To: Company Announcements Office  
From: Peter Larsen  
Date: 2 March 2012  
Subject: Toronto Stock Exchange Listing – Lihir Technical Report

In relation to Newcrest Mining Limited’s secondary listing on the Toronto Stock Exchange ("TSX"), please find attached for immediate release and for the information of the market:


The attached Report is referred to in the Newcrest Annual Information Form ("AIF") for the Fiscal Year Ended June 30, 2011 dated as of February 27, 2012, lodged on the ASX contemporaneously and as filed with the Canadian regulatory authorities.

**Important note:**

With respect to the reporting of Newcrest’s resources and reserves which are required to be reported in accordance with the Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves ("The JORC Code") 2004 edition, readers of the AIF and accompanying technical reports are expressly referred to Newcrest’s December 2011 Resources and Reserves Statement lodged with ASX on 10th February 2012.

Canadian regulations require Ore Reserves and Mineral Resources to be reported in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects of the Canadian Securities Administrators ("NI 43-101") and the provisions of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards – for Mineral Resources and Ore Reserves 2010 ("CIM Definition Standards").

As noted above, Australian regulations require ore reserves and resources to be reported in accordance with The JORC Code.

A comparison of the respective requirements of NI 43-101 and The JORC Code is contained at page 14 (and following) of the AIF under the heading “Mineral Reserves and Mineral Resources”.

Yours sincerely

Peter Larsen  
Deputy Company Secretary
TECHNICAL REPORT ON THE LIHIR PROPERTY
IN
PAPUA NEW GUINEA

Prepared for Newcrest Mining Limited

by

AMC Mining Consultants (Canada) Ltd in accordance with the requirements of National Instrument 43-101, Standards for Disclosure of Mineral Projects, of the Canadian Securities Administrators.

Qualified Persons:
Mr Mark Berry MAIG
Mr Colin Moorhead BSc (Hons), FAusIMM

AMC 711037

Effective Date of Report: 31 December 2011
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1  SUMMARY

1.1  Geology

Newcrest Mining Limited (Newcrest) owns 100% of the Lihir Property (Lihir), which it acquired through the acquisition of Lihir Gold Limited in August 2010. Lihir is located on Lihir Island, 900 kilometres (km) north-east of Port Moresby in Papua New Guinea (PNG). The property comprises a group of mining and exploration tenements that host epithermal gold mineralization within a Pleistocene volcanic caldera complex.

Exploration has identified several adjacent and partly overlapping mineral deposits in the Luise Caldera, which are collectively called the Ladolam Deposit. The principal components are called Lienetz, Minifie, Kapit and Coastal. This is also essentially the sequence in which the pits are mined. The limits of the mineralization have not been completely defined and are open at depth, along strike and to the east (currently limited by the Pacific Ocean).

1.2  Mine Production

In the financial year ending 30 June 2011, Lihir mined 22.2 million tonnes (Mt) of ore and milled 6.3 Mt of ore to produce 791 thousand ounces (oz) of gold. Gold production at Lihir represented approximately 29% of Newcrest’s total gold production. Cash cost for the year was A$419 per oz.

1.3  Mineral Resources

The Lihir Mineral Resources as at December 2011 are presented in Table 1.1. They comprise Measured Resources, which are the low, medium and high grade stockpiles; as well as Indicated and Inferred Resources. There are no Measured Resources in the orebody model.

<table>
<thead>
<tr>
<th>Resource Classification</th>
<th>Tonnes (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured</td>
<td>94</td>
<td>2.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Indicated</td>
<td>700</td>
<td>2.0</td>
<td>44.8</td>
</tr>
<tr>
<td>Inferred</td>
<td>87</td>
<td>1.7</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Notes: 1. Cut-off grade 0.85 g/t Au based on a gold price of US$1,100/oz
2. Reported within pit shell developed using gold price of US$1,400/oz
3. The figures above include those resources converted to reserves

1.4  Mineral Reserves

Lihir Mineral Reserves as at December 2011 are presented in Table 1.2. The Proven Mineral Reserve estimate is generated from estimates of stockpiled ore that is classified as
a Measured Mineral Resource. There are currently nine separate stockpiles containing high grade, medium grade and low grade ore. The Probable Mineral Reserve estimate is generated from Indicated Mineral Resources within the final pit limits generated by the life-of-mine (LOM) plan.

Table 1.2  Lihir Mineral Reserves Estimate at 31 December 2011

<table>
<thead>
<tr>
<th>Reserve Classification</th>
<th>Tonnes (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven</td>
<td>94</td>
<td>2.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Probable</td>
<td>330</td>
<td>2.3</td>
<td>24.4</td>
</tr>
</tbody>
</table>

Notes: 1 Cut-off grade 0.95 g/t Au based on a gold price of US$950/oz 2 Gold price used to define pit limits US$850/oz.

1.5 Infrastructure

Lihir has established the normal range of infrastructure expected of a large mining operation. The construction and ongoing servicing of the mine and related infrastructure required the construction of port facilities, an upgrade of the existing airstrip, the development of accommodation facilities and infrastructure services to support the operation. All key services required for the mine were constructed by the property owners i.e. power, water supply, roads, and other infrastructure.

Most travel to and from the island is via aircraft, however, sea passenger services do operate to local islands. Marine facilities are established and service oil tankers, general cargo ships, passenger ferries, and work boats.

1.6 Environmental Management

Prior to the discovery of gold at Lihir, the population of the Lihir island group was approximately 7,100. The economy was centered on subsistence agriculture and the population lived in many small villages around the island.

Environmental, social, and community issues have been professionally managed through pro-active planning, and the development of sophisticated environmental management systems and protocols based on thorough baseline studies and modeling. There appears to be no technical environmental issue likely to constrain the operation in the foreseeable future.

1.7 Capital and Operating Costs

The major capital expenditure at Lihir is the mill expansion project called Million Ounce Plant Upgrade (MOPU). Total expenditure on MOPU is expected to be US$1.3B. Other major capital investments include additional processing capacity (additional flotation is being evaluated), construction of a coffer-dam to assist development of the Kapit pit,
relocation of low grade stockpiles, development of the ROM and coastal mine areas, power station projects and resource drilling.

Lihir actual operating cost for FY 2011 in Australian dollars is shown in Table 1.3.

<table>
<thead>
<tr>
<th>Lihir Island</th>
<th>Unit</th>
<th>FY11 Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Production</td>
<td>koz</td>
<td>791</td>
</tr>
<tr>
<td>Total site cash costs</td>
<td>A$M</td>
<td>489</td>
</tr>
<tr>
<td>Stripping and ore inventory</td>
<td>A$M</td>
<td>(185)</td>
</tr>
<tr>
<td>Third party smelting refining and transporting</td>
<td>A$M</td>
<td>3</td>
</tr>
<tr>
<td>Royalty</td>
<td>A$M</td>
<td>24</td>
</tr>
<tr>
<td>Depreciation</td>
<td>A$/oz</td>
<td>162</td>
</tr>
</tbody>
</table>

*Relates to full twelve months of production, rather than ten month period of ownership

Lihir estimated operating cost for FY 2012 in Australian dollars is shown in Table 1.4.

<table>
<thead>
<tr>
<th>Lihir Island</th>
<th>Unit</th>
<th>FY12 Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total site cash costs</td>
<td>A$M</td>
<td>500 - 520</td>
</tr>
<tr>
<td>Stripping and ore inventory</td>
<td>A$M</td>
<td>(190) - (200)</td>
</tr>
<tr>
<td>Third party smelting refining and transporting</td>
<td>A$M</td>
<td>3 - 8</td>
</tr>
<tr>
<td>Royalty</td>
<td>A$M</td>
<td>23 - 30</td>
</tr>
<tr>
<td>Depreciation</td>
<td>A$/oz</td>
<td>190 - 200</td>
</tr>
</tbody>
</table>

1.8 Economic Analysis

Incremental increases in production from MOPU, additional processing capacity and ongoing optimization are collectively expected to take production from approximately 0.85 Moz to beyond 1.4 Moz per year during the five year period. Cash costs are expected to be around US$450 per oz.

1.9 Conclusions

Lihir is a robust mining operation with substantial mineral reserves. The company has a successful track record for developing and operating the project, as well as maintaining good relations with the local community and PNG government bodies. The current expansion to mill production is progressing well and there is no reason to doubt that gold production will increase significantly once the expansion has been completed.
The key future challenges and risks are as follows:

- The ability to successfully implement and maintain the long-term integrity of the coffer-dam is required for expanding the mining of Kapit pit seaward. Delay in completion of the dam would have an impact on the mining schedule but major leaks or instability of the wall would have a major adverse impact on the mineral reserve and the LOM plan.

- The ability to successfully maintain stability of open pit walls in a complex geological environment is required to achieve the mine plan. Management plans to account for variable rock strength, seismic activity, geothermal activity, high rainfall and significant groundwater are regularly updated to ensure pit stability is not compromised.

- Geothermal depressurization of the Kapit area is required in advance of mine operations. The maintenance of steam relief wells is a critical requirement and delays to expected depressurization trends could have an adverse impact on mine production schedules.

- Geothermal power represents an important source of power for the operation, a means to reduce future operating cost and a way to reduce reliance on heavy fuel oil (HFO) for power generation. The sustainability and expansion of this power supply must be managed closely given there have been periods in which declines of geothermal steam supply and reservoir pressure have resulted in shortfalls in geothermal steam for power generation.

1.10 Recommendations

Lihir is an established mining operation with mineral reserves sufficient for an extended mine life. Newcrest has sophisticated procedures for investigating and evaluating mineral resources and mineral reserves, and in operating projects for their efficient exploitation.

In view of the nature of Lihir and the substantial mineral reserve inventory, no recommendations are included.
2 INTRODUCTION

2.1 General and Terms of Reference

This Technical Report (the Report) on the Lihir Property (Lihir) in the Province of New Ireland, Papua New Guinea (PNG) has been prepared by AMC Mining Consultants (Canada) Ltd (AMC) of Vancouver, Canada on behalf of Newcrest Mining Limited (Newcrest) of Melbourne, Australia, in contemplation of a proposed listing of Newcrest on the Toronto Stock Exchange. It has been prepared in accordance with the requirements of National Instrument 43-101 (NI 43-101), "Standards of Disclosure for Mineral Projects", of the Canadian Securities Administrators (CSA) for lodgment on CSA's “System for Electronic Document Analysis and Retrieval” (SEDAR).

2.2 Report Authors

A listing of the authors of this Report, together with the sections for which they are responsible, is in Table 2.1.

Table 2.1 Persons who Prepared or Contributed to this Technical Report

<table>
<thead>
<tr>
<th>Qualified Person</th>
<th>Position</th>
<th>Employer</th>
<th>Independent of Newcrest</th>
<th>Date of Site Visit</th>
<th>Professional Designation</th>
<th>Sections of Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Berry</td>
<td>Principal Geologist</td>
<td>AMC</td>
<td>Yes</td>
<td>February 2009, June 2011</td>
<td>MAIG</td>
<td>Overall report compilation</td>
</tr>
<tr>
<td>C Moorhead</td>
<td>Executive General Manager Minerals</td>
<td>Newcrest</td>
<td>No</td>
<td>August and November 2011</td>
<td>FAusIMM</td>
<td>12, 14, 15</td>
</tr>
</tbody>
</table>

Other Experts upon whose contributions the Qualified Persons have relied

<table>
<thead>
<tr>
<th>Expert</th>
<th>Position</th>
<th>Employer</th>
<th>Independent of Newcrest</th>
<th>Date of Site Visit</th>
<th>Professional Designation</th>
<th>Sections of Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Bowyer</td>
<td>Australian Tenement Manager</td>
<td>Newcrest</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>4 (part)</td>
</tr>
<tr>
<td>V Singh</td>
<td>Group Manager Resource Geology</td>
<td>Newcrest</td>
<td>No</td>
<td>N/A</td>
<td>MAusIMM</td>
<td>14</td>
</tr>
<tr>
<td>D Grigg.</td>
<td>Superintendent Mine Strategic Planning</td>
<td>Newcrest</td>
<td>No</td>
<td>Site based</td>
<td>MAusIMM</td>
<td>15</td>
</tr>
<tr>
<td>Albert de Sousa</td>
<td>General Manager, Marketing &amp; Logistics</td>
<td>Newcrest</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>19</td>
</tr>
</tbody>
</table>
Mr Mark Berry visited the Lihir open pit and was accompanied by Mr Glen Williamson in June 2011. Mr Berry has made previous visits to Lihir and inspected the mine operations and aspects of the surface infrastructure. In August 2011, Mr Tony Showell, a metallurgical consultant, and Mr Alan Robertson, an environmental consultant also visited the island.

