveyances, crushing stations, ore bins, loading stations, water dams, pump stations, backfill stations, backfill transportation and placement

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systems, secondary ventilation and refrigeration plant, workshops, and power and water reticulation systems. Surface infrastructure includes headgears and winding systems, primary ventilation and refrigeration plants, process facilities, office blocks and training centres, workshops and stores, lamp rooms, change houses and accommodation. At the Mining Assets there are also a number of services and supply centres. These include compressed air supply stations and minor workshops for minor repairs to plant and equipment.

Notwithstanding the age of the general infrastructure, SRK consider that all surface and underground infrastructure is reasonably maintained and equipped. In conjunction with planned maintenance programmes and where necessary, remedial action, the current infrastructure is considered adequate to satisfy the requirements of the LoM plans.

Further, the power generation and distribution systems, water sourcing and reticulation systems are appropriate for operations as envisaged in the individual LoM plans. Where this has not been the case SRK has allocated appropriate capital costs, which have been included in the TEPs as presented in Section 12.

### 8.3

#### **LoM Capital Expenditures Programmes**

The capital expenditure programmes are the Companies' current projections for the Mining Assets. SRK has reviewed these estimates and consider them appropriate as inputs to the valuation, as incorporated at Tax Entity level. The accuracy of these estimates are of the order of 15% for the major capital projects, as expected of feasibility level studies, and for the provisions for ongoing capital SRK consider these to be in the order of 25%.

Table 8.1 summarises the latest capital requirements for the Mining Assets, excluding off-mine exploration costs.

Where appropriate the estimates have been modified by SRK to include any additional capital requirements as identified in Sections 5 through to Section 7. SRK note that all capital estimates are exclusive of financing charges and unless otherwise stated are considered by SRK to be adequate to meet the requirements of the current LoM plan. Capital projects at the Mining Assets are principally aimed at sustaining the integrity of primary infrastructure required for the underground operations. As described in Section 5 through to Section 7 these include the following:

- **At Free Gold Operations:**

- the sub-66L project at Tshepong BU will enable access to the deeper levels. It includes the development of a twin decline system to 71L, planned to commence during 2003 and commissioned at design throughput by 2007,
- the completion of 178m(vertical) of shaft sinking to the 81L at Phakisa BU and the necessary equipping of the shaft as a men, material and rock hoisting facility at some 150ktpa following the installation of a Koepe hoist on the 55L for the transfer of ore and waste to Nyala BU for hoisting to surface. The project is scheduled to commence in the second quarter 2004,
- infrastructural improvements at Bambanani BU and West BU,
- the installation of hoisting facilities at Joel North BU to support mining operations below 121L. This is planned to be fully commissioned by 2005,
- shaft pillar mining at Nyala BU following associated modification to the shaft hoisting installation;

- **At Harmony Free State Operations**

- The Masimong expansion project at BU No.5 to access high-grade areas of Basal Reef to east and west of the current workings. The capital is required to extend flat-end haulage development utilising the existing shaft capacity;

- **At ARMgold Welkom Operations no future capital expenditures are currently forecast;**

- **At West Wits Operations:**

- the South Reef Project at Doornkop BU includes the deepening of the main shaft to 212L and re- equipping of the sub-vertical shaft and is expected to attain maximum production by 2009,
- the Sub-shaft Project at Elandsrand BU accessing ore from 102L to 113L which is projected to be complete by 2007;





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- **At Evander Operations** no specific capital projects are planned, however the majority of share-based payments are expected to be used for continued ongoing capital provisioned amounting to ZAR608m, which includes provision for the plan of ZAR6.4m. The Roslpruit Project, currently excluded from the Base Case valuation, considers the gradual development of an extension to the Kimberley Reef, adjacent to No.8 BU, through installation of a new ventilation system from surface or from underground. The feasibility study as completed by Harmony projects capital expenditure requirements of ZAR5.2billion;
- **At ARMgold Orkney Operations** capital projections are generally of a routine nature and primarily for capital development and/or provisions for unforeseen expenditures;
- **At the Kalgold Operations** capital projections are generally of a routine nature and primarily for capital development and/or provisions for unforeseen expenditures;
- **At the Harmony Australian Operations** capital projections are project related and focused on exploration and underground development at the underground operations and also includes certain mine closure related costs; and
- **At the Harmony Canadian Operations** no capital expenditure is currently forecast with Bissett operations on care and maintenance.

The total estimated capital expenditure for the Mining Assets over the LoM period are summarised in Table 8.1.

**Table 8.1 Mining Assets: estimated capital expenditures**

### Operations

### Capital Expenditure

(ZARm)

Free Gold Operations

1,946

Harmony Free State Operations

401

ARMgold Welkom Operations

-

West Wits Operations

1,902

Evander Operations

608

ARMgold Orkney Operations

44

Kalgold Operations

1

M.t Magnet and Cue Operations

227

South Kalgoorlie Operations

36

Total

5,165

**Harmony**

**4,148**

**ARMgold**

**1,017**

9.

**HUMAN RESOURCES**

9.1

**Introduction**

This section includes discussion and comment on the human resources-related aspects associated with the Mining Assets. Specifically, information as provided by the Companies is included on the current organisational structures and operational management, recruitment, training, productivity initiatives and remuneration policies, industrial relations and productivity projections.

9.2

**Legislation**

Various regulatory authorities, in addition to mining and labour codes, govern labour legislation in South Africa. In general these are well established and in conjunction with the Companies operating policies, form the cornerstone of human resource management.

