• EIGHTH ANNUAL REPORT OF THE INDEPENDENT MONITORING PANEL FOR THE COWAL GOLD PROJECT – OCTOBER 2012

INTRODUCTION

The Independent Monitoring Panel (IMP) was established in accordance with condition 8.8(b) of the Development Consent for the Cowal Gold Project. The members of the IMP are:

- Emeritus Professor Clive Bell, University of Queensland; former Executive Director, Australian Centre for Minerals Extension and Research (ACMER)
- Dr Craig Miller, Associate Environmental Scientist, CDM Smith
- a NSW Department of Planning representative

The IMP was established under the Development Consent to:

- provide an overview of the independent audits required under condition 8.8(a) of the Development Consent;
- regularly review all environmental monitoring procedures undertaken by the Applicant and monitoring results; and
- provide an Annual Statement of the Environment Report for Lake Cowal with particular reference to the ongoing interaction between the mine and the lake and any requirements of the Director-General.

Construction activities commenced at the mine site in January 2004. Site visits were made to the mine site by members of the IMP before construction (Allen Kearns, 16-17 September 2003 and 22 November 2004) and after the commencement of construction (Clive Bell, 14-15 December 2004; Allen Kearns, 9 February 2006; Clive Bell and Allen Kearns, 3-4 July 2007). Subsequent annual visits have been made by Clive Bell and Craig Miller, with the visit in 2012 occurring on 21 and 22 September.

The Director-General has not specified any requirements under condition 8.8(b)(ii) for the preparation of this report. This report covers site activities and environmental monitoring information provided to the IMP in the 2011 Annual Environmental Management Report (AEMR). The 2012 IMP Report includes the review of the Independent Environmental Audit Report (April 2012) for the period May 2011 to April 2012. The IMP also assessed additional material provided by Barrick Australia Ltd in the reports listed in Appendix 1.

OVERVIEW OF THE INDEPENDENT ENVIRONMENTAL AUDIT (IEA)

Under the Minister's Condition of Approval (MCoA) (26 February 1999), an Independent Environmental Audit was to be completed:

- six-monthly during construction;
- 12 months after commencement of ore processing;

- then every three years thereafter until decommissioning of the mine and ore processing operations, respectively, or as otherwise directed by the Director-General.

In its report of August 2007, the IMP recognised that the template-based approach, that had been used by Trevor Brown and Associates applied environmental management consultants (aemc) in the four six-monthly reports leading up to the 2007 IMP reporting period, was well-structured for addressing complex environmental compliance requirements, and was a good example of best practice for easily accessible and updated environmental compliance information. Thus the IMP made the recommendation that "Barrick consider continuing use of the template-based approach established by aemc for environmental auditing of operations in order to regularly and systematically update progress on each of the environmental management and monitoring components. This approach would greatly assist the IMP in its annual review."

A report was prepared by aemc and provided to the IMP for the period May 2011 to April 2012, which was the sixth 12 months of operation. The audit was undertaken over the period from 16-20 April 2012.

The independent environmental auditors reviewed the available documentation covering licenses and approvals granted by Government for the project as well as the environmental monitoring documentation held by Barrick at the mine site office in order to verify compliance with the conditions of approval.

As mentioned in previous IMP reports, the independent environmental auditors established a logical framework for verifying compliance by setting out the entire list of requirements, in the separate management plans that have been prepared by Barrick, that cover environmental management under the Minister's Conditions of Approval. These separate plans include:

- Indigenous Archaeology and Cultural Heritage Management Plan
- Flora and Fauna Management Plan
- Erosion and Sediment Control Management Plan
- Soil Stripping Management Plan
- Rehabilitation and Offset Management Plan (submitted but not yet approved)
- Landscape Management Plan
- Bushfire Management Plan
- Land Management Plan
- Compensatory Wetland Management Plan
- Site Water Management Plan
- Hazardous Waste and Chemical Management Plan
- Dust Management Plan
- Blast Management Plan
- Noise Management Plan
- Traffic Noise Management Plan
- Cyanide Management Plan

The compliance by Barrick against the requirements of the above-listed plans was assessed by the Independent Environmental Auditors, and comments were

made against those approval conditions that had been activated. The scope of the Independent Environmental Audit dated April 2012 included the following components:

- review of the implementation of the requirements of the development consent conditions, licences and approvals for the project for the operation of the mine and process plant;
- conduct of site inspections and review of on-site documentation and monitoring data relevant to the compliance audit;
- discussions held with project staff in relation to the development consent conditions;
- assessment of compliance of the project with the development consent conditions; and
- preparation of an Independent Environmental Audit Report providing assessment of compliance against each consent condition.