Mr Vik Singh is an employee of Newcrest and has been appointed as the Competent Person for reporting Lihir Mineral Resources under the JORC Code. Mr David Grigg is an employee of Newcrest and has been appointed as the Competent Person for reporting Lihir Ore Reserves under the JORC Code. Mr Colin Moorhead is an employee of Newcrest and accepts Qualified Person responsibility for the reporting of the Lihir Mineral Resources and Mineral Reserves in this report. Mr Moorhead last visited the Lihir operations in November 2011.

This Report is based on information provided by Newcrest (listed in Section 27), on site visits undertaken by Qualified Persons, and on discussions with Newcrest personnel.

Newcrest was provided with a draft of the Report to review for factual content and conformity with the brief.

This report is effective as of 31 December 2011.

### 2.3 Units of Measure and Currency

Throughout this Report, measurements are in metric units and currency is expressed in Australian dollars, United States dollars and PNG kina. Table 2.2 includes key terms used and their abbreviations.
<table>
<thead>
<tr>
<th>Unit/Term</th>
<th>Abbreviation</th>
<th>Unit/Term</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidity or basicity</td>
<td>pH</td>
<td>Mining Easement</td>
<td>ME</td>
</tr>
<tr>
<td>Acid Rock Drainage</td>
<td>ARD</td>
<td>Megawatts</td>
<td>MW</td>
</tr>
<tr>
<td>Carbon-In-Leach</td>
<td>CIL</td>
<td>Mining Leases</td>
<td>MLs</td>
</tr>
<tr>
<td>Counter-current decantation</td>
<td>CCD</td>
<td>Metres Reduced Level</td>
<td>mRL</td>
</tr>
<tr>
<td>Cubic metres</td>
<td>m³</td>
<td>Million Ounces</td>
<td>Moz</td>
</tr>
<tr>
<td>Cubic metres per hour</td>
<td>m³/hr</td>
<td>Million Ounce Plant Upgrade</td>
<td>MOPU</td>
</tr>
<tr>
<td>Cyanide</td>
<td>CN</td>
<td>Net Present Value</td>
<td>NPV</td>
</tr>
<tr>
<td>Dead weight tonnes</td>
<td>DWT</td>
<td>Net Smelter Return</td>
<td>NSR</td>
</tr>
<tr>
<td>Deep sea tailings placement</td>
<td>DSTP</td>
<td>Non-Acid Forming</td>
<td>NAF</td>
</tr>
<tr>
<td>Department of Environment and Conservation</td>
<td>DEC</td>
<td>One millionth of a metre</td>
<td>micron</td>
</tr>
<tr>
<td>Dry bulk density</td>
<td>DBD</td>
<td>Ordinary Kriging</td>
<td>OK</td>
</tr>
<tr>
<td>Environmental Impact Statement</td>
<td>EIS</td>
<td>Papua New Guinea</td>
<td>PNG</td>
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<tr>
<td>Environment management system</td>
<td>EMS</td>
<td>Papua New Guinea kina</td>
<td>PGK</td>
</tr>
<tr>
<td>Exploration Licences</td>
<td>ELs</td>
<td>Percent</td>
<td>%</td>
</tr>
<tr>
<td>Flotation grade ore</td>
<td>FGO</td>
<td>Per annum</td>
<td>pa</td>
</tr>
<tr>
<td>Gold</td>
<td>Au</td>
<td>Per cubic metre</td>
<td>/m³</td>
</tr>
<tr>
<td>Grams per tonne</td>
<td>g/t</td>
<td>Per kilowatt hour</td>
<td>/kWh</td>
</tr>
<tr>
<td>Grams per tonne of gold</td>
<td>g/t Au</td>
<td>Per troy ounce</td>
<td>/oz</td>
</tr>
<tr>
<td>Heavy fuel oil</td>
<td>HFO</td>
<td>Per tonne</td>
<td>/t</td>
</tr>
<tr>
<td>High grade ore</td>
<td>HGO</td>
<td>Potentially Acid Forming</td>
<td>PAF</td>
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<tr>
<td>Integrated Benefits Package</td>
<td>IBP</td>
<td>Pre-feasibility study</td>
<td>PFS</td>
</tr>
<tr>
<td>Kilogram(s)</td>
<td>kg</td>
<td>Pyrite</td>
<td>Py</td>
</tr>
<tr>
<td>Kilograms per cubic metre</td>
<td>kg/m³</td>
<td>Quality Assurance Quality Control</td>
<td>QA/QC</td>
</tr>
<tr>
<td>Kilometre(s)</td>
<td>km</td>
<td>Reverse Circulation</td>
<td>RC</td>
</tr>
<tr>
<td>Kilometre(s) per hour</td>
<td>km/h</td>
<td>Run-Of-Mine</td>
<td>ROM</td>
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<tr>
<td>Kilo (thousand) ounces (troy)</td>
<td>koz</td>
<td>Semi-autogenous grinding</td>
<td>SAG</td>
</tr>
<tr>
<td>Kilotonne per annum</td>
<td>ktpa</td>
<td>Square kilometres</td>
<td>km²</td>
</tr>
<tr>
<td>Kilowatt</td>
<td>kW</td>
<td>Square metres</td>
<td>m²</td>
</tr>
<tr>
<td>Kilowatt-hours</td>
<td>kWh</td>
<td>Tailings Storage Facility</td>
<td>TSF</td>
</tr>
<tr>
<td>Kilovolts</td>
<td>KV</td>
<td>Tonne(s)</td>
<td>t</td>
</tr>
<tr>
<td>Internal diameter</td>
<td>ID</td>
<td>Tonnes per cubic metre</td>
<td>t/m³³</td>
</tr>
<tr>
<td>Life-Of-Mine</td>
<td>LOM</td>
<td>Tonnes per day</td>
<td>tpd</td>
</tr>
<tr>
<td>Unit/Term</td>
<td>Abbreviation</td>
<td>Unit/Term</td>
<td>Abbreviation</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>--------------</td>
<td>-----------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Life of province plan</td>
<td>LOPP</td>
<td>Tonnes per hour</td>
<td>tph</td>
</tr>
<tr>
<td>Lihir Sustainable Development Plan</td>
<td>LSDP</td>
<td>Uniform Conditioning</td>
<td>UC</td>
</tr>
<tr>
<td>Litre</td>
<td>l</td>
<td>Volt(s)</td>
<td>V</td>
</tr>
<tr>
<td>Metre(s)</td>
<td>m</td>
<td>Weak acid dissociable cyanide</td>
<td>CN$_{WAD}$</td>
</tr>
<tr>
<td>Million Tonnes</td>
<td>Mt</td>
<td>Wet metric tonnes</td>
<td>wmt</td>
</tr>
<tr>
<td>Million Tonnes per annum</td>
<td>Mtpa</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Millimetres</td>
<td>mm</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Million ounces (troy)</td>
<td>Moz</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
3 RELIANCE ON OTHER EXPERTS

The Qualified Persons have relied, in respect of legal, marketing and environmental aspects, upon the work of certain Experts listed below. To the extent permitted under NI 43-101, the Qualified Persons disclaim responsibility for these sections of the Report.

The following disclosure is made in respect of each of these Experts:

Ms L Bowyer, Australian Tenement Manager, Newcrest:
- Report, opinion or statement relied upon: Information on mineral tenure and status, title issues, royalty obligations, etc.
- Extent of reliance: full reliance following a review by the Qualified Person(s).
- Portion of Technical Report to which disclaimer applies: Section 4, excluding Section 4.3.

Mr A Robertson, Director, RGS Environmental Pty Ltd
- Report, opinion or statement relied upon: Information on environmental, permitting, and social/community matters.
- Extent of reliance: full reliance following a review by the Qualified Person(s).
- Portion of Technical Report to which disclaimer applies: Section 20.

Mr Albert de Sousa, General Manager, Marketing & Logistics, Newcrest:
- Summary report on Newcrest marketing.
- Extent of reliance: status of Newcrest’s sales arrangements.
- Portion of Technical Report to which disclaimer applies: Section 19.
4 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Location

The Lihir operations are on Niolam Island which is part of the Lihir Group in the Province of New Ireland, PNG. The island, generally referred to as Lihir Island as it is the largest island in the Lihir Group, is located approximately 900 km north-north-east of the national capital Port Moresby. The property is located at approximately 3°06'54"S latitude, 152°38'27"E longitude. The location is shown in Figure 4.1. Lihir consists of a single open pit mine from which ore is processed on site to produce gold doré.

Figure 4.1 Property Location
4.2 Land Tenure

Mine development and operations at Lihir are conducted in accordance with the agreed development plans stipulated in the mining development contract i.e. the Approved Proposal For Development (APFD) and Special Mining Lease Number 6 (SML 6) (Department of Mining and Petroleum, 1995) signed by the Independent State of PNG in 1995 (“Department of Attorney General, 1995”).

The property consists of SML 6, two granted Mining Leases (MLs) and one granted Exploration Licence (EL), plus a number of miscellaneous mining purpose and easement leases. The total area under licence is approximately 236 km². The registered holder for all tenure is Lihir Gold Limited and the total statutory annual expenditure commitment for the project is PGK150,000.

Details of leases and licences are provided in Table 4.1 and Figure 4.2.

Table 4.1 Lihir Property Land Tenure Details

<table>
<thead>
<tr>
<th>Lease</th>
<th>Lease Type</th>
<th>Lease Status</th>
<th>Grant Date</th>
<th>Expiry Date</th>
<th>Area Km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL485</td>
<td>EL - Exploration Licence</td>
<td>Granted</td>
<td>19/06/1983</td>
<td>31/03/2012</td>
<td>210.00</td>
</tr>
<tr>
<td>LMP34</td>
<td>LMP - Lease for Mining Purpose</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>16/03/2035</td>
<td>0.34</td>
</tr>
<tr>
<td>LMP35</td>
<td>LMP - Lease for Mining Purpose</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>16/03/2035</td>
<td>6.74</td>
</tr>
<tr>
<td>LMP38</td>
<td>LMP - Lease for Mining Purpose</td>
<td>Granted</td>
<td>18/10/1997</td>
<td>16/03/2035</td>
<td>0.04</td>
</tr>
<tr>
<td>LMP39</td>
<td>LMP - Lease for Mining Purpose</td>
<td>Granted</td>
<td>18/10/1997</td>
<td>16/03/2035</td>
<td>0.00</td>
</tr>
<tr>
<td>LMP40</td>
<td>LMP - Lease for Mining Purpose</td>
<td>Granted</td>
<td>18/10/1997</td>
<td>16/03/2035</td>
<td>0.02</td>
</tr>
<tr>
<td>ME71</td>
<td>ME - Mining Easement</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>16/03/2035</td>
<td>0.06</td>
</tr>
<tr>
<td>ME72</td>
<td>ME - Mining Easement</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>16/03/2035</td>
<td>0.21</td>
</tr>
<tr>
<td>ME73</td>
<td>ME - Mining Easement</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>16/03/2035</td>
<td>0.19</td>
</tr>
<tr>
<td>ML125</td>
<td>ML - Mining Lease</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>20/07/2015</td>
<td>0.48</td>
</tr>
<tr>
<td>ML126</td>
<td>ML - Mining Lease</td>
<td>Granted</td>
<td>21/07/1995</td>
<td>20/07/2015</td>
<td>0.24</td>
</tr>
<tr>
<td>SML6</td>
<td>SML - Special Mining Lease</td>
<td>Granted</td>
<td>17/03/1995</td>
<td>16/03/2035</td>
<td>17.39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>235.72</strong></td>
</tr>
</tbody>
</table>
Figure 4.2  Lihir Island Exploration and Mining Tenements
4.3 Integrated Benefits Package Agreement

A revised Integrated Benefits Package Agreement (IBP) was signed in 2007 with the Lihir Mining Area Landowners Association and the Nimamar Rural Local-Level Government (NRLLG). The IBP sets out the heritage and compensation arrangements for the local landowners, with the main objectives of ensuring that development in Lihir occurs in parallel with mining, is balanced across the island, is sustainable and is stable.