During 1999, many changes and initiatives took effect, primarily in response to the recently promulgated provisions of South African labour legislation. The Labour Relations Act regulates the relationship between employees and trade unions, establishes dispute resolution mechanisms, promotes collective bargaining and protects employees from unfair dismissal. Separation may be carried out on the basis of genuine economic, technological, structural or similar needs of an employer. Consultation, with full disclosure of relevant

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information, is required with trade unions prior to employers effecting separation programmes. The other major statutes in force in South Africa are:

- the Basic Conditions of Employment Act which prescribes minimum conditions of employment, e wages;
- the Occupational Diseases in the Mines and Work Act;
- the Compensation of Occupational Injury and Diseases Act which provides a mechanism for com employees who have been incapacitated as a result of injury or disease arising from the performan work;
- the Occupational Health and Safety Act and Mine Health and Safety Act which impose a duty o to provide a safe and healthy working environment;
- the Employment Equity Act, which prohibits unfair discrimination and places an obligation o to implement affirmative action measures. In this instance Employment Equity forums have been established with all unions in an effort not only to give effect to the Employment Equity Act, bu address, through appropriate policies and procedures, the total development of human resources; a
- the Skills Development Act, which seeks to enable the development of the skills of the loca

Through a process of negotiation with regulatory authorities and representative bodies, including organised labour, mine management has initiated various programmes to ensure compliance with the various regulatory statutes. The Companies have informed SRK that, with respect to the revised legislation, the Mining Assets are materially compliant and that pro-active involvement to seek appropriate exemptions through a negotiated process will be pursued.

9.3

**Organisational Structures and Operational Management**

SRK has been informed that the organisational structure currently in place, together with operational management, will remain until such time as planned shaft closures occur, following which, downsizing will be assessed. The Mining Assets are adequately resourced with the appropriate levels of technically qualified and experienced personnel in production and related support functions. Table 9.1 gives the historical and the 2004 projected LoM manpower (Total Employees Costed "TEC") for the Mining Assets.

Table 9.1 Mining Assets: historical and 2004 forecast

**Mining Operations**

2001

2002

2003

2004

(No.)

(No.)

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(No.)

(No.)

Free Gold Operations

20,368

14,722

15,478

17,211

Harmony Free State Operations

15,668

12,776

12,219

12,896

ARMgold Welkom Operations

1,492

1,786

2,092

2,007

West Wits Operations

17,640

16,907

15,162

12,250

Evander Operations

8,805

8,639

8,261

6,631

ARMgold Orkney Operations

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6,579

6,174

5,845

3,833

Kalgold Operations

453

444

511

481

Harmony Australia Operations

882

882

831

831

**Total**

**71,887**

**62,330**

**60,398**

**56,139**

**Harmony**

**53,632**

**47,009**

**44,723**

**41,694**

**ARM**

**18,255**

**15,321**

**15,675**

14,445

9.4

**Recruitment, Training, Productivity Initiatives and Remuneration Policies**

Recruitment, training, productivity initiatives and remuneration policies are, in general, typical of operating practices and strategies as implemented within the South African gold mining industry.

- **Training:** Training initiatives have focused on the development of both technical and management senior and middle management. At the operational level, training initiatives include mine management commitment to the Adult Basic Education and Training ("ABET") initiatives;

- **Productivity Initiatives:** Mine management continually reviews and implements various productivity initiatives which reflect the operational conditions and remuneration policies within the individual markets; and

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- Remuneration Policies: Levels generally comply with industry-wide salary scales. In addition to base salary components, employees receive additional entitlements, which are related to accommodation and medical and employee benefit plans in the form of pension/provident schemes.

9.5

**Industrial Relations**

The Companies 2004 business plans require some 56,139 mine workers with approximately 80% being members of registered trade unions. Industrial relations at the Mining Assets are managed in accordance with key driving factors. These include the prevailing legislative requirements, regulatory bodies, labour representation, collective bargaining arrangements and regional/operational specific employee-employer agreements.

Historically, trade unions in South Africa have had, due to links with political parties, a significant influence over social and political reform as well as the collective bargaining process. Presently the situation is manageable, however, it is uncertain whether labour disruptions will be used to advocate such political causes in the future. Mine management has embarked on a process involving all labour representatives (unions and management) to ensure appropriate and timely interaction to resolve industrial relations issues, including communication and joint decision-making, bonus strategies and procedures. Depending on fluctuations in the US\$ gold price and exchange rates, future workforce reductions may be required. In this instance, SRK consider that appropriate procedures are in place and other than periodic action during wage negotiations, consider industrial relations risks to be manageable.

9.6

**Productivity Assumptions**

Productivity initiatives are primarily focused on restructuring of staffing structures and working practices as part of the Companies' overall strategy. This strategy is based on the recent success of both the "Harmony Way" and ARMgold's "We do it better" operating principles. The importance of maintaining economic production levels, where labour cost contributes significantly in a highly regulated labour market (South Africa Region) is the principal focus and is recognised in all strategies. Labour cost constitutes between 40% and 60% of the total working costs. Table 9.2 gives historical and projected productivity indices for the Mining Assets.