The IMP has reviewed the reporting process used in the Independent Environmental Audit Report of April 2012. The IMP was easily able to assess and verify the status of environmental management information at the site and the general compliance with development consent conditions, licences and approvals granted to Barrick, as reported by the independent environmental auditors. The IMP did note, however, that the IEA Report made no reference to the Landscape Management Plan which had been addressed in previous years.

The Independent Environmental Auditors (aemc) drew the following conclusion in their April 2012 report (p.24) :

The audit findings confirm overall general compliance with the Minister's Conditions of Approval, Environmental Protection Licence conditions and requirements of the conditions attached to the Mining Lease.

It was noted that compliance was achieved in all areas except for minor exceedances in Blast Management and Traffic Noise. During 2011, one blast overpressure exceedance of 123 dBL (i.e. 3 dBL above the 120 dBL criterion) occurred on 5 July 2011, whilst, with traffic noise, exceedance (3-day average) occurred at two locations, viz. TN1-140 Ungarie Road (1Dba above the 55 dBA criterion) and TN2-"Claireview" residence (2 dBA above the 50 dBA criterion).

REVIEW OF ENVIRONMENTAL MONITORING PROCEDURES AND MONITORING RESULTS

The 2011 Annual Environmental Management Report (AEMR) was sent to the IMP on 4 July 2012. The 2011 AEMR covers the period 23 December 2010 to 22 December 2011. Overall, it is a well-structured and informative report prepared in accordance with the NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS (Minerals)) Guidelines and Format for the Preparation of an Annual Environmental Management Report (DTIRIS 2006) and in consultation with relevant stakeholders. The IMP made four recommendations in the 2011 IMP Report concerning environmental

monitoring procedures, and these recommendations are assessed below in terms of adequacy of response by Barrick since that report.

2011 IMP Recommendation 1: *CGM should undertake the analysis of the properties of the current soil stockpiles as stated in the CGM letter of 29 January 2011, as soon as is practicable, to further assist in the planning for future rehabilitation.*

2012 IMP Assessment 1: In response to the above recommendation, Cowal Gold Mine (CGM) replied (20 December 2011) –

"Barrick (Cowal) Limited (Barrick) will undertake backhoe sampling of the currently stockpiled soil resources at the Cowal Gold Mine (CGM) as soon as practicable (weather permitting). Analysis of the soil stockpiles was unable to be undertaken during 2011 due to very wet conditions which prevented use of the backhoe required for sampling.

Barrick has engaged Dr David McKenzie of McKenzie Soil Management Pty Ltd to conduct agronomic analysis of the soil samples and to provide an interpretation of the soil sampling results. Dr McKenzie has also engaged two 3rd year PhD candidates (Jessica Drake - Australian National University and Adrienne Ryan - University of Sydney) to assist with the soil stockpile sampling study (and dust monitoring programme study - see response to IMP Recommendation 4 below). Carnegie Natives Pty Ltd has also been engaged by Barrick to help facilitate the soil stockpile sampling study. Dr McKenzie will also prepare an appropriate soil stripping procedure for the CGM soil stockpiles to guide appropriate use of the stockpiled materials.

Based on the outcomes of soil stockpile sampling, Barrick will confirm the quantities of topsoil and subsoil currently available for rehabilitation use, update the CGM materials inventory and soil stockpile database and implement amelioration measures (e.g. gypsum application) where necessary to maintain the stockpiled soils.

As detailed in the currently approved CGM Mining Operations Plan (MOP) (January 2011 to September 2102), estimates (as at 21 December 2010) indicate that approximately 1,728,167 m^3 of topsoil and 2,083,400 m^3 of subsoil are available for future rehabilitation use. These estimates were based on surveying results and mapping of the soil stockpiles conducted using a helium blimp in May 2010.

An action plan and implementation timetable for the measures proposed above is provided in Attachment A."

During the mine visit and subsequently, the IMP assessed the progress in achievement of the Action Plan targets listed in Attachment A for addressing the IMP Recommendation 1. The activities listed were completed at the end of July 2012.

2011 IMP Recommendation 2: *CGM should continue to evaluate the future needs for cover materials for rehabilitation including the subsoil material previously selected and stored for future use. It is recommended that assessment of this material be included in any future field and column trials and that growth of roots into the subsoil in existing trial plots on the Southern Waste Emplacement be explored and the salinity of this subsoil material be determined. Additionally CGM should attempt to obtain an estimate of the salinity range of materials previously saved for rehabilitation (see 2011 IMP Recommendation 1); this data will assist the site in calculating the volumes and planning appropriate layering of satisfactory materials for root zone construction through to mine closure.*

CGM should also finalise and implement the Northern Waste Emplacement Trials over the next year.