The revised IBP sets out a framework for:

- Financial commitments over five years, totaling PGK107M.
- Commitments to assist the Lihir people to establish commercial ventures on Lihir Island, including participation in mining activities.
- Developing the capability and capacity of the Lihir people to manage their own affairs.
- Implementing all incomplete projects agreed to under the original IBP.
- Compensation associated with land affected by mining and related operations.
- Requirements associated with rehabilitation and mine closure.

4.4 Environmental Liabilities

The Mineral Resource Authority in PNG holds a total of PGK111,000 as security deposits.
5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Topography Elevation and Vegetation

Lihir Island is formed around extinct volcanoes and is approximately 20 km long by 10 km wide with an area of 197 km$^2$ (Figure 5.1). The mine is located within the caldera of the Luise Volcano which is located on the east coast of the island. Luise Caldera is an extinct volcanic crater that is geothermally active. It has a 6 km by 4 km elliptical crater with steep walls reaching 600 m above sea level. Several hundred thousand years ago the eastern (seaward) part of the main Luise caldera collapsed, with debris flows extending 25 km to 40 km eastward such that the submerged slope now forms the base of Luise Harbour.

Natural vegetation on the island is predominantly tropical rain forest. At the mine site, flooding effects are generally limited to a need for increased pit sump pumping, an increase in local backwater and occasional inundation of the Luise Harbour foreshore region.

Soils are naturally highly mineralized and contain elevated heavy metal concentrations. The gold mineralization within the Luise Caldera is hosted within volcanic and intrusive rocks and breccias that have undergone extensive alteration.

Parts of the narrow coastal plain, particularly in the northern and eastern areas, have formed on coral platforms. This includes the regions around the Putput ore processing plant, Londolovit townsite and Kunaye Airport.
Figure 5.1  Lihir Island Environs
5.2 Climate

Lihir Island is located at latitude 3° south and does not experience distinct wet or dry seasons. Lihir experiences high rainfall, averaging about 3.9 m per annum, with mean relative humidity of 80%. Since 1986, average annual composite rainfall was 3,880 mm, although this varies significantly between months, monitoring locations, and years. Periods of rainfall extremes often, but not always, correlate with the El Niño Southern Oscillation.

Air temperatures at Lihir are relatively constant from month to month, with daily air temperatures ranging between 21.1°C and 33.7°C. Temperatures at the mine site range from 21.0°C to 34.2°C while the sea temperature remains relatively constant at approximately 27°C to 28°C throughout the year.

Winds close to sea level are generally light, with monthly mean wind speeds of less than 5 knots. There are two wind seasons of variable duration. Between May and September/October, winds are mainly from the south-east and east while in the other season (between December and March), winds from the north and west prevail, although wind direction can vary with location. November and April are transitional months. Luise Caldera has a noticeable effect on wind flow. Wind speeds at the mine site are light and variable and range from 0.6 km/h to 16.6 km/h.

Lihir lies north of the cyclone belt, which is at latitude 10° to 20° south; however, high-intensity, short-duration storms with accompanying winds do occur.

Air quality at Lihir is affected by both natural and anthropogenic emissions. Natural air emissions include hot springs and geothermal discharges that release steam and other gases including H₂S. These vary in intensity throughout the year. Anthropogenic emissions arise from mining operations, power generation and ore processing activities, and from local community activities such as road use, and subsistence agricultural burn-offs.

5.3 Natural Hazards

PNG extends across several major tectonic plate boundaries and is one of the most seismically active regions in the world. Lihir Island is located in the West Melanesian Arc seismic source zone where earthquakes of up to magnitude eight have been recorded. Most earthquakes in the region result from strike-slip movement but some occur along steeply dipping reverse faults resulting in a strong vertical motion component and have potential to generate local tsunamis. Both tsunami and earthquake risks have been assessed and incorporated into the project design criteria.

Volcanic activity on Lihir Island is limited to remnant hydrothermal venting in the Luise Caldera in the form of hot springs and fumaroles. Steam and gas (including H₂S) naturally discharge within the pit area and along the Kapit beach and nearshore region. The hydrothermal reservoir temperatures can reach 100°C at the water table and exceed 200°C.
at depth. Isolated geothermal activity in the form of hot springs is evident elsewhere on the island, such as within the southern Kinami caldera.

5.4 Access

Prior to the discovery of gold at Lihir, the population of the Lihir Island group was approximately 7,100. The economy was centred on subsistence agriculture and the population lived in many small villages around the island.

The construction and ongoing servicing of the mine and related infrastructure required the construction of port facilities, an upgrade of the existing airstrip, the development of accommodation facilities, and infrastructure services to support the operation. Most travel to and from the island is via aircraft, however, sea passenger services do operate to local islands. Marine facilities are established to service oil tankers, general cargo ships, passenger ferries, and work boats.

All key services required for the mine were constructed by the property owners i.e. power, water supply, roads, and other infrastructure.

A mine village has been constructed at Londolovit to house mine staff, contractors and families who are not Lihir residents, as the local area is unable to supply the workforce required by the mine. The mining leases are accessed by sealed road from Londolovit, which is approximately four kilometres north of the mine.

5.5 Surface Rights

Lihir has been granted rights to undertake mining and processing of gold and related activities, through negotiations with the state and local government, and landowners in the area.

Newcrest holds a granted mining lease, but there are some areas of the lease where agreements are not yet in place with local landowners or the community, notably Alaia Rock which is of cultural significance to the local population.
6 HISTORY

6.1 Project Ownership

In 1982, gold mineralization was discovered on Lihir Island leading to a major exploration campaign and feasibility study, culminating in the PNG Government granting a Special Mining Lease in 1995 to the Lihir Joint Venture Project comprising Rio Tinto Limited (Rio Tinto) and Nuigini Mining Limited.

In 1995, Lihir Management Company was established to own and operate the Lihir Gold Mine, construction started in the same year and first gold was poured in 1997. Since then, annual production has progressively increased.

In 2005, Rio Tinto divested itself from the joint venture and a new company Lihir Gold Limited (LGL) was formed. A new CEO and management team was established to operate the mine.

In 2008, LGL approved a major expansion to the mine process plant to increase annual gold processing capacity to approximately one million ounces per year, denoted as the Million Ounce Plant Upgrade (MOPU). Construction of the expansion commenced in 2008 and is scheduled for completion in 2012.

In August 2010, LGL merged with Newcrest.

6.2 Production

Production commenced from Lihir in 1997 and has generated cumulative production in excess of 9.0 Moz of gold since start up. Production statistics are presented in Table 6.1.
### Table 6.1  Historical Mill Production from Lihir

<table>
<thead>
<tr>
<th>Period</th>
<th>Mill Throughput (t 000’s)</th>
<th>Feed Grade (g/t Au)</th>
<th>Gold Recovery (%)</th>
<th>Gold Production (oz)</th>
</tr>
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<tr>
<td>Jan – Dec 1997</td>
<td>717</td>
<td>6.69</td>
<td>88.0</td>
<td>135,975</td>
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<tr>
<td>Jan – Dec 1998</td>
<td>2,352</td>
<td>6.94</td>
<td>93.7</td>
<td>530,000</td>
</tr>
<tr>
<td>Jan – Dec 1999</td>
<td>2,911</td>
<td>7.04</td>
<td>95.1</td>
<td>625,147</td>
</tr>
<tr>
<td>Jan – Dec 2000</td>
<td>3,413</td>
<td>6.01</td>
<td>91.6</td>
<td>606,311</td>
</tr>
<tr>
<td>Jan – Dec 2001</td>
<td>3,619</td>
<td>6.18</td>
<td>90.0</td>
<td>647,942</td>
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<tr>
<td>Jan – Dec 2002</td>
<td>3,828</td>
<td>5.46</td>
<td>89.6</td>
<td>607,087</td>
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<tr>
<td>Jan – Dec 2003</td>
<td>3,926</td>
<td>4.95</td>
<td>88.0</td>
<td>550,772</td>
</tr>
<tr>
<td>Jan – Dec 2004</td>
<td>4,158</td>
<td>5.11</td>
<td>88.5</td>
<td>599,399</td>
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<tr>
<td>Jan – Dec 2005</td>
<td>3,482</td>
<td>5.98</td>
<td>89.7</td>
<td>595,966</td>
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<td>Jan – Dec 2006</td>
<td>4,344</td>
<td>5.14</td>
<td>90.2</td>
<td>650,811</td>
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<td>Jan – Dec 2007</td>
<td>4,816</td>
<td>5.25</td>
<td>86.0</td>
<td>700,211</td>
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<tr>
<td>Jan – Dec 2008</td>
<td>6,154</td>
<td>4.76</td>
<td>82.5</td>
<td>771,456</td>
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<tr>
<td>Jan – Dec 2009</td>
<td>6,509</td>
<td>4.99</td>
<td>81.3</td>
<td>853,391</td>
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<tr>
<td>Jan – Jun 2010</td>
<td>3,316</td>
<td>4.37</td>
<td>81.9</td>
<td>377,199</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>59,830</strong></td>
<td><strong>5.35</strong></td>
<td><strong>87.9</strong></td>
<td><strong>9,042,641</strong></td>
</tr>
</tbody>
</table>
7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Bismarck Archipelago is located in north-east PNG (Figure 7.1) and includes the islands of New Britain, New Ireland, Bougainville and the Solomons. Lihir Island is one of four volcanic island groups that form a chain parallel to the New Ireland coast line called the Tabar to Feni Chain. The islands in this chain are volcanic of largely Pliocene to Recent age rising from a submarine platform. The island chain has a varied but predominately shoshonitic composition.

Figure 7.1 Regional Geological Framework

7.2 Deposit Geology

7.2.1 Geological Setting

Lihir Island is formed from the remnants of five volcanoes (Figure 7.2). Lihir operations are located within the youngest volcano at Luise Caldera on the eastern side of the island (approximately one million years old), although gold mineralization itself dates from 0.15 to 0.90 million years. The Island Group lies along a north-north-east (~025°) trending submarine ridge. The most prominent faults on Lihir Island are normal faults striking 040° to 050° and dipping 40 to 50° to the north-west.
Exploration has identified several adjacent and partly overlapping mineral deposits in the Luise Caldera, which are collectively called the Ladolam Deposit. The principal component deposits are called Lienetz, Minifie, Coastal and Kapit. The limits of the mineralization have not been completely defined and are open at depth, along strike and to the east (currently limited by the Pacific Ocean).

Gold mineralization in the Luise Caldera is hosted within volcanics, intrusives, and breccias which have undergone extensive alteration. Two major alteration episodes have been identified which have destroyed much of the original host rock lithologies, and due to this an “ore type” classification has been developed based largely upon various combinations of alteration, hardness, the degree of brecciation and/or leaching of matrix material, and the presence of late stage anhydrite veining.