**Table 9.2 Productivity: historical and assumed productivity initiatives**

**Statistic**

2001

2002

2003

2004

**Centares**

Free Gold Operations

(m

2

/TEC/month)

4.3

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4.5

5.2

5.7

Harmony Free State Operations

(m

2

/TEC/month)

3.8

4.8

5.5

5.9

ARMgold Welkom Operations

(m

2

/TEC/month)

4.1

3.6

4.2

7.2

West Wits Operations

(m

2

/TEC/month)

4.1

4.7

4.4

6.0

Evander Operations

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(m

2

/TEC/month)

4.1

3.9

3.5

5.3

ARMgold Orkney Operations

(m

2

/TEC/month)

4.4

4.5

4.4

5.6

**Tonnes Milled**

Free Gold Operations

(t/TEC/month)

35

49

50

46

Harmony Free State Operations

(t/TEC/month)

28

30

36

48

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ARMgold Welkom Operations

(t/TEC/month)

19

21

23

36

West Wits Operations

(t/TEC/month)

33

40

43

51

Evander Operations

(t/TEC/month)

23

23

22

31

ARMgold Orkney Operations

(t/TEC/month)

26

25

25

31

Kalgold Operations

(t/TEC/month)

176

180

178

275

Harmony Australia Operations

(t/TEC/month)

103

452

712

635

171





**Table 9.2 Productivity: historical and assumed productivity initiatives (continued)**

**Gold Production**

**2001**

**2002**

**2003**

**2004**

Free Gold Operations

(g/TEC/month)

153

197

193

192

Harmony Free State Operations

(g/TEC/month)

114

124

129

139

ARMgold Welkom Operations

(g/TEC/month)

97

102

78

124

West Wits Operations

(g/TEC/month)

124

159



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150

195

Evander Operations

(g/TEC/month)

135

125

111

155

ARMgold Orkney Operations

(g/TEC/month)

184

194

180

181

Kalgold Operations

(g/TEC/month)

282

363

385

499

Harmony Australia Operations

(g/TEC/month)

164

743

1,571

1,108

Future production is in part reliant upon the achievement of productivity initiatives currently underway at Free Gold Operations. Termed Continuous Operations ("Conops"), this initiative seeks to increase the amount of labour time at the working face by increasing the number of shifts from the current eleven day fortnight to the maximum allowed,

taking due cognisance of all legal requirements and statutory conditions. Conops broadly projects an increase of between 20% and 30% in production (by measure of tonnes milled) for an increase of between 10% and 15% in labour costs. Note that labour costs are approximately 50% of the total operating expenditures.

Conops is in place at ARMgold's operations and it's managements' intention to implement Conops at all the Companies' South African operations, commencing with Free Gold Operations.

9.7

**Separation Liability**

The total separation liability for the Mining Assets is estimated at approximately ZAR895m of which some ZAR682m is attributable to Harmony and ZAR213m is attributable to ARMgold. These have been estimated by application of an average unit separation cost multiplied by the projected TEC at the time of either downsizing or closure.

**Table 9.3 Mining Assets: separation costs**

**Tax Entities**

**Terminal Separation Benefits Liability**

**(ZARm)**

Free Gold

200

Joel

18

Harmony Free State

188

ARMgold Welkom

32

Randfontein

272

Evander

104

ARMgold Orkney

72

Kalgold

8

Mt. Magnet & Cue

0

South Kalgoorlie

0

**Total**

**895**

**Harmony**

**682**

**ARMgold**

**213**

**10. HEALTH AND SAFETY**

**10.1 Introduction**

This section includes discussion and comment on the safety and health-related aspects associated with the Mining Assets. Current and historical health and safety statistics are presented with discussion on the more significant measures in progress to deal with identified risks, including risk management and safety and health measures.

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## 10.2 Legislation

Various regulatory bodies and mining and labour legislation govern health and safety in South Africa. In general these are well established and, in conjunction with management's operating policies, form the cornerstone of health and safety management. Key legislation changes as noted in the various operating regions are summarized below.

In South Africa, following publication of the Leon Commission Report in 1994 all aspects of health and safety on mines is governed by the Mine Health and Safety Act, No. 29 of 1996 ("the Mine Health and Safety Act") which came into effect on 15 January 1997. The Mine Health and Safety Act was the result of intensive discussion and consultations between Government, employees and employee representatives over an extended period of time and, whilst leaving room for self-regulation, also provides for strict control by Government. In complying with the Mine Health and Safety Act, mine management has established risk management and medical surveillance systems in addition to the health and safety committees to which workplace representatives have been elected. In summary this provides for various health and safety measures and provides for employee participation in these matters with stated objectives, *inter alia*:

- to protect the health and safety of persons at mines;
- to require employers and employees to identify hazards and eliminate, control and minimise relating to health and safety at mines;
- to ensure compliance with both South African and international law and regulations on health at mines;
- to provide for employee participation in matters of health and safety through health and safety representatives and health and safety committees at mines;
- to provide for effective monitoring of health and safety conditions at mines;
- to provide for enforcement of health and safety measures at mines;
- to provide for investigations and inquiries to improve health and safety at mines;
- to promote a health and safety culture in the mining industry;
- training in health and safety in the mining industry; and
- co-operation and consultation on health and safety between the regulatory bodies, employers and their representatives.

With respect to the Harmony Australian Operations, they are operated in accordance with the relevant regulatory codes and practices governing Australian mining operations.

## 10.3 Statistics

Table 10.1 presents safety statistics for the Mining Assets and includes the total number of fatalities, fatality rate and the lost time injury frequency rate ("LTIFR") for 2001 to 2003 inclusive. Table 10.2 presents similar statistics for the Companies.

The overall safety performance of the Mining Assets during calendar 2003 (measured against performance during calendar 2002) is summarised as: a decrease in the number of fatalities by 16%; a decrease in the fatality rate by 30% and a decrease in the LTIFR by 10%.