2012 IMP Assessment 2: In response to the above recommendation, CGM replied –

"Barrick will continue to evaluate the availability of cover materials likely required for future rehabilitation use (including the availability of currently stockpiled subsoil materials) based on the results of the soil stockpile sampling programme, the updated materials inventory and waste rock production schedule outlined in the CGM MOP.

Subsequent to sampling and analysis of the CGM's stockpiled soils (see response to IMP Recommendation 1 above), Barrick will obtain an estimate of the salinity range of the stored materials to assist in planning the appropriate layering of the materials. Analysis of the salinity of the stored materials and preparation of an appropriate soil stripping procedure will be undertaken by Dr McKenzie (see response to IMP Recommendation 1).

Prior to using subsoil materials in future field and column trials undertaken at the CGM, independent laboratory analysis of the material will be conducted and the results (including the salinity of the material) will be documented.

Barrick currently engages DnA Environmental to monitor rehabilitated areas and conduct rehabilitation field trials at the CGM. Barrick will commission DnA Environmental to include within the rehabilitation monitoring programme conducted at the existing rehabilitation trial plots located on the Southern Waste Rock Emplacement, sampling and analysis of subsoil materials. Sampling will be undertaken using standard soil sampling techniques with a core sampler. Analysis of the subsoil material will be conducted by an independent laboratory and include measurement of Electrical Conductivity to determine soil salinity. The results of this sampling will be included in DnA Environmental's annual rehabilitation monitoring report.

Assessment of plant root growth in the subsoil materials of the existing rehabilitation trial plots located on the Southern Waste Rock Emplacement will also be included in the monitoring programme conducted by DnA Environmental. DnA Environmental will detail the methodology for assessing

plant root growth and the monitoring results in their annual rehabilitation monitoring report.

Barrick also engages Carnegie Natives Pty Ltd to conduct column trials using shallow and deep-rooted tree and shrub species in both tailings and waste rock materials from the CGM. Plant root growth is currently monitored by Carnegie Natives Pty Ltd in these column trials. Plant root growth will continue to be monitored in future column trials conducted using subsoil materials.

An action plan and implementation timetable for the measures proposed above is provided in Attachment A."

During the mine visit and subsequently, the IMP assessed the progress in meeting the targets, listed in Attachment A, to address this IMP recommendation. Each of the actions listed had been, or were being, addressed. The annual rehabilitation monitoring programme by DnA Evvironmental, which will include an assessment of root growth into subsoil in trial plots of the Southern Waste Emplacement, will be conducted in November 2012.

With respect to the second part of the IMP Recommendation 2 that "CGM should also finalise and implement the Northern Waste Emplacement Trials over the next year", CGM replied (20 December 2011) –

"Barrick has finalised with DnA Environmental the design for additional replicate trial plots to be established on the outer batters of the Northern Waste Rock Emplacement, adjacent to the D1 contained water storage. DnA Environmental's design is described in the report 'Revised experimental design and implementation plan – Northern waste emplacement rehabilitation trials for Cowal Gold Mine Barrick (Cowal) Limited November 2011'. DnA Environmental's report:

- outlines the aim of the additional replicate rehabilitation trials;
- describes the landform construction philosophy (including landform preparation procedures) and topsoil and subsoil stockpiling protocols;
- summarises the revegetation strategy; and
- details the design of the replicate plots, quantities of materials required and discusses the proposed monitoring methodology.

DnA Environmental's report also provides a recommended schedule of works to guide implementation of the rehabilitation trials (including appropriate timing for topsoil re-spreading and re-seeding to coincide with autumn rainfall) (refer to Attachment B). Barrick anticipates commencement of works in accordance with DnA Environmental's design and implementation plan in early 2012, with replicate plots to be established by April 2012.

Monitoring of the replicate trial plots will also be undertaken by DnA Environmental and an annual weeds survey of all rehabilitation trials will be undertaken by Carnegie Natives.

An action plan and implementation timetable for the measures proposed above is provided in Attachment A."

The IMP notes that DnA Environmental finalised the design of the Northern Waste Emplacement Trials and developed a schedule for implementation during 2012. Although construction of the trials has commenced, delays have been experienced because of the unavailability of native grass mulch.