Whilst this is more a metallurgical classification than a geologic one, it has proved useful in determining many of the mining and processing characteristics of the orebody and the host rocks. The ore types are roughly sub-horizontal in occurrence and form a fairly consistent vertical sequence of clay-rich rock, grading into white mica-feldspar rock, then feldspar-biotite and, at depth, into feldspar-biotite-anhydrite rock.
Within and at the boundaries of the ore types, geological structure is also a major influence on the localization of higher gold grades in the orebodies.

7.2.2 Alteration

Two major alteration episodes have been identified. There was an earlier and deeper “porphyry style” event resulting in potassic alteration grading laterally into propylitic alteration. This was followed by a later and higher level epithermal event producing argillic, advanced argillic, phyllic, and lower temperature potassic alteration.

Early stage potassic alteration occurred, associated with the emplacement of alkalic stocks within the volcanic edifice, with peripheral and broadly contemporaneous propylitic alteration.

Sudden collapse of the volcanic edifice is interpreted to have resulted in the rapid depressurizing of the system and subsequent telescoping of epithermal alteration and associated gold mineralization upon the porphyry environment. Argillic and advanced argillic alteration assemblages developed through continued geothermal activity, driven by post mineralization magmatism. Geothermal activity continues.

7.2.3 Mineralization

Gold is the only metal of economic significance present within the Luise Caldera. A number of mineralization styles have been recognized, ranging from early porphyry to late stage epithermal mineralization. Two of these represent economically significant phases of gold mineralization at Lihir.

- The most important is refractory potassium feldspar-sulphide mineralization. In this association, gold occurs primarily as sub-micron size particles in sulphide minerals. Overall sulphide content is relatively high, with the average sulphur grade of the reserves being above 6%. The main sulphide mineral is pyrite, with the marcasite form present as an accessory mineral and rare arsenopyrite.

  Gold also occurs as small (less than 100 micron) blebs within fine pyrite crystals. The sulphides are characterized by their fine grained nature, and have been deposited through wholesale flooding and deposition within all host rocks, imparting a sooty, dark grey coloring to the host rocks. Within the Lienetz and Kapit orebodies (and in some localized portions of Minifie) this style of mineralization has been associated with strong leaching of the original lithologies creating pinhole to open, vughy textures.

  Cavities of up to 10 m in extent have been encountered in Lienetz. This secondary porosity is thought to have been the result of dissolution of host rock by hot alkaline fluids as a result of boiling.
• The second significant style of gold mineralization occurs as a low sulphidation quartz-chlorite-bladed anhydrite association, more typical of epithermal style mineralization, deposited through the mixing of magmatic fluids with oxidising near-surface water. Occasional free gold, up to several millimetres in size, has been observed in association with this mineralization style.

Mineralization occurs as discrete fracture filled veins through all levels of the deposits, and is inferred to be an overprinting style of epithermal mineralization associated with the cooling of the active geothermal system within the Luise Caldera. It is also characterized by relatively high, though erratic, gold grades when compared with the high sulphidation style of mineralization.
8 DEPOSIT TYPES

A model for gold emplacement at Lihir is presented in Figure 8.1. Listric faults (developed during the collapse of the Luise volcanic edifice) acted as conduits for hot magmatic fluids rising towards the surface. Extensive phreatomagmatic brecciation which developed after the unloading of the system by edifice collapse is interpreted to have provided sites of increased permeability and fluid mixing.

High sulphidation refractory gold deposition subsequently occurred along these feeder structures and closely linked breccia units. Clay rich, argillically altered material acted as a cap to the system, with gold deposition penetrating into this overlying material constrained to strongly developed structures only. As the system cooled, low sulphidation, epithermal style gold mineralization developed as discrete, generally narrow (<10 cm), structurally controlled mineralized veins or vein sets, closely associated with the listric feeder structures of the earlier high sulphidation mineralization.

Figure 8.1 Conceptual Genetic Model for Gold Deposition at Lihir
9 EXPLORATION

The first systematic mineral exploration in the region was undertaken by the PNG Bureau of Mineral Resources and the Geological Survey of PNG between 1969 and 1974. In their report (which was released in 1982), it detailed the hydrothermal alteration and thermal activity evident on Lihir Island and suggested that it was a favorable geologic environment for epithermal gold mineralization.

Gold mineralization at Lihir was initially discovered in 1982 by a joint venture between Kennecott Exploration and Niugini Mining. Geologists sampled pyritized, silicified outcrops and boulders along the beach of the harbour, adjoining Luise Caldera on the east side of Lihir Island. These samples were highly anomalous in gold grades.

In November 1982, the PNG Government lifted a moratorium previously imposed on the issuance of new prospecting authorities, and on the same day the participants in the Joint Venture applied for a prospecting authority (now called an EL) covering the whole of Lihir Island and part of Luise Harbour. This prospecting authority was issued seven months later.

Semi-detailed mapping, soil samples, rock chips and hand-cut trenches made in 1983 outlined surface gold mineralization in the Luise Caldera, ultimately identifying four areas of gold mineralization within the Luise Caldera i.e. Minifie, Lienetz, Coastal and Kapit.

Diamond drilling commenced in the Coastal area in 1983, and continued in conjunction with bulldozer trenching in both the Coastal and Lienetz areas throughout 1984. Although all holes intersected mineralization, extensive disseminated gold mineralization was first discovered in hole L13-3 at Lienetz. By the end of 1984, the presence of a potential large gold resource had been confirmed and in 1985 the drilling program was expanded to include reverse circulation (RC) drilling in order to delineate oxide mineral resources. The Minifie area, immediately south of Lienetz, was drill-intersected in 1986 and the first drill hole in the Kapit area found a thick section of potentially economic gold mineralization in late 1987.

In addition to drilling, exploration work has included detailed topographic, geochemical and geophysical surveying, surface geological mapping, trenching, auger sampling, specific gravity determinations, hydrogeology, petrology and mineralogy studies.
10 DRILLING

10.1 Overview

Drilling is the primary source of data for mineral resource estimation at Lihir. Data is sourced from a number of methods including diamond coring, RC drilling and rotary drilling (used for grade control sampling). All data is used for interpretation with only the diamond and RC drilling used for grade estimation.

10.2 Drilling Statistics

Figure 10.1 shows drillhole locations at Lihir and Table 10.1 summarizes the drilling statistics. The majority of drilling for resource estimation is diamond drill core, comprising PQ (84.8 mm core diameter), HQ (63.5 mm core diameter) and NQ (47.6 mm core diameter).

Figure 10.1 Drillhole Locations and Topography

NB – DD = Diamond, OHP = Open Hole Percussion, RC = Reverse Circulation Percussion
Table 10.1 Drilling Statistics to 30 June 2011

<table>
<thead>
<tr>
<th>Drilling Type</th>
<th>Number of Holes Drilled</th>
<th>Metres Drilled (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond drilling</td>
<td>1,636</td>
<td>400,804</td>
</tr>
<tr>
<td>RC Percussion drilling</td>
<td>700</td>
<td>33,076</td>
</tr>
<tr>
<td>Open Hole percussion drilling</td>
<td>232</td>
<td>79,106</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,568</strong></td>
<td><strong>512,987</strong></td>
</tr>
</tbody>
</table>

10.3 Drilling Conditions

Lihir is an active geothermal area and all drilling activities are established carefully to ensure that drilling is safely conducted when zones of high pressure steam are intersected (Figure 10.2).

Figure 10.2 Drilling Operations at Lihir
10.4 Hole Surveying

All completed drillhole collars are surveyed by the mine surveyors.

A variety of methods have been used to measure downhole deviation (dip and azimuth), including conventional camera, electronic single shot and gyroscopic methods. The majority of the holes have been surveyed using conventional camera methods. At present, single shot electronic surveys are completed at an initial depth of 50 m and thereafter every 50 m downhole.

10.5 Core Orientation

Very little core orientation is performed on site as the ground conditions downhole are generally quite poor due to broken or faulted ground and high clay contents in the upper sections of the deposit. This makes it very difficult to transfer orientation lines or match between runs.

10.6 Core Recovery

There are only minor zones of lost core or poor core recovery. Core recovery is generally excellent with core recoveries around 99%.

10.7 Logging and Sampling

All diamond drillholes are processed in-house. Core photography, geological and structural logging, bulk density and geotechnical data are collected prior to (typically) half core sawing to sample the core and forwarding for assaying. Logging data are entered into the database via a laptop computer.

At the completion of drill core logging, the geologist defines which intervals of a drillhole are to be cut for analysis. All recent drilling is analyzed on 2 m intervals on the metre mark. PQ series and HQ series drill core is sampled by cutting the core in half with a diamond blade saw. NQ series core is not cut in half as the entire section is sampled so that sample support is maintained.

All data collection and sampling is conducted on site at the Lihir core processing facility, which includes logging sheds, core cutting, and storage areas.
11 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 Drill Core Sampling

Lihir has a well maintained core logging and storage facility at the mine where all logging and sampling activities take place.

After core logging, a cut-line is drawn on the core and the core is photographed. Intact and competent drill core is cut in half along the cut-line using a diamond saw. Where the core is too soft to be cut with a diamond saw, a knife is used to cut the core in the core tray. Where the core is too broken or brittle to be cut by the saw, the fragments are manually sampled.

The standard sampling interval is 2 m. The left hand half of the core is placed in a calico bag marked with the appropriate sample number and sent to the laboratory for sample preparation and assaying. The remaining half core is stored in the original trays on pallets at the core processing facility.

Gold and sulphur reference material and blanks are inserted at a ratio of 1:20 and recorded on the dispatch sheet.

11.2 Sample Preparation

Lihir has a sample preparation facility at the mine and all routine drill core samples are processed on site.

Sample preparation for analysis is as follows:

- Samples are crushed to 10 mm maximum diameter and split to a maximum weight of 3 kg using a riffle splitter.
- Split samples are dried in an oven at 160°C for several hours.
- Each 3 kg sample is pulverized using a Labtechnics LM5 pulverizing mill to specified grind parameters of 90% passing 106 micrometers.
- A 200 g sub-sample is collected for analysis and submitted to the assay laboratory.

11.3 Analysis

Lihir has an assay laboratory at the mine and all routine drill core samples are processed on site. Samples are analyzed routinely for gold, copper and sulphide sulphur. Assay protocols are summarized in Table 11.1. Results are recorded electronically and sent to the Geology Department to be uploaded to the resource database for checking and validation.
### Table 11.1  Lihir Assay Techniques and Detection Limits

<table>
<thead>
<tr>
<th>Element</th>
<th>Technique Description</th>
<th>Detection Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Au</td>
<td>Fire assay with 25 g charge and Atomic Absorption Spectroscopy (AAS) finish. Detection limit of 0.01 ppm (g/t).</td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>Primary analysis with 0.5 g sample using digestion by mixed acid (perchloric, hydrochloric and nitric) digest followed by Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES). Ore grade (&gt;1%) mixed acid digest for Cu &gt;= 1% with flame AAS finish. Detection limit of 0.01%.</td>
<td></td>
</tr>
<tr>
<td>Sulfide S</td>
<td>The sample is ignited at high temperature in a stream of oxygen. The resulting sulphur dioxide is measured by an infra-red detector using a Carbon/Sulphur analyser. S detection limit of 10 ppm.</td>
<td></td>
</tr>
</tbody>
</table>

#### 11.4 QA/QC Procedures

All assays are checked and verified in accordance with the Newcrest Resource Development Quality Assurance Quality Control (QA/QC) and database management procedures. QA/QC procedures have been in place for all of the historic drilling programs at Lihir.