**Table 10.1 Mining Assets: historical safety statistics**

**Statistics**

2001

2002

2003

**Fatalities**

Free Gold

11

10

1

Harmony Free State

9

8

2

ARMgold Welkom

4

2

1

Randfontein

12

20

20

Evander

5

6

4

ARMgold Orkney

10

7

2

Kalgold

-

-

-

Harmony Australian Operations

-

-

-

**Fatality Rate**

Free Gold

0.35

0.24

0.05

Harmony Free State

0.26

0.27

0.07

ARMgold Welkom

0.92

0.35

0.27

Randfontein

0.32

0.47

0.54

Evander

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0.27

0.33

0.23

ARMgold Orkney

0.56

0.48

0.27

Kalgold

-

-

-

Harmony Australian Operations

n/a

-

-

**LTIFR**

Free Gold

17

15

15

Harmony Free State

35

26

24

ARMgold Welkom

17

12

13

Randfontein

24

23

23

Evander

22

24

33

ARMgold Orkney

28

24

17

Kalgold

7

13

4

Harmony Australian Operations

n/a

15

2

**Table 10.2 companies: historical safety statistics**

**Statistics**

**2001**

**2002**

**2003**

**Fatalities**

Harmony

26

37

29

ARMgold

14

9

3

**Fatality Rate**

Harmony 0.28

0.35

0.27

ARMgold

0.63

0.29

0.12

**LTIFR**

Harmony

28

23

23

ARMgold

26

16

15

**10.4 Health and Safety Management**

Health and safety management of the Mining Assets is focused on the development of company wide health and safety policies, taking cognisance of the legislation and regulatory environment. The Health and Safety policies the Companies are broadly aligned and state that the Companies will endeavour to:

- maintain a consultative process with employees through Health and Safety Representatives and C
- in all aspects related to safety and occupational health;
- provide employees with information, instruction, training and supervision which is necessary t

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them to perform their work safely and without risk to health;

- actively practice a comprehensive Risk Management Safety Programme aimed at continuous improvement of safety and occupational health;

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- protect property, equipment, materials and natural assets from damage by fires, explosions, contamination or any other down grading incident;
- actively participate in the Environmental Management Programmes and compliance with the requirements of its' Nuclear Licence; and
- keep abreast of new developments and technology.

The Companies have informed SRK that all health and safety departments adhere to both the provisions of the Mine, Health and Safety Act and the Minerals Act with full-time, as well as part-time safety representatives employed at all the Mining Assets. In accordance with the provisions of the Mine, Health and Safety Act, a number of baseline risk assessments, continuous risk assessments and physical conditions ratings are conducted. Managerial instructions, emergency procedures and codes of practice are reasonably in place. Specific health and safety hazards identified include water, dust, fire, seismicity, and falls of ground, explosions, insufficient emergency power equipment and occupational hygiene issues.

The HIV/AIDS infection rate of approximately 28% at the Companies' South African operations is representative of South Africa's mining industry. In order to mitigate against the likely impact and consequence of the occurrence of HIV/AIDS, the Companies have embarked on the following activities:

- awareness programmes in all operating regions;
- company wide wellness programmes;
- medical assistance to repatriated employees; and
- separation packages for employees who wish to return home.

Further, actuarial assessments by Harmony indicate that the cost of addressing the disease at Harmony's operations may peak at approximately 2% of the total cost of production, which equate to approximately US\$4/oz. At current levels of infection and taking cognisance of remedial action taken, the net cost has been estimated by Harmony at approximately US\$1.20/oz. This cost has not been included into the Tax Entities for purposes of valuation, as presented in Section 13.

Measured against the Ontario benchmarks for fatality rates of 0.15/mmhrs LTIFR of 7.5/mmhrs both Companies currently operate at some 50% of this target. Whilst this does, in part, reflect the impact of deep level gold mining in South Africa, current fatality statistics are considered to be unacceptably high.

### 10.5 Future Considerations

The Mining Assets will continue to be exposed to commonplace mining hazards such as water, dust, fire, seismicity, falls of ground ("FoG"), explosions, occupational hygiene issues, and materials handling and transportation. Increased vigilance and focus is required in respect to:

- potential increases in the FoG as the proportion of production sourced from remnant mining increases on certain of the older Mining Assets;
- potential increases in seismicity as the mining extent increases and operations progress develop;
- the potential impacts of HIV/AIDS on the labour force, should the present rate of industry-wide infections not be curtailed.

## 11. ENVIRONMENTAL

### 11.1 Introduction

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The following section includes discussion and comment on the environmental and water management of the Mining Assets. Specifically, detail and comment is included on the status of the environmental legislation and permitting, environmental management systems and environmental liabilities.

### **11.2 South African Legislation and Compliance**

#### **11.2.1 Legislation and Environment**

Environmental legislation in South Africa, as specifically applied to mining operations, defines the relevant authorisation requirements. This comprises environmental authorisation, mining authorisation, water use licences, water pollution regulations, waste disposal permission, air pollution

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registration certificates, control of hazardous substances, disturbance of archaeological resources, protection of forests and closure of mines by the issuing of closure certificates. A critical component of authorisation is the requirement for an Environmental Management Programme ("EMP") and evidence of financial provisioning for rehabilitation and final closure. The EMP is developed through an Environmental Impact Assessment ("EIA") process and is documented in an Environmental Management Programme Report ("EMPR"), together with supporting baseline information on the mine environment and a review of identified environmental impacts. The DME is responsible for approval of the EMP and ensuring that other regulatory authorities with an interest in the environment accept the EMP. In summary, the EMP contains the environmental conditions of authorisation for development and operation, which are generally defined in the form of objectives, principles and key design criteria, whilst EMPRs identify the individual impacts, mitigation measures and rehabilitation issues and must also be approved by other South African Government departments. The requirements imposed upon mining companies to ensure environmental restitution remain under review in the areas of hazardous waste management and mine closure, and it is possible that this will result in additional costs and liabilities. Further, water management remains a key focus, specifically in respect to the changed requirements as provisioned for by the National Water Act 36 of 1998 and the National Environmental Management Act 107 of 1998.