2012 IMP Recommendation 1: CGM should endeavour to complete the Northern Waste Emplacement Trials as soon as required materials become available.

2011 IMP Recommendation 3*: CGM should continue to monitor the status of rehabilitation on the tailings walls to provide data to confirm that the current preferred rehabilitation approach will lead to a cover which is stable and sustainable.*

2012 IMP Assessment 3: In response to this recommendation, CGM replied (20 December 2011) –

"Barrick will continue to engage DnA Environmental to monitor CGM rehabilitation and prepare an annual rehabilitation monitoring report that will evaluate the status of the rehabilitation at the CGM (including on the tailings storage facility batters). DnA Environmental will continue to use the Ecosystem Function Analysis (EFA) monitoring methodology to assess the performance of rehabilitation at the CGM.

Barrick will also prepare a report in the first quarter of 2012 which will detail the results of all rehabilitation trials conducted at the CGM to date. The report would aim to formally document the outcomes of all CGM rehabilitation trials, and based on these outcomes, propose the preferred surface cover system concepts most likely to provide successful, stable and sustainable rehabilitation of the final landforms at the CGM.

An action plan and implementation timetable for the measures proposed above is provided in Attachment A."

In assessing the progress in achievement of the Action Plan targets listed in Attachment A, the IMP noted that the annual rehabilitation monitoring by DnA Environmental will take place in November 2012.

2012 IMP Recommendation 2: CGM should continue to monitor existing rehabilitation trials (and those planned for establishment in 2012) with a view to further refining its approach to achieve sustainable, post-mining landscapes.

2011 IMP Recommendation 4: *CGM should ensure that new bulk standard samples of soil and waste materials are prepared for use as an ongoing check on metal and other analyses conducted at various laboratories.*

2012 IMP Assessment 4: In response to this recommendation, CGM replied (20 December 2011) –

"Barrick has conducted bulk standard sampling of soil and waste materials to monitor for metals and other relevant parameters and has dispatched this new sample to an independent laboratory (National Measurement Institute, Sydney) for analysis. The results of this sampling will be used to verify results from the dust monitoring programme undertaken at the CGM.

An action plan and timetable for implementation of the measures outlined in this response is provided in Attachment A. The schedule of works for implementation of the Northern Waste Rock Emplacement additional replicate plot trials outlined in DnA Environmental's (2011) 'Revised experimental design and implementation plan – Northern waste emplacement rehabilitation trials for Cowal Gold Mine Barrick (Cowal) Limited November 2011' is provided in Attachment B."

The IMP notes that the standard bulk samples have been prepared and sent to several laboratories for analysis. The metal results from one laboratory were implausibly high, and this appears to be a problem related to the laboratory's procedures.

2012 IMP Recommendation 3: CGM should continue to explore reasons for the anomalous metal concentrations on control soil and overburden samples being obtained from one of the laboratories used for analysis of dust samples.

In relation to the response to each of the four IMP recommendations made in 2011, the IMP believes the written response of CGM made on 20 December 2011 comprehensively addressed the issues and the plan of action for each. In most cases, the nominated targets have been reached; the timelines on several targets have slipped, with some being affected by circumstances beyond the control of CGM.

ADDITIONAL ISSUES IDENTIFIED BY THE IMP FROM THE 2011 AEMR AND MINE VISIT (21-22 SEPTEMBER 2012)

Groundwater Profiles around Mine Pit

In Section3.4 (Groundwater) in the AEMR, there is no reference to the Figures 19a and 19b on Deep Groundwater Contours around the mine pit. The next annual AEMR should discuss this issue.

2012 IMP Recommendation 4: In the 2012 AEMR, CGM should not only provide figures showing groundwater contours around the pit, but discuss the implications for the aquifers of the surrounding environment and groundwater movement.

Metal Analyses on Surface Waters

In Section 3.3 (Surface Water) of the AEMR, Table 13 lists the analyses undertaken on various water bodies (including Lake Cowal) in the Surface

Water Monitoring Programme. There is no reference to analysis for copper in this table. An analysis for copper is given for the water in D6 in Table 14, but no data for copper is shown for Lake Cowal water in Tables 15, 16 or 17. It is essential that copper be measured in the surface water bodies, and that these data are shown in the AEMR.

2012 IMP Recommendation 5: CGM should ensure that copper is analysed on all surface water bodies, including Lake Cowal, (along with the other metals and metalloids listed) and that these data are reported in the next AEMR.