A detailed QA/QC program is in place for ongoing assessment of sampling and analytical procedures. The process currently involves submission and analysis of:

- Blind submissions of certified reference material (standards) to Lihir laboratory.
- Duplicates from the LM5 pulverizer pulp, assayed during the same batch.
- Blind resubmission of pulps to Lihir laboratory.
- Replicate submissions of pulps to an alternative laboratory for analysis.
- Submission of coarse blank samples (Non-Lihir Island barren rock samples).
- Checks on grind and crush size from the sample preparation steps.
- Visits to the laboratory for confirmation of actual procedures applied.
- Monthly QA/QC meetings with laboratory personnel.

A monthly report is prepared by the mine detailing QA/QC performance and an annual report is prepared to support the documentation of the mineral resource estimate.

#### 11.5 Certified Reference Materials

The Lihir database contains 5,635 standards with results for gold. There have been 30 standards used, not all of which were certified for sulphur. The first 16 standards were off-the-shelf standards. Since 2008, there have been 14 standards used, all matrix-matched. The latest series of standards (LGL series) are paired standards with
two standards having almost the same grade, and certified for gold, sulphide sulphur and total sulphur.

11.5.1 Lihir Laboratory – Gold

Figure 11.1 shows the recent chronological performance of the standards for gold, expressed in terms of the number of standard deviations the assay result was from the certified value. Results are disappointing because there are a large number of standards that return assay results that are more than five standard deviations from the expected value. Newcrest interpret these as mislabeled samples or swapped samples and indicate problems with the sampling protocols. In 2011, the number of incidents where this has happened reduced significantly due to increased attention to this issue on site.

![Figure 11.1 Recent Chronological Performance of All Gold Standards](image)

Vertical Axis = Standard Deviations, Horizontal Axis = Time.

95% of sample results should fall within 2 Standard Deviations (zone coloured yellow).

Taking the mismatched samples into account, the data suggests there is a systematic negative bias in the Lihir assay laboratory performance for gold of the order of 5%. Whilst this bias is not considered to be a serious problem, during 2011 the mine has implemented a range of measures to improve laboratory performance.

11.5.2 Independent Laboratory – Gold

A limited number of checks performed on the LGL series standards at an independent laboratory have returned comparable results with Lihir, suggesting the certified value for gold of the LGL series standards may be slightly too high. The mine is currently investigating this possibility by submitting a number of these standards to umpire laboratories for analysis.
11.5.3 Lihir Laboratory – Sulphide Sulphur

Figure 11.2 shows the recent chronological performance of the standards for sulphide sulphur, expressed in terms of the number of standard deviations the assay result was from the certified value. Results also show the effect of a large number of standards that return assay results that are more than five standard deviations from the expected value, as well as the recent improvement.

Figure 11.2 Recent Chronological Performance of All Sulphide Sulphur Standards

Vertical Axis = Standard Deviations, Horizontal Axis = Time.
95% of sample results should fall within 2 Standard Deviations.

Taking the mismatched samples into account, the data suggests there is a systematic positive bias in the Lihir assay laboratory performance for sulphur of the order of 15-20%. The method used to determine sulphide sulphur at site is non-standard and uses a controlled and reduced temperature to convert sulphide sulphur to sulphur dioxide which is then measured by an infrared detector. The positive bias is considered to be due to the different procedure used at site compared to the procedure used to generate the expected value.

11.6 Pulp Duplicates

The assay database notionally contains over 27,000 repeats. However, for much of this data, it is not possible to reliably determine the type of repeat of the sample data. Many of the samples do not have paired values and are therefore unlikely to be repeats. The problem is due to a change of software package implemented in 2009 whereby sample and assay method codes from the database used previously were not transferred to the new system.

11.6.1 Lihir Laboratory Gold Repeats – Same Batch

Figure 11.3 presents a scatter plot of samples submitted to the Lihir laboratory since 2009 that have repeat values. The plot shows that results are reasonable.
11.6.2 Lihir Laboratory Gold Repeats – Blind Resubmissions

Figure 11.4 presents a Q-Q Plot showing results from a program of blind resubmissions totaling 349 pulp samples to the Lihir laboratory. The plot shows that results are excellent with no bias.
11.6.3 Independent Laboratory Gold Repeats – Same Batch

Figure 11.5 presents a scatter plot of samples submitted to an independent laboratory since 2009. The plot suggests there are a small number of mislabeled samples and a lack of precision in determinations below approximately 0.5 g/t Au, but above this level the results are reasonable.

11.6.4 Independent Laboratory Gold Repeats – Blind Resubmissions

From 2000 to 2005 there was a large sample re-assay program in which nearly 50,000 sample pulps originally analyzed at the Lihir laboratory were resubmitted for analysis at an independent laboratory. Figure 11.6 presents a Q-Q Plot showing results from this program. The plot shows that at low assay values less than 0.1 g/t Au, Lihir laboratory shows a positive bias, but above 15 g/t Au the Lihir laboratory has a negative bias and understates the grade compared with the independent laboratory.
Figure 11.5  Independent Laboratory – Same Batch Gold Repeats Since 2009
11.7 Coarse Blanks

The Lihir database contains 598 coarse blanks with results for gold. These samples cover the period from March 2008 to May 2010. The blank material was sourced from a local basalt quarry on the island.

Figure 11.7 shows the chronological performance of the blanks for gold, expressed in terms of the analyzed gold grade. Two groups of data are shown – Group 1 data has a 0.02 g/t detection limit and Group 2 has a 0.1 g/t detection limit.

Results suggest there are a number of mislabeled samples with high gold content, consistent with results from the other standards, particularly samples greater than 0.3 g/t Au. Group 1 blanks also show a significant number of spikes which could be an indication of either low grade sample swaps or potential contamination in sample
preparation. These spikes continue during the initial introduction of Group 2 blanks, but performance improves for the last 100 samples.

Coarse blanks were discontinued in May 2010 after it was found that the basalt had been contaminated with mine waste rock that contained elevated sulphur content. They are in the process of being re-established.

**Figure 11.7  Lihir Laboratory – Coarse Blanks Performance**

![Graph showing Coarse Blanks Performance](image)

### 11.8 QA/QC Summary

Historical QA/QC performance at Lihir has been relatively poor and all control measures used indicate that there have been some serious problems at the mine with sample mix-ups, swaps and mislabeling. It is fair to assume that if control samples are subject to these problems, so too are the routine drill samples. Therefore there is some uncertainty as to the correctness of individual sample analyses for both gold and sulphide sulphur.

QA/QC results do not suggest there is a serious bias in the performance of the Lihir laboratory in terms of gold analysis. Therefore whilst there are concerns over the accuracy of individual samples, this problem does not translate into a concern at a global level.

QA/QC results suggest there is a significant positive bias in the performance of the Lihir laboratory in terms of sulphide sulphur analysis. Whilst this is believed to be due to Lihir laboratory using a different analytical technique to that used to determine the certified value, it does raise a concern about the accuracy of this data. It is noted that sulphide sulphur assays are used for metallurgical characterization and are not directly applied to mineral resource and mineral reserve estimates.
12 DATA VERIFICATION

All data and interpretative inputs to mineral resource estimates are checked and verified in accordance with a range of Newcrest standard operating procedures (SOP). Procedures were also in place for all of the historical drilling programs at Lihir.

Diamond drillholes are processed in-house using a dedicated core processing facility, sample preparation and analytical laboratory. Core is marked up and photographed with geology, bulk density and geotechnical information recorded on dedicated core logging laptops. All resource logging data is automatically uploaded to the resource database via logging notebook computers.

Newcrest employs a dedicated resource database team to check, verify and validate new data and to ensure the integrity of the total resource database. Day to day management of the resource data is undertaken by the database administrator on site using the customized acQuire database system.

Login and access permissions are limited to control access to the database and to maintain the integrity of the resource data. Data access is generally limited to project geologists and the database administrators.

Newcrest undertakes regular internal and external reviews of all geological and mineral resource estimation processes to check the quality and integrity of these procedures.

The Qualified Persons have, through examination of internal and public Newcrest documents, personal inspections on site and discussions with Newcrest personnel, verified the data in this Report and satisfied themselves that the data is adequate for the purpose of this report.
13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

The Lihir gold processing facility commenced operations in 1997 treating high grade ore (HGO) with lower grade ore stockpiled for later processing. Gold production has increased progressively since start up, and achieved annual production of 790,974 ozs in the year ending June 2011. The original process plant flow sheet consisted of ore grinding, auto-thermal whole ore oxidation in pressure autoclaves, followed by gold recovery from washed oxidized slurry using conventional Carbon-In-Leach (CIL) cyanidation. The plant has been expanded with the installation of a flotation plant installed in 2007 which allows the sulphur content of lower grade ore types to be increased in autoclave feed.

In 2008, a decision was made to undertake a further major expansion to the plant to achieve a nominal annual plant gold capacity of around one million ozs (MOPU). The expansion is currently underway. The processing technology and flow sheet selected for the upgrade is as per previous operations. The current process plant operations and the changes to be introduced with the MOPU are described in Section 17 of this report.

A significant amount of metallurgical testwork was undertaken as part of the original feasibility for the project. The range of ore types to be treated in future operations are now well understood from 14 years of continuous operations. The metallurgical parameters of various ore types from the deposit are well established, and therefore no major new test work programs have been undertaken as part of the current MOPU implementation.

13.2 Ore Type and Mineralogy

Metallurgical test work undertaken as part of the original Lihir Feasibility Study showed that the ore is refractory. Direct cyanidation of finely ground ore yielded less than 30% gold extraction, and coarse gold is extremely rare. Gold present in ore is principally as auriferous pyrite and accessory marcasite. Other base metal sulphides and sulfosalts (such as chalcopyrite, sphalerite, arsenopyrite, and tennantite-tetrahedrite) are also present at minor and trace levels. The ore generally contains low levels of arsenic, principally as an impurity in pyrite. After a number of oxidative test work campaigns in the original feasibility study, whole ore pressure oxidation was selected for Lihir over other processes tested, including flotation and roasting, bio-oxidation and whole ore roasting.

Metallurgical test work and operating experience at site has shown that there are main five rock types of increasing hardness identified as:

- Argillic Clay
- Advanced Argillic
- Leached Soak Domain
- Boiling Zone
- Anhydrite Sealed
Comminution test work undertaken on the various rock types as part of the feasibility studies allows prediction of the hardness properties of each block of ore, and prediction of plant power requirements.

The target sulphur content in slurry to the autoclave is in the range 5-7% to ensure auto-thermal operation of the autoclave. Ore blending and flotation plant operation is undertaken in a manner to maintain this feed sulphur content.

13.3 Gold Recovery

The mean gold recovery over the 12 month period ending June 2011 was 83%. Ore treated in the flotation plant has a lower overall recovery due to gold losses in flotation tail.
14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

Newcrest has reported a mineral resource estimate for Lihir as at 31 December 2011. The mineral resources have been prepared under the direction of Competent Persons under the JORC Code using accepted industry practice and have been classified and reported in accordance with the JORC Code.

There are no material differences between the definitions of Measured, Indicated and Inferred Mineral Resources under the CIM Definition Standards and the equivalent definitions in the JORC Code.

Mineral resources comprise the open pit mineral resources plus surface ore stockpiles. Open Pit resources are reported inclusive of mineral reserves and represent the resources located inside a pit shell developed using a gold price of US$1,400 per oz. A cut-off criterion of 0.85 g/t Au has been applied to resources for reporting purposes in December 2011, based on a gold price assumption of US$1,100 per oz.

14.2 Mineral Resources

Table 14.1 presents the Lihir Mineral Resources. Mineral resources comprise Measured Resources, which are the low, medium and high grade stockpiles; as well as Indicated and Inferred Resources. There are no Measured Resources in the orebody model.

<table>
<thead>
<tr>
<th>Resource Classification</th>
<th>Tonnes (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured</td>
<td>94</td>
<td>2.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Indicated</td>
<td>700</td>
<td>2.0</td>
<td>44.8</td>
</tr>
<tr>
<td>Inferred</td>
<td>87</td>
<td>1.7</td>
<td>4.6</td>
</tr>
</tbody>
</table>

14.3 Modeling and Estimation

14.3.1 Geological Interpretation and Domaining

Geological interpretation of ore type and gold domains is based on drilling information nominally spaced at 35 m intervals in cross section and 10 m intervals in plan.

Sixteen mineralization domains and one background waste domain have been interpreted and modeled, as illustrated in Figure 14.1. These domains are interpreted using nominal cut-off criteria of 3.5 g/t Au for high grade areas and 1.0 g/t Au for low grade areas.
Figure 14.1 3D Representation of Lihir Mineralization Domains, Looking North-East

Five alteration styles have been interpreted i.e. argillic, anhydrite sealed, boiling zone, leached-soaked, and advanced argillic (Figure 14.2).
14.3.2 Compositing and Data Analysis

Drillhole data was composited at 6 m intervals for gold prior to flagging by mineralization and alteration domains. The drillhole data was also composited at 2 m intervals for estimating sulphur and copper which are important for process considerations. The drillholes were composited downhole without any boundary constraints to ensure that no data was lost adjacent to boundaries.

Data analysis consisted of the following:

- Univariate and bivariate statistics.
- Grade capping assessment.
- Slice plots of grade by easting, northing and RL to assess stationarity assumptions.
- Contact analysis to assess the existence of sharp and/or gradational boundaries between domains.
- Q-Q plots to assess the effectiveness of domain choices.
Based on this review, Newcrest adopted the following criteria for grade estimation:

- For gold grade estimation, the 17 original ore domains were consolidated into ten domains (Table 14.2).
- For sulphur grade estimation, the five original alteration domains were consolidated into four domains (Table 14.3).
- For copper grade estimation, no constraining domains were applied and a global domain was used.
- For dry bulk density (DBD), three domains were created matching subsets of the original alteration domains (Table 14.3).

Table 14.2  Lihir Modeling Domains and Mineralization Domains

<table>
<thead>
<tr>
<th>Model Domain Code</th>
<th>Mineralization Domain Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>2</td>
<td>Kapit Halo</td>
</tr>
<tr>
<td>502</td>
<td>3</td>
<td>Lienetz Halo</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>North Lienetz Halo</td>
</tr>
<tr>
<td>503</td>
<td>1</td>
<td>Kapit Central</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Lienetz Central</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>North Lienetz Central</td>
</tr>
<tr>
<td>504</td>
<td>5</td>
<td>Coastal</td>
</tr>
<tr>
<td>505</td>
<td>9</td>
<td>ROM</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Borefields</td>
</tr>
<tr>
<td>506</td>
<td>11</td>
<td>Tamaduk</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Minifie Halo</td>
</tr>
<tr>
<td>507</td>
<td>15</td>
<td>Minifie Central</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Minifie Horseshoe</td>
</tr>
<tr>
<td>508</td>
<td>17</td>
<td>Minifie Deeps</td>
</tr>
<tr>
<td>509</td>
<td>22</td>
<td>Link Central</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>Link Halo (no longer domained separately by site geologists)</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>Background 'Waste'</td>
</tr>
</tbody>
</table>
Table 14.3  Lihir Model Alteration Domains and DBD Domains versus Interpreted Alteration Domains

<table>
<thead>
<tr>
<th>Model DBD Domain Codes</th>
<th>Model Alteration Domain Code</th>
<th>Interpreted Alteration Domain Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDOM1</td>
<td>SDOM1</td>
<td>1</td>
<td>Advanced Argillic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Argillic</td>
</tr>
<tr>
<td>BDOM2</td>
<td>SDOM3</td>
<td>3</td>
<td>Boiling Zone</td>
</tr>
<tr>
<td></td>
<td>SDOM4</td>
<td>4</td>
<td>Leached Soaked</td>
</tr>
<tr>
<td>BDOM3</td>
<td>SDOM5</td>
<td>5</td>
<td>Anyhtrite Sealed</td>
</tr>
</tbody>
</table>

14.3.3 Grade Capping

Assessment of the need to cap high grades was made by reviewing the raw histograms, and by a metal per composite assessment, i.e. reviewing how much metal is contained by the top 1% of the declustered samples. As a working guide, top cuts are chosen to limit the top 1% of samples to approximately 5% of the contained metal.

Table 14.4 documents the grade caps applied for the 2011 Lihir resources.

Table 14.4  Grade Caps Applied to Lihir Resource Estimation

<table>
<thead>
<tr>
<th>Gold Domain</th>
<th>Gold Cap (g/t)</th>
<th>Sulphur Domain</th>
<th>Sulphur Cap (%)</th>
<th>DBD Domain</th>
<th>DBD Cap (gm/cm³)</th>
<th>Copper Domain</th>
<th>Copper Cap (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>50</td>
<td>SDOM1</td>
<td>–</td>
<td>BDOM1</td>
<td>2.97</td>
<td>Global</td>
<td>–</td>
</tr>
<tr>
<td>502</td>
<td>50</td>
<td>SDOM2</td>
<td>–</td>
<td>BDOM3</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>503</td>
<td>30</td>
<td>SDOM3</td>
<td>–</td>
<td>BDOM5</td>
<td>3.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>504</td>
<td>20</td>
<td>SDOM4</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>506</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>507</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>508</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>509</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14.3.4 Variography

Variography was completed for gold, sulphur, copper and DBD. The variogram models for each estimation domain were aligned to the average orientation of each domain wireframe because none of the experimental variograms were structured enough to demonstrate unambiguous directions of continuity. As a result, the interpreted plane of maximum continuity for the majority of domains dips at a shallow angle to the north-east.
The variogram models were generally interpreted as being isotropic in the plane with shorter ranges perpendicular to the plane of maximum continuity.

Raw experimental variograms were generally un-interpretable due to the highly skewed distributions of gold and the variography was performed on gaussian transformed data and the back-transformed variograms were utilized for kriging.

The nugget effect was obtained from the downhole variograms of the 6 m composites. In general, the nuggets were in the range 30-60%. The gold variograms models are presented in Table 14.5.

**Table 14.5 Gold Variogram Models**

<table>
<thead>
<tr>
<th>Gold Estimation Domain 501 (Top Cap of 50 g/t)</th>
<th>Nugget</th>
<th>Structure 1 (Spherical)</th>
<th>Structure 2 (Spherical)</th>
<th>Structure 3 (Spherical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Variance</td>
<td>1.115</td>
<td>1.036</td>
<td>0.489</td>
<td>0.189</td>
</tr>
<tr>
<td>Proportion of Total</td>
<td>39%</td>
<td>37%</td>
<td>17%</td>
<td>7%</td>
</tr>
<tr>
<td>Range D1 (m)</td>
<td>–</td>
<td>16</td>
<td>54</td>
<td>350</td>
</tr>
<tr>
<td>Range D2 (m)</td>
<td>–</td>
<td>16</td>
<td>54</td>
<td>350</td>
</tr>
<tr>
<td>Range D3 (m)</td>
<td>–</td>
<td>16</td>
<td>54</td>
<td>350</td>
</tr>
<tr>
<td>Rotation (Isatis Math)</td>
<td>20,0,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation (Isatis Geology)</td>
<td>70,0,0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gold Estimation Domain 502 (Top Cap of 30 g/t)</th>
<th>Nugget</th>
<th>Structure 1 (Spherical)</th>
<th>Structure 2 (Spherical)</th>
<th>Structure 3 (Spherical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Variance</td>
<td>1.292</td>
<td>1.706</td>
<td>0.232</td>
<td>–</td>
</tr>
<tr>
<td>Proportion of Total</td>
<td>40%</td>
<td>53%</td>
<td>7%</td>
<td>–</td>
</tr>
<tr>
<td>Range D1 (m)</td>
<td>–</td>
<td>35</td>
<td>225</td>
<td>–</td>
</tr>
<tr>
<td>Range D2 (m)</td>
<td>–</td>
<td>35</td>
<td>225</td>
<td>–</td>
</tr>
<tr>
<td>Range D3 (m)</td>
<td>–</td>
<td>25</td>
<td>25</td>
<td>–</td>
</tr>
<tr>
<td>Rotation (Isatis Math)</td>
<td>-30,0,-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation (Isatis Geology)</td>
<td>120,-25,0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gold Estimation Domain 503 (Top Cap of 30 g/t)</th>
<th>Nugget</th>
<th>Structure 1 (Spherical)</th>
<th>Structure 2 (Spherical)</th>
<th>Structure 3 (Spherical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Variance</td>
<td>5.528</td>
<td>10.052</td>
<td>2.846</td>
<td>–</td>
</tr>
<tr>
<td>Proportion of Total</td>
<td>30%</td>
<td>55%</td>
<td>15%</td>
<td>–</td>
</tr>
<tr>
<td>Range D1 (m)</td>
<td>–</td>
<td>22</td>
<td>115</td>
<td>–</td>
</tr>
<tr>
<td>Range D2 (m)</td>
<td>–</td>
<td>22</td>
<td>115</td>
<td>–</td>
</tr>
<tr>
<td>Range D3 (m)</td>
<td>–</td>
<td>22</td>
<td>80</td>
<td>–</td>
</tr>
<tr>
<td>Rotation (Isatis Math)</td>
<td>-10,0,-20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation (Isatis Geology)</td>
<td>100,-20,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gold Estimation Domain</td>
<td>Structural Variance</td>
<td>Proportion of Total</td>
<td>Range D1 (m)</td>
<td>Range D2 (m)</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Domain 504</strong></td>
<td>3.447</td>
<td>38%</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Domain 505</strong></td>
<td>14.098</td>
<td>55%</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Domain 506</strong></td>
<td>1.616</td>
<td>41%</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Domain 507</strong></td>
<td>4.977</td>
<td>43%</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Domain 508</strong></td>
<td>17.918</td>
<td>54%</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
14.3.5 Estimation Parameters

A three dimensional block model was created to estimate gold, sulphur, copper and DBD as summarized in Table 14.6.

Table 14.6 Lihir Block Model Parameters

<table>
<thead>
<tr>
<th>Variable</th>
<th>X (m)</th>
<th>Y (m)</th>
<th>Z (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>7800</td>
<td>2200</td>
<td>500</td>
</tr>
<tr>
<td>Maximum</td>
<td>11480</td>
<td>6600</td>
<td>1532</td>
</tr>
<tr>
<td>Block Size</td>
<td>40</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>No. of Blocks</td>
<td>92</td>
<td>110</td>
<td>86</td>
</tr>
</tbody>
</table>

Gold grades were estimated into each 40 m x 40 m x 12 m parent block using ordinary kriging (OK). The search neighborhoods were essentially isotropic in the plane of the mineralization with ranges of approximately three to four times the drill spacing. The selection of samples in the Z direction was restricted by limiting the number of samples per drillhole to reflect the intricate geometries of the domains. A summary of the search neighborhood parameters for gold is presented in Table 14.7.