Mining practices in South Africa are such that whilst individual operations are materially compliant, strict compliance can seldom be demonstrated. Where minor/nominal non-compliance occurs, this is generally not considered material to the continuation of future operations.

Environmental liability provisioning in the South African mining industry is a condition of the EMP process, which must be agreed with the relevant regulatory authorities and has to be approved by the South African Revenue Services ("SARS"). Based on South Africa's environmental and regulatory requirements, monies are accrued based on the estimated environmental rehabilitation costs over the operating life of a mine. Further, annual contributions are made to an environmental trust fund (the "Trust Fund") created in accordance with South African statutory requirements, which provide for the estimated cost of pollution control and rehabilitation at the end of the life of a mine. SARS in this instance, approves such annual contributions to the Trust Fund and requires that the annual contributions be estimated on the basis of remaining liability divided by the expected remaining life of the operation.

#### **11.2.2 Compliance**

- Environmental Management Programme: All EMPs at the various operations, apart from the EMPs

at the West Wits Operations' Randfontein No.4 BU, the Kalgold Operation and the Evander Operations' Evander No.10 BU have been approved. The Randfontein No.4 BU and the Kalgold Operations' EMPs have been submitted for approval. Operations at Evander Operations No.10 BU were ceased prior to the approval of the EMP and discussions are currently being held with the DME with regard to the closure. In the interim, it has been agreed that all the outstanding environmental issues at the Evander Operations No.10 BU will be incorporated into existing EMPs and accounted for in the Evander Operations closure liability.

In several instances the Environmental Management Program Reports ("EMPRs") are in the process of being updated;

- Water Use Licences: The recent introduction of the National Water Act has resulted in the need

to convert water permits issued under the Water Act to water registrations and water use licenses. All operations, apart from West Wits Operations, have registered water uses and are awaiting instruction from the DWAF on direction regarding submission of applications for water use licenses. Harmony Free State Operations submitted its water use license application in 2002 and to date no license has been received. West Wits Operations is operating, in agreement with the DWAF, under their original water permits and are anticipating the issue of a temporary water use license in July 2003;

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- Financial Provision: In accordance with the requirements of the Minerals Act and in line with the Income Tax Act, trust funds have been set up into which contributions are being made for mine closure. Kalgold Operations is in the process of registering a trust into which contributions can be made and is the only operation that is currently not contributing to a registered trust. The Free

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Operations' St Helena Environmental Trust has recently been registered;

- Radiation: Certificates of Registration are required under the National Nuclear Regulator A

The registrations are issued by the National Nuclear Regulator ("NNR") and have been issued to all operations apart from the Free Gold Operations' St Helena, which to date not been received; and

- Waste Disposal Sites: Permitted waste disposal sites are operated at the West Wits Operation

Elandsrand BU and Deelkraal BU and Free Gold Operations' Joel and St Helena BUs. Unlicensed sites

are being used at a second site at Elandsrand BU and at Evander Operations No.8 BU. The Evander

Operations No.8 BU site will be relocated to the regional municipal site, which is in the initial planning stages. All other operations have integrated their waste management into municipal solid waste systems.

### **11.3 Australian Legislation and Compliance**

#### **11.3.1 Harmony Australian Operations**

Approvals for the mining and processing operations conducted on the Mt Magnet Hill 50, the Cue Big Bell and the South Kalgoorlie mining leases were obtained from the Department of Industry and Resources ("DIR") (formerly Department of Minerals and Energy) using the Notice of Intent process. The need for formal assessment of the mining activities by the Department of Environmental Protection ("DEP") was considered but found not to be required.

Works Approvals were sought and obtained from the Department of Environmental Protection for activities such as construction and operation of tailings storage facilities and hypersaline bore fields.

Commitments made within the Notice of Intent and Work Approval documents are binding for any future operations on these tenements unless a request for an amendment is submitted to the relevant government authorities and is accepted. Commitments typically relate to rehabilitation practices (topsoil removal and spreading) and closure criteria (waste dump slope angles, vegetation establishment success), environmental management practices (dust control, chemical storage and handling) and environmental monitoring.

Environmental approvals are actively sought for new projects (i.e. satellite open pits) as directed by Senior Mine personnel. Discussions with site Environmental Managers indicated that approvals are generally received with minimal delay due to the good working relationships established with regulators. Bonds are not typically lodged until work is ready to commence on newly approved areas. Systems have been developed at Hill 50 to actively track the status of all environmental approval submissions. This has helped ensure mining does not commence in areas until all necessary approvals have been obtained and bonds lodged.

#### **11.3.2 Harmony Canadian Operations**

The Harmony Canadian Operation's Bisset mine does not own the mineral rights and operates in accordance with a mining lease and an environmental licence. It is understood that whilst the licence has no term, it may be revoked,

temporarily or permanently, should Harmony Canadian Operations fail to comply with its terms. As the operation is currently on care and maintenance the environmental aspects were not reviewed in detail.

**11.4 Environmental Policy and Management**

**11.4.1 Harmony**

Harmony believes that all its employees as well as members of the public have the right to good quality air, water and soil as well as a safe working environment. Harmony is committed to acting responsibly as far as remediation of environmental impacts, resulting from mining activities is concerned. In order to implement policy Harmony commits to the following:

- to conduct environmental impact assessments when establishing new operations;
- to monitor and audit environmental progress;
- adopt the best affordable technology to limit impacts on the environment and minimise waste

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- to interact with all relevant authorities and all interested and affected parties; and
- conform with environmental and health and safety legislation.

Harmony environmental affairs are the responsibility of the Group Environmental Coordinator who is assisted by environmental coordinators or foremen at the various business units and an environmental engineer with regard to strategy development.