ANNUAL STATE OF THE ENVIRONMENT REPORT FOR LAKE COWAL

The IMP is required to provide an Annual State of the Environment Report for Lake Cowal with particular reference to the on-going interaction between the mine and Lake Cowal.

In March 2008 the CGM Development Consent was modified to remove the requirement to conduct baseline biological monitoring and focus on the potential impact pathways from the mine to Lake Cowal, as recommended by the IMP. The process of revising the monitoring programme required the identification of potential pathways, risk assessment, the identification of trigger values requiring a management response, and the development of the monitoring method. The IMP is pleased that Government recognised the validity of the potential pathways to impact approach and allowed the change.

The IMP is also pleased at the rigour and utility of the revised *Surface Water, Groundwater, Meteorological and Biological Monitoring Programme* developed by Professor David Goldney and applied by CGM over the last four years.

Lake Cowal filled between the 2010 and 2011 visits of the IMP, and the resulting impact on biodiversity is apparent. Water birds have bred in the area in high numbers for the first time in over a decade, and riparian vegetation on the lake edge is flourishing.

The IMP is pleased that the operations of CGM during the intervening period of high rainfall and lake filling have not resulted in any of the trigger values being activated, suggesting that the impact of the CGM on the lake and its biodiversity, during a period of environmental stress on the mine, is currently neutral. The IMP considers that this is likely due to the best practice operational and environmental management undertaken by CGM. The turbidity of the lake at present is notable, and this would appear to be due to the mobilisation of lake bed sediments and sediments from surrounding and upstream agricultural areas.

The IMP suggests that Barrick should be prepared for the potential ecological consequences and implications of progressive drying and emptying of Lake Cowal. The consequences and implications include:

- Increased fire risk due to drying of vegetation regrowth, including lignum
- Increased mobilisation of dust from the lake bed

- Increased potential for pest plagues, i.e. locusts and mice
- Increased evidence of wildlife mortality
- Mass stranding, mortality, and decomposition of fish
- Organic odour from decomposing and drying lakebed mud

2012 IMP Recommendation 6: CGM should be prepared for operational or advocacy requirements arising from the progressive drying and emptying of Lake Cowal.

Finally, Condition 8.8(b)(ii)(c) requires the IMP to respond to "any requirements of the Director General". To date, the IMP has not been provided with any information or requests on other “requirements of the Director General”.

SUMMARY LIST OF IMP RECOMMENDATIONS FOR 2012

2012 IMP Recommendation 1: *CGM should endeavour to complete the Northern Waste Emplacement Trials as soon as required materials become available.*

2012 IMP Recommendation 2: *CGM should continue to monitor existing rehabilitation trials (and those planned for establishment in 2012) with a view to further refining its approach to achieve sustainable, post-mining landscapes.*

2012 IMP Recommendation 3: *CGM should continue to explore reasons for the anomalous metal concentrations on control soil and overburden samples being obtained from one of the laboratories used for analysis of dust samples.*

2012 IMP Recommendation 4: *In the 2012 AEMR, CGM should not only provide figures showing groundwater contours around the pit, but discuss the implications for the surrounding environment*.

2012 IMP Recommendation 5: *CGM should ensure that copper is analysed on all surface water bodies, including Lake Cowal, along with the other metals and metalloids listed) and that these data are reported in the next AEMR.*

2012 IMP Recommendation 6: *CGM should be prepared for operational or advocacy requirements arising from progressive drying and emptying of Lake Cowal.*

INDEPENDENT MONITORING PANEL

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APPENDIX 1 – LIST OF REPORTS ASSESSED BY INDEPENDENT MONITORING PANEL

Cowal Gold Project – 2011 Annual Environmental Management Report (4 July 2012). Barrick Australia Limited.

Cowal Gold Project – Independent Environmental Audit (April 2012). Trevor Brown and Associates (aemc).

Revised Experimental Design and Implementation Plan – Northern Waste Emplacement Rehabilitation Trials. Prepared for Cowal Gold Mine. November 2011. DnA Environmental.

Preliminary Soil Characterisation Report – Subsoil 02 and Topsoil 02. Prepared for Barrick Cowal Gold Mine by Carnegie Natives and McKenzie Soil Management. 16 May 2012

Lake Cowal Waterbird Monitoring Survey. Progress Report. August 2012. Centre for Environmental Management, The University of Ballarat.

Cattle SR, Hemi K, Pearson GL and Sanderson T .(2012). Distinguishing and characterising point-source mining dust and diffuse-source dust deposits in a semi-arid district of eastern Australia. *Aeolian Research* 6: 21-29.