OK was also used for the local estimation of sulphur, copper, and density into 40 m x 40 m x 12 m panels.
Table 14.7  Lihir Search Neighbourhood Parameters for Gold Estimation

<table>
<thead>
<tr>
<th>Domain</th>
<th>Orientation</th>
<th>Dimensions</th>
<th>Angular sectors</th>
<th>Min Samples/Opt Samples per sector</th>
<th>Discretisation</th>
<th>Max No of Samples per hole</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>20,0,0</td>
<td>200x200x40</td>
<td>4</td>
<td>5/6</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>502</td>
<td>-30,0,-25</td>
<td>240x240x40</td>
<td>4</td>
<td>5/7</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>503</td>
<td>-10,0,-20</td>
<td>150x150x80</td>
<td>4</td>
<td>5/5</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>504</td>
<td>-30,0,-25</td>
<td>200x200x90</td>
<td>4</td>
<td>6/5</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>505</td>
<td>45,0,-45</td>
<td>200x200x80</td>
<td>4</td>
<td>5/6</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>506</td>
<td>-15,0,-30</td>
<td>250x250x50</td>
<td>4</td>
<td>6/6</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>507</td>
<td>0,0,-30</td>
<td>180x180x50</td>
<td>4</td>
<td>6/5</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>508</td>
<td>40,0,-30</td>
<td>320x320x50</td>
<td>4</td>
<td>2/8</td>
<td>5x5x2</td>
<td>3</td>
</tr>
<tr>
<td>509</td>
<td>0,0,-15</td>
<td>220x220x90</td>
<td>4</td>
<td>5/6</td>
<td>5x5x2</td>
<td>4</td>
</tr>
<tr>
<td>100</td>
<td>90,0,0</td>
<td>1000x1000x350</td>
<td>1</td>
<td>6/28</td>
<td>5x5x2</td>
<td>5</td>
</tr>
</tbody>
</table>

NB – Orientations provided in Isatis Maths Rotation nomenclature.

Uniform Conditioning (UC) was then used to estimate local gold recoverable resources into 40 m x 40 m x 12 m panels, based on a selective mining unit of 20 m x 20 m x 12 m and implemented taking ‘information effect into account’. This technique estimates the tonnage and grade of mineralisation which can be extracted as smaller selective mining units from large blocks (panels) estimated by OK. UC estimates the proportions of recoverable mineralisation in each panel without specifying the actual locations within these blocks.

The UC model was then converted to a new 20 m x 20 m x 12 m block model using Localized Uniform Conditioning (LUC). In this process spatial grades are estimated that conform to the proper grade-tonnage curves obtained by the UC method, as well as maintaining the relative spatial grade distribution pattern approximated by direct kriging of the small blocks.

The UC/LUC approach is summarized as:

1. Gaussian transformation of variables and construction of back-transformed functions using Hermite polynomials.
2. Support correction using the Discrete Gaussian Model.
3. Conditioning by panel grades.
4. Preparation of grade-tonnage curves to validate the UC estimates against the theoretical selectivity curves.
5. Conversion of the UC model to a LUC model, to estimate gold into a new block model of size 20 m x 20 m x 12 m.
14.4 Resource Model Validation

The Lihir resource model has been extensively validated by:

- Filtering the model and checking for any un-estimated blocks.
- Comparing the global statistics of each domain and variable with the corresponding block estimates.
- Comparing the composite and block grades in slices throughout the deposit.
- Locally comparing drillholes and estimated blocks in cross-section and plan.
- Comparing the resource model with the mine operations grade control model which is used for short term mine scheduling.
- Comparing the resource model to the previous estimate by area and level.
- Comparison of the UC grade-tonnage curves against the theoretical Discrete Gaussian Model.

The global comparisons between composite and block grades are within 5% for most domains and variables. All estimates are considered to be robust.

14.5 Resource Classification

All stockpiles at Lihir are reported as Measured Resources.

The Lihir Mineral Resource is reported within an economic pit outline and is classified into Indicated and Inferred based on geological continuity, data density and in consideration of the proposed mining method. The majority of the resource has been reported as Indicated. The Inferred Resource is limited to the peripheral areas of the resource where drilling spacing is greater and there is less confidence in the geological interpretation.
15 MINERAL RESERVE ESTIMATES

15.1 Introduction

Mineral reserves at Lihir comprise the Lihir open pit mineral reserve and surface ore stockpiles. The mineral reserves have been prepared under the direction of Competent Persons under the JORC Code using accepted industry practice and have been classified and reported in accordance with the JORC Code. The mineral reserves are reported at 31 December 2011.

There are no material differences between the definitions of Proven and Probable Mineral Reserves under the CIM Definition Standards and the equivalent definitions in the JORC Code.

15.2 Mineral Reserve Assumptions

15.2.1 Commodity Prices and Exchange Rate

Lihir Mineral Reserves were estimated using a gold price of US$850 per oz to define pit limits, which was completed in June 2011. There was no contributing revenue from any other minor elements. Selling costs of US$4.66 per oz for refining, 2.0% for royalties and a 0.25% mining levy were applied to estimate the revenue received. Reserves within the final pit limits were reported for December 2011 using a cut-off grade based on an updated gold price of US$950 per oz.

15.2.2 Ore Processing Rates and Metallurgical Recovery

Newcrest has commenced the MOPU to increase the installed capacity of the Lihir ore processing facilities to approximately 11 Mtpa, with further upgrades planned to increase capacity to 14 Mtpa. Newcrest has forecast a reduction in unit fixed processing costs as a result of the increased throughput of the ore processing facilities. This has been factored into the mineral reserve estimation process in the form of cut-off grade calculations and reduced ore processing costs for pit optimization.

Mineral reserves were estimated using ore processing recovery estimations completed by the ore processing team and provided as a series of recovery formulae. Recovery relationships are complex and were converted to a simplified linear relationship for use in pit optimization software. Newcrest has assumed for pit optimization that ore processing recoveries will be improved by an additional 1% of recovery through process improvements as a result of the expansion.

15.2.3 Operating Cost Estimates

The mine design that supports the mineral reserves has been based on the LOM plan developed specifically for mineral reserve reporting. Operating cost estimates used in the preparation of the mineral reserves have been developed from the same LOM plan.
15.2.4 Cut-off Grade

The mineral reserves comprise all mineralized material, that when delivered to the pit rim, has a recovered value greater than the cost of all of the downstream processes, including the expected fixed site costs that are projected to be applicable at the time the material is processed.

Lihir Mineral Reserves are reported at a cut-off grade of 0.95 g/t Au.

As the Lihir operation is constrained by the ore tonnes that can be processed by the mill, the lower grade fraction of ore is currently stockpiled in long term stockpiles and the higher grade fraction processed through the mill. As a result, the low grade stockpiles are expected to be processed at the end of the mine life when mining operations have been completed. The cut-off grade for this material has therefore been calculated based on the fixed costs of a small reclaim fleet re-handling low grade ore from long term stockpiles for processing through the mill.

15.3 Lihir Mineral Reserve

15.3.1 Mineral Reserve Estimate

The December 2011 Lihir Mineral Reserves are based on the mineral resource model used to prepare the June 2011 Mineral Resource estimate and a LOM plan prepared specifically for reporting mineral reserves. The June 2011 resource estimate is not materially different to the December 2011 resource estimate described in Section 14. The mineral reserves as at 31 December 2011 are shown in Table 15.1.

Table 15.1 Lihir Mineral Reserves Estimate at 31 December 2011

<table>
<thead>
<tr>
<th>Mineral Reserve Classification</th>
<th>Tonnes (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockpiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proven Reserve</td>
<td>94</td>
<td>2.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Probable Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lihir Pit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proven Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probable Reserve</td>
<td>330</td>
<td>2.3</td>
<td>24.4</td>
</tr>
<tr>
<td>Total</td>
<td>420</td>
<td>2.3</td>
<td>31.5</td>
</tr>
</tbody>
</table>

Note: Rounding may cause some computational discrepancies in totals

The Proven Mineral Reserve estimate is generated from estimates of the tonnage and grade of stockpiled ore that is classified as a Measured Mineral Resource. There are currently nine separate stockpiles containing high grade (one stockpile), medium grade (three stockpiles) and low grade (five stockpiles) ore that are recorded and monitored using
mine site recording software and reconciled through regular stockpile surveys. Most of the
stockpiled ore is within long-term low grade ore stockpiles, with the two largest stockpiles at
Kapit Flat and Minifie containing approximately 80% of the tonnes.

The Probable Mineral Reserve estimate is generated from Indicated Resources within the
final pit limits identified in the LOM plan. The LOM plan has been developed from pit
optimization, phase and final limits designs, and a detailed production schedule, in which
multiple phases have been used to derive a practical production schedule over the life of
Lihir. Multiple phases operate at any time within the Lihir pit to provide a continuous feed
blend to the ore processing plant. There are eleven phases, with each phase containing
between 1 Mt and 57 Mt of ore.

The planned final dimensions of the pit are approximately 2,000 m by 1,400 m, with a final
depth of approximately 300 m below sea level. A plan showing final pit limits and the
location of each phase is shown in Figure 15.1.
The mineral reserves and waste quantities in each phase are summarized in Table 15.2.
Table 15.2 Lihir LOM Mining Phases from December 2011 Mineral Reserves

<table>
<thead>
<tr>
<th>Mineral Reserve Classification</th>
<th>Ore (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
<th>Total Mining (Mt)</th>
<th>Strip Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase11</td>
<td>16</td>
<td>2.4</td>
<td>1.2</td>
<td>22</td>
<td>0.4</td>
</tr>
<tr>
<td>Phase12</td>
<td>11</td>
<td>2.1</td>
<td>0.7</td>
<td>17</td>
<td>0.6</td>
</tr>
<tr>
<td>Phase9</td>
<td>41</td>
<td>2.5</td>
<td>3.3</td>
<td>82</td>
<td>1.0</td>
</tr>
<tr>
<td>GW28</td>
<td>6</td>
<td>2.6</td>
<td>0.5</td>
<td>25</td>
<td>3.2</td>
</tr>
<tr>
<td>Kapit Upper (waste)</td>
<td>1</td>
<td>1.4</td>
<td>&lt; 0.1</td>
<td>93</td>
<td>86.3</td>
</tr>
<tr>
<td>Kapit Starter</td>
<td>30</td>
<td>3.3</td>
<td>3.2</td>
<td>112</td>
<td>2.8</td>
</tr>
<tr>
<td>Kapit2</td>
<td>47</td>
<td>2.7</td>
<td>4.1</td>
<td>109</td>
<td>1.3</td>
</tr>
<tr>
<td>Kapit3</td>
<td>22</td>
<td>1.9</td>
<td>1.4</td>
<td>52</td>
<td>1.4</td>
</tr>
<tr>
<td>Saddle1</td>
<td>45</td>
<td>2.1</td>
<td>3.0</td>
<td>131</td>
<td>1.9</td>
</tr>
<tr>
<td>Saddle2</td>
<td>57</td>
<td>1.9</td>
<td>3.5</td>
<td>81</td>
<td>0.4</td>
</tr>
<tr>
<td>ROM</td>
<td>50</td>
<td>2.2</td>
<td>3.5</td>
<td>194</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>330</strong></td>
<td><strong>2.3</strong></td>
<td><strong>24.4</strong></td>
<td><strong>920</strong></td>
<td><strong>1.8</strong></td>
</tr>
</tbody>
</table>

*Note: Rounding may cause some computational discrepancies in totals*

The Lihir Mineral Reserve has been prepared using accepted industry practice and has been classified and reported in accordance with the guidelines of the JORC Code. The mine planning processes used for the estimate are logical and well documented.

Inferred Mineral Resources have not been included within the Lihir Mineral Reserve.