### **11.4.2 ARMgold**

ARMgold has an environmental policy statement in which the company commits to sustainable development with regards to human health, the natural environment and economic prosperity through its exploration, mining, processing and future closure activities. ARMgold specifically commits to the following:

- environmental management as a core corporate activity with appropriate policies, programmes practices and financial provision;
- company integration of policies, programmes and practices with the introduction of appropriate instruments for monitoring and control;
- continuous improvement of environmental performance taking cognisance of technical, scientific and economic developments;
- liaise with the public and Government to ensure effective and equitable measures to protect environment with due regard to social aspects; and
- ensure that employees, contractors and suppliers comply with ARMgold corporate environmental requirements and co-operatively identify opportunities and improvements.

### **11.5 Environmental Issues**

#### **11.5.1 Free Gold Operations**

The decontamination of the Joint Metallurgical Scheme ("JMS") presents a significant risk to the Free Gold Operations. This incorporates liabilities associated with disturbed ground associated with discontinued processing facilities. Investigations have been undertaken to determine the extent of contamination and decontamination options but no firm costing has been undertaken and as such currently represents an unquantified risk. In the context of the total liability of the Free Gold Operations this risk is not however considered to be material.

At Joel BU the location of the tailings dam, across a watercourse, represents a potential liability but the mine has clean water diversion facilities in place upstream of the tailings dam and operates a pumping system downstream of the tailings dam by means of which seepage water is recirculated to the process water system.

Water pollution is a significant risk in the Dankbaar/Brakpan Complex area where farmers are being exposed to severe groundwater pollution. Currently Free Gold Operations are trucking clean water to affected farms at a cost of ZAR80k per month. A project is underway to install a pipe network to supply the farmers with clean water with the pipeline route having been determined and agreed to by the affected farmers. The tender process is to begin mid-July

2003. Willow Valley Chicken, located to the east of Bambanani BU and west of Harmony Free State Operations' Saaiplaas BU, have complained about contamination of groundwater used by the farm. Further investigations are being undertaken to determine the extent and source of contamination, however the issue remains an environmental risk.

*11.5.2 Harmony Free State Operations*

Water management at Harmony Free State Operations, due to the presence of several mining operations in the region, is a complicated matter. The geographical extent of water contamination is widespread and has been an area of investigation for several years and there are several risks associated with surface water management. From a groundwater perspective the Unisel and De Kroon pollution plumes have been identified and present a liability to the operations. Preliminary investigations have

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indicated that engineering options such as collection and interception barriers may prevent further movement of the contaminated water to the Sand River. Water pollution control dams for the surface discharge to the Sand River have silted up and will need to be cleaned out to increase retention capacity.

**11.5.3 ARMgold Welkom Operations**

Groundwater pollution has been identified at the ARMgold Welkom tailings dam. A mitigating factor is that the Sale Agreement of the facility to ARMgold from AngloGold indemnifies ARMgold from pollution that occurred prior to the purchase. Currently ARMgold is actively maintaining an enlarged cut-off trench at the facility to reduce the potential to contribute to further contamination.

The current discharge from shafts at ARMgold Welkom Operation is 2.4Mlpd. The water is managed in Free Gold's water management system and a requirement for water treatment by ARMgold Welkom Operations is considered to be unlikely.

**11.5.4 West Wits Operations**

Mine decant water was recently discovered at West Wits Operations discharging to the Tweelopies East Spruit. Uncertainty currently exists as to the origin, and any associated liability. The mine decants 11Mlpd. West Wits Operations have commissioned an independent hydrogeological study to investigate this issue, however no conclusive findings are as yet available. Potential treatment methods include the Paques method, gypCIX or reverse osmosis, which have capital costs ranging from ZAR4.5m/MI to R8 million/MI. To date, the cost of managing the mine decant water has been in the order of ZAR10m. It is expected that a future decant will also occur some 2km east of the current decant but the quantities and any costs associated with this decant have not currently been estimated.

With regard to rehabilitation an area of concern are the sinkholes that have formed in the vicinity of Randfontein No.4 BU. Randfontein has a ZAR300m insurance policy underwritten by Lloyds of London in the event that a claim is made against the mine. To date no claim has been made. There are a number of sinkholes that have not been filled that remain a liability and risk to the mine. This is not however considered to be material in the context of the total liability associated with the West Wits Operations.

Radiation has been detected in the Deelkraal process dam. The NNR has required that the dam be rehabilitated. It has been proposed that the dam sediment be reprocessed, however, heavy rains during the past summer have not enabled the dam to be drained and the rehabilitation to take place. As such the contamination remains a liability. Uranium concentrate at West Wits Operations is being stored while approval for its transport to VRO where it will be processed is awaited from the NNR.

With effect from 10 June 2003, the Placer Dome Western Areas Joint Venture ("PDWAJV") took over pumping operations at Randfontein 4 BU, insofar as it now conducts the pumping operations itself for its own account. The PDWAJV is to continue pumping at approximately 75Mlpd indefinitely until such time as it no longer has a need to pump. At such time Harmony will be advised accordingly and will incur additional pumping costs of approximately ZAR54m per annum. Accordingly the operating expenditures for Randfontein assume the continuation of the agreement with PDWAJV.

**11.5.5 Evander Operations**

At the Evander operation groundwater pollution has been detected in the vicinity of tailings dams. Analysis of Sasol boreholes has, however suggested that the pollution plume is not extensive. An item of concern is the diversion of clean water from Leeuwpan, which is Evander Operations' evaporation facility, to achieve compliance with the NWA Regulation 407. A cut-off trench has been suggested to bring the management of the facility into compliance. Return water dams at Evander pose a risk as several do not comply with the requirement to accommodate a 1:50 year flood and are located within 1:50 year floodlines. The result of the current situation could be pollution events exposing the operation to a liability.

**11.5.6 ARMgold Orkney Operations**

SRK has been informed by the Companies that ARMgold is indemnified against historical pollution problems as formed part of the Sale Agreement with VRO and any liabilities are therefore limited to the physical constraint of the shaft surface area.





In the Black Reef area ARMgold may have some liability as a result of the limited exploration undertaken in the area and their acceptance of some responsibility by virtue of the submission and approval of the EMPR for prospecting, as well as reported rehabilitation measures undertaken. Anticipated activities in the area could relate to the need for additional rehabilitation (possibly including measures for the treatment of contaminated areas) and the need to flatten the slopes of excavations. Much of this contamination is probably the result of the proximity of VRO Western Tailings complex near to the area, rather than the operations of ARMgold.

With respect to the regional ground water problem, although contamination of ground water in the Klerksdorp, Stilfontein and Orkney area represents a significant liability, it is unlikely that this will impact significantly on ARMgold. This view is taken due to the historic nature of the problem and the number of mines in the area that have contributed to the problem over a far greater time period than ARMgold has been operating. Any incremental impact due to the operations of ARMgold over a relatively short period is unlikely to be material.

#### **11.5.7 Kalgold Operation**

Initial vegetation attempts have proved difficult at the Kalgold tailings dam. Solutions to the current problem are being investigated to ensure that EMP commitments are met. If no successful method is forthcoming there will be a risk of having to implement alternative rehabilitation methods such as cladding, which will be more expensive. Through monitoring programmes it is apparent that groundwater contamination is extending from the plant, heap leach pad tailings dam fine drains and return water dams toward the open-pit which currently contains the pollution to the site. Should the extent of the contamination increase significantly it could result in a limited cost liability to the operation.

The river diversion at Kalgold mine pit is not in compliance with DWAF requirements. It is estimated that ZAR4.5m would be required to bring the diversion into compliance. The compliant diversion will be implemented on determining the extent of proposed underground operations, which will influence the positioning of the diversion.

#### **11.5.8 Harmony Australian Operations**

Potential liabilities associated with Mt. Magnet & Cue and South Kalgoorlie operations are considered as follows:

- seepage from tailings storage facilities at the Mt. Magnet Hill 50 operation the Cue Big Bell

operation and South Kalgoorlie New Celebration operation. Vegetation deaths and contaminated groundwater plumes have been identified as resulting from such seepage;

- poor rehabilitation of historic waste dumps at South Kalgoorlie and to a lesser extent at t

operation. As detailed in the relevant Closure Plans, remedial works are required to bring the rehabilitation to a standard that would be considered acceptable by regulatory authorities;

- inadequate exploration rehabilitation at the New Celebration operation. Substantial amounts

drill hole capping, sump rehabilitation and track rehabilitation is required for historic exploration programmes. Regulatory officials have indicated that bonds will be levied on all affected tenements unless progress is demonstrated; and

- land Contamination at the Hill 50, Big Bell and South Kalgoorlie operations. Considerable a

all three sites may be classified as contaminated with the proposed introduction of the Contaminated Sites Bill 2002. Contaminants are likely to include hydrocarbons (TPH), arsenic, mercury, cyanide and acid (pH). Areas most likely to be classified as contaminated would include tailings areas, contractors lay down areas, processing plants and open-pits containing low pH (acidic) waters. Whilst some contaminated areas can be remediated, others are likely to remain classified as contaminated and future uses restricted. Costs associated with remediation have been included in Closure Plans, but as all three operations have little experience with actual remediation costs, these amounts are not considered to have a high degree of accuracy.





Given that Harmony has identified these issues and implemented detailed improvement programmes to address these, it is considered by SRK that adequate measures have been taken at this time to minimise the environmental risks.

**11.5.9 Harmony Canadian Operations**

SRK has not reviewed the environmental liabilities at Harmony's Canadian Operations and has been informed that the current operation is currently under care and maintenance. Annual operating costs for continuation of the care and maintenance is of the order of ZAR2.76m and is represented as part of the overall unallocated expenditures for Harmony.

**11.6 Liabilities and Risks**

The Mining Assets have addressed their own environmental and water management requirements. Cost items relating to standard environmental practice, which were included in the analysis, are not discussed here. Risks identified, which will require environmental management measures in addition to routine practices with potentially significant cost implications, are considered below for each of the Mining Assets.

Throughout this review process SRK has identified risks, which cannot be quantified definitively. In such cases, SRK has included indicative provisioning based on a qualitative view, or in areas where the risk is considered to be low, drawn attention to it without including a provision.

A key aspect in determining future liabilities is the possibility that water treatment may be required during operations or following decommissioning. Whilst this is not a requirement in instances to date, the potential for future requirements are dependent upon:

- the execution of both recently passed legislation and more stringent future legislation which may result in more costly water management requirements;
- discharge criteria demanding potable water standards as opposed to more lenient general standards;
- tacit acceptance by various organisations of the concept of desalination and its increasing use as technology improves.

Actual requirements for post-closure radiation protection in South Africa are difficult to determine owing to the state of flux pending finalisation of legislative requirements. SRK's interpretation is that, in practice, a compromise will be found between strict idealistic standards and pragmatism.

Australian Environmental Bonds were last reviewed by Harmony as part of the Annual Environmental Report submissions made during 2002. It is anticipated that the bond amounts will increase during 2004 due to across the board unit rate bond increases by DIR. Bond reductions should be experienced at Big Bell during 2004 due to the large amount of rehabilitation earthworks undertaken during 2003.