### 15.3.2 Production Reconciliation

Lihir Mineral Reserves are supported by close reconciliation of tonnes (1%), gold grade (2%) and contained gold ounces (3%) between the resource model and mine production. A summary of reconciliations is shown in Table 15.3.
Table 15.3  Lihir Model Reconciliations at December 2010

<table>
<thead>
<tr>
<th></th>
<th>Tonnes (Mt)</th>
<th>Gold Grade (g/t)</th>
<th>Contained Gold (Moz)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Grade</td>
<td>4.30</td>
<td>6.65</td>
<td>0.92</td>
</tr>
<tr>
<td>Medium Grade</td>
<td>1.60</td>
<td>3.78</td>
<td>0.19</td>
</tr>
<tr>
<td>Low Grade</td>
<td>11.87</td>
<td>2.14</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Total Resource Model</strong></td>
<td>17.76</td>
<td>3.38</td>
<td>1.93</td>
</tr>
<tr>
<td><strong>As Mined</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Grade</td>
<td>4.87</td>
<td>5.70</td>
<td>0.89</td>
</tr>
<tr>
<td>Medium Grade</td>
<td>2.66</td>
<td>3.37</td>
<td>0.29</td>
</tr>
<tr>
<td>Low Grade</td>
<td>10.12</td>
<td>2.14</td>
<td>0.70</td>
</tr>
<tr>
<td><strong>Total As Mined</strong></td>
<td>17.65</td>
<td>3.31</td>
<td>1.88</td>
</tr>
<tr>
<td><strong>Variance (%Resource Model)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Grade</td>
<td>13%</td>
<td>-14%</td>
<td>-3%</td>
</tr>
<tr>
<td>Medium Grade</td>
<td>67%</td>
<td>-11%</td>
<td>49%</td>
</tr>
<tr>
<td>Low Grade</td>
<td>-15%</td>
<td>0%</td>
<td>-15%</td>
</tr>
<tr>
<td><strong>Total Variance</strong></td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
</tr>
</tbody>
</table>

15.3.3  Estimation Procedure

Lihir is a mature gold mining operation that has been in production since 1996. Inputs to mine planning and pit optimization are based on operating practice and regularly reviewed mine planning forecasts. Information is available to confirm mine planning parameters in the following areas.

- Orebody model to production reconciliations are available to calibrate the resource model against past production and determine how well previous models were able to forecast mine production. Reconciliations showed that no additional ore loss and dilution needed to be included within the model used to generate mineral reserves.

- Equipment operating parameters such as availability, utilization, operating efficiency, required ancillary equipment hours and equipment productivity are available to determine annual operating hours and annual production rates. These parameters were used to determine mine production levels and equipment requirements.

- Operating costs such as equipment operating and maintenance costs, labour costs, explosives costs, dewatering and other associated costs are available and were used to estimate operating costs.
A life of province plan (LOPP) was completed to align the Lihir mine plan to Newcrest corporate objectives. This plan provides strategy guidance to the Lihir mine plan in the areas of ore processing and mining production levels, stockpiling, and cut-off grade strategy, and overall mine sequencing.

The selection of final pit limits for Lihir follows industry standard processes.

- Input assumptions are collated and signed off.
- Pit optimization is run with Whittle software to generate a range of pit shells at different gold prices.
- Pit shells are selected that generate the maximum discounted value.
- Selected pit shells are used as the basis for final limits and phase designs. The final limits pit design is based on the revenue factor 1.0 pit shell.
- Final limit and phase pit designs are interrogated for tonnes and grades, and exported to Comet mine scheduling software.
- Mine scheduling within Comet confirms a practical and economical mine schedule.
- Ore reserves are generated from Indicated Resources within the final pit limits.

The pit optimization process underpinning mineral reserve estimation is well documented and was independently reviewed in September 2010, with a number of changes incorporated as a result of the review.

Inferred Mineral Resource blocks were included within the pit optimization, but were not reported within the mineral reserve. Inferred Mineral Resources constitute approximately 1% of tonnes within final pit limits above the cut-off grade.

### 15.4 Factors Affecting the Mineral Reserve

The Lihir Mineral Reserve will be reduced if construction of the final coffer-dam across Luise Harbour is not successful, and mining of the later stages of the Kapit pit is not able to progress into this area. If this occurs, the ROM and Kapit 3 phases will need to be redesigned to a reduced footprint. There are approximately 72 Mt of ore within these two phases, representing approximately 17% of the mineral reserve.

The Lihir Mineral Reserve will be increased if the approvals needed to mine areas currently excluded from the mine plan are obtained.
16 MINING METHODS

16.1 Mining Operations

Production mining operations at Lihir are conducted by Newcrest using their own equipment fleet and workforce. A separate mining contractor operation using a smaller pioneering fleet is developing new areas on the steeply dipping caldera slopes. Production mining uses a fleet of 500 t class hydraulic face shovels loading into 135 t rear dump haul trucks. Ore and waste is drilled and blasted on 12 m benches and mined in a single pass, except where excessive heave has required a second lift for safety reasons. The ground is frequently too hot for conventional explosives, requiring high temperature blasting products and specialized blasting procedures for mining in hot ground.

Ore is mined to stockpiles segregated by gold and sulphur grade. Low grade ore between 0.95 and 3.0 g/t Au is stockpiled at a number of locations around site for later processing. Medium grade ore between 3.0 and 4.0 g/t Au is stockpiled according to sulphur grade, and is used for blending into the crusher to provide a consistent grade of sulphur into the ore processing plant to maximize autoclave performance. High grade ore above 4.0 g/t Au is stockpiled for short term re-handle into the ore processing plant. Ore is blended off ROM stockpiles by front end loaders and 90 t haul trucks into the crusher according to a blend plan provided by the ore processing plant. An additional small stockpile of crushed ore is maintained by a contractor with a mobile crusher in case of crusher breakdowns.

Waste rock from the mine is either dumped into 1,500 t barges for off-shore submarine disposal or hauled to the harbour for construction of a platform across the harbour for use in a later coffer-dam wall. Submarine disposal is carefully planned and controlled to achieve a continuous rill slope along the steeply dipping sea floor and prevent uncontrolled slumping triggering a tidal surge event. Harbour platform construction is also carefully planned and controlled using spotters to avoid slumping of the outer walls into the ocean and placing haul truck operators at risk.

The current mining fleet used at Lihir is listed in Table 16.1.
Table 16.1 Lihir Current Mine Production Fleet

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Description</th>
<th>Size</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mine Production</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loading Equipment</td>
<td>Terex O&amp;K RH200</td>
<td>500 t</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Terex O&amp;K RH120</td>
<td>250 t</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Caterpillar 992 front end loader</td>
<td>600 kW</td>
<td>2</td>
</tr>
<tr>
<td>Haul Trucks</td>
<td>Caterpillar 785</td>
<td>135 t</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Caterpillar 777</td>
<td>90 t</td>
<td>3</td>
</tr>
<tr>
<td>Dozers</td>
<td>Caterpillar D10</td>
<td>430 kW</td>
<td>10</td>
</tr>
<tr>
<td>Graders</td>
<td>Caterpillar 16H</td>
<td>220 kW</td>
<td>2</td>
</tr>
<tr>
<td>Ancillary</td>
<td>Caterpillar 385 excavator</td>
<td>85 t</td>
<td>1</td>
</tr>
<tr>
<td>Drills</td>
<td>Ingersoll Rand D45</td>
<td>–</td>
<td>7</td>
</tr>
<tr>
<td>Barges</td>
<td>Bottom dump barge</td>
<td>1,500 t</td>
<td>4</td>
</tr>
<tr>
<td><strong>Contractor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loading Equipment</td>
<td>Various</td>
<td>190 t</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Various</td>
<td>120 t</td>
<td>1</td>
</tr>
<tr>
<td>Haul Trucks</td>
<td>Caterpillar 777</td>
<td>90 t</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Caterpillar 773</td>
<td>50 t</td>
<td>5</td>
</tr>
</tbody>
</table>

Mobile equipment fleet requirements are relatively constant over the LOM, with contractor operations able to supplement mining requirements as required.

The grade control of ore is managed by sampling blast-holes. Assay analysis of the samples is completed through an on-site laboratory. Ore block tonnes and grades are uploaded into a truck dispatch system which tracks mine production and records the tonnes and grades of ore blocks mined for orebody reconciliation and ore stockpile monitoring in Snowden Reconciler software.

16.2 Mine Schedule

The Lihir pit comprises three separate mining areas in Minifie, Lienetz and Kapit. These areas have been further sub-divided into 11 phases for mine scheduling purposes. Current mining at Lihir is focused on the Minifie and Lienetz pits, with future mining extending to the Kapit mineralized area that is adjacent to the existing pits. Development of this pit requires relocation of some of the existing low grade ore stockpiles and construction of a coffer-dam within Luise Harbour. A harbour platform of truck dumped mine waste is currently being constructed across the harbour as the initial phase of coffer-dam construction.

Mining production rates are determined by the throughput of the ore processing plant. The mining schedule has been completed to provide high grade ore feed to the ore processing plant, with low grade ore stockpiled in long term stockpiles for processing at the end of mine life. This will result in the mining operation projected for completion in 2031 and the ore
processing operation projected for completion in 2044. At the completion of mining, there is approximately 165 Mt of low grade ore stockpiled for processing.

Phase 11 and Phase 12 are currently being mined with Kapit Upper phase in development. Phase 11 is expected to be completed in 2014, Phase 12 in 2013 and Kapit Upper in 2017. The next phase to commence will be Phase 9 in 2012. Approximately 60 Mt of material is planned for mining and stockpile re-handle each year. The remaining LOM strip ratio is about 2:1 waste:ore.

16.3 Geotechnical, Geothermal and Hydrological Considerations

Pit geotechnical control is through a complex pit slope model containing 53 geotechnical zones across the three pit areas based on lithology, structure, and level within the pit. Inter-ramp angles vary from 12 to 55°, with batter angles from 25 to 70°. Slope failures have occurred, including a major failure of the Caldera wall in the Kapit area in 2005. Geotechnical design is undertaken by independent engineering consultants and is independently reviewed on an annual basis.

Horizontal pit wall holes are drilled to allow dewatering and controlled venting of steam to depressurize pit walls. The mine undertakes probe hole drilling to identify cavities within the rock mass and measure rock temperatures prior to blasting and for input to the development of a temperature block model for the deposit. Extensive prism, pit face radar and geotechnical monitoring of pit slopes and seismic monitoring is also undertaken. Earthquake, tsunami and landslide events have been recorded at the site.

Lihir receives high annual rainfall and has extensive groundwater volumes which are managed through a pit dewatering program and surface water management facilities incorporated into pit designs. Pit dewatering bores are located outside the pit or on pit berms to intercept as much groundwater as possible and minimize groundwater seepage into the pit. Groundwater is highly saline and is discharged into the ocean.

Pit perimeter diversion drains are installed on a 50 m wide drainage berm sloping at 3% to intercept as much surface runoff as possible from the caldera, which is diverted around the mining operation and into the ocean. Remaining surface runoff, groundwater seepage and rainfall is collected by 16 m wide drainage berms incorporated into pit designs and directed into sumps. Water is then pumped by in-pit dewatering pumps to external holding dams before discharge into the ocean. In-pit water is acidic from contact with sulphide rocks.

Geothermal depressurization for Kapit pit mining has been underway since 2004 using a program of steam relief and monitoring wells. Pressure trends to date indicate that depressurization will be sufficient to allow mining to proceed in accordance with current life-of-mine plans. Maintenance of steam relief wells is critical to the successful mining of the Kapit pit.
Newcrest maintains a Geo-hazard Management Plan to identify and manage the various geotechnical and geothermal hazards on site. The plan recognizes and details controls for hazards such as:

- Earthquakes and tsunamis
- Slumping from sub-sea barging operations
- Slumping of pit walls
- Slumping of ore stockpiles
- Geothermal outbursts
- Cavities
- Inrush of water from the sea or perimeter drains

16.4 Future Plans

The MOPU is in progress at Lihir to increase mill throughput. This will result in lower fixed costs per tonne. In addition to a new crushing facility and upgrades to the ore processing plant, additional power generation capacity and water supply is also required. Expansion of the mine into the ROM area will require the relocation or construction of new maintenance workshops and mine offices.

Later expansion of the mine into the Luise harbour will require the construction of an off-shore coffer-dam to allow the enclosed portion of the harbour to be dewatered. The coffer-dam will be a significant structure, designed to be approximately 200 m wide and will be engineered to cope with earthquake and tsunami events. A 100 m wide buffer zone between the toe of the coffer-dam and crest of the pit has been included in the design. The final design for the coffer-dam will be completed by an independent specialist engineering firm and will be independently reviewed.

Infrastructure costs are considered during mine planning by including the cost for construction or relocation of significant infrastructure before that mining area can be developed