Based on the items identified above and discussions with Harmony and ARMgold, SRK has estimated that the total Environmental Liability for the Mining Assets is summarised in Table 11.1. The net difference will be funded from future contributions (included in the Total Working Cost projections in the case of the South African Mining assets and in the capital expenditure projections for the Australian Assets) to fund the total liability.

The above estimate of environmental liability excludes any potential resale or salvage values, which may be realised during the rehabilitation process.







**Table 11.1 Liabilities**

**Tax Entities**

**Total Liability**

**Trust Fund**

**Outstanding Liability**

**Closure Date**

(ZARm)

(ZARm)

(ZARm)

(Financial Year)

Free Gold

680

537

143

2023

Joel

18

18

0

2014

Harmony Free State

370

65

305

2018

ARMgold Welkom

33

23

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10

2011

Randfontein

362

206

156

2023

Evander

120

49

70

2018

ARMgold Orkney

25

15

10

2011

Kalgold

13

1

12

2007

Mt. Magnet & Cue

95

0

95

2010

South Kalgoorlie

69

0

69

2006

Bisset

11

0

11

Not operating

**Total**

**1,796**

**915**

**881**

Harmony

1,389

599

790

ARMgold

407

316

91

**12. TECHNICAL-ECONOMIC INPUT PARAMETERS**

**12.1 Introduction**

The following section includes discussion and comment on the technical-economic aspects of the LoM plans associated with the Tax Entities. Specifically, comment is included on the basis of projections, production schedules, operating costs and capital expenditures. These have been compiled into detailed TEPs on an annual basis and have been supplied to the Companies and their respective Financial Advisors to derive the revenue and cost inputs. Key aspects associated with the generation of the TEPs and their derivation are discussed.

**12.2 Basis of Valuation and Technical-Economic Parameters**

The valuation of the Tax Entities as presented in Section 13 has, *inter alia*, been based on the LoM plans, the resulting production profiles and associated revenue streams from gold sales, by-product credits, operating costs and capital

expenditure profiles as provided to SRK by the Companies, reviewed, adjusted where appropriate and provided to the respective Financial Advisors by SRK. The generation of a LoM plan requires substantial technical input and detailed analysis and is critically dependent upon assumptions of the long-term gold price and its impact on cut-off grades, potential expansion or contraction of the Mineral Resources and Mineral Reserves and the return on capital expenditure programmes.

The basis of forward projections of operating costs for mature mining operations generally include an inflation adjusted cost, based on the previous financial year's performance, with certain modifications for projected improvements in productivity and other cost-reduction initiatives. In the case of development projects, TEPs are invariably based on recently completed feasibility studies.

Where warranted, following its independent review and post discussions with the Companies, SRK has adjusted the assumed operating costs to account for future operating conditions (i.e. tonnage contribution from various ore sources and mining methods, mineability and shaft closures) and taking cognisance of its view on productivity initiatives.

Unless otherwise stated, operating costs comprise:

- cash cost components: namely direct mining costs, direct processing costs, direct general administration costs, consulting fees, management fees, bullion transport and refining charges;
- the incremental components, including royalties but excluding taxes paid, required to yield
- the incremental components, including terminal separation benefits, reclamation and mine cl

(the net difference of the total environmental liability and the current trust fund provision) but non-cash items such as depreciation and amortisation. Incrementally these cash expenditures summa yield total working costs; and





- total costs: which is the summation of total working costs, net movement in working capital expenditure.

Additional costs required to reflect the assumed expenditures, as represented by the historical operating statistics in Section 2 are the projections of capital costs as given in Section 8. In addition to long-term capital projects, the LoM capital expenditure programmes generally include significant detail based on approved expenditure programmes (typically five-years). Where warranted, SRK has made provision over and above these expenditures, specifically, for example, where no detail is available beyond this five-year period for additional infrastructure. Capital provisioning for all assets is not provided for the first year due to a detailed capital budget and is discontinued two-years prior to the projected closure dates.

Environmental costs have been included in the operating costs as they are confirmed as necessary contributions to the environmental fund. All closure costs are to be expended in the year of final production. Further, SRK consider that there will be potential opportunities to realise salvage values on closure, although owing to the indeterminate nature of estimating such values these have been excluded from the LoM projections included herein.

No significant revenue is sourced from by-products or other precious metals.

### 12.3 Technical-Economic Parameters

The TEPs which have been provided to the Companies and their respective Financial Advisors for deriving cash flow projections, include:

- gold production profiles from all ore sources, including surface, underground and plant closure
- total working costs profiles as previously defined; and
- capital expenditure profiles.

The TEPs are detailed in Tables 12.1 to 12.10 for each Tax Entities, and Table 12.11 and Table 12.12 report the Companies attributable TEPs. Further, all expenditures are stated in financial years and 1 January 2004 money terms. In all cases the refining charges (typically ZAR50/kg) are included in the total working costs and have not been separately identified given their relatively minor contribution as a percentage of the total working costs.

In the case of Orkney Operations and Welkom Operations certain costs are based on contracts, which are dependent upon revenue projections. In this instance these have, *inter alia*, been based on the Base Case projections as included in Table 1.1 and are included in the total working costs.

In the case of the Doornkop Project certain contractual agreements between Harmony and its Joint Venture Partners have resulted in the initial injection of ZAR140m and an agreement that 16% of all future operating profits resulting from the Doornkop BU is paid by Harmony to its Joint Venture partner. SRK has included the cash injection of ZAR140m into the companies net cash/debt position and the profit share of 16% as a cash cost item under overhead category for Doornkop BU.

In the case of the Australian Operations royalties are paid on the basis of payable gold being 99% of gold recovered and the royalty being 2.5% of the sales revenue associated with the payable gold. The corresponding amounts have been included as items under royalty in the operating expenditures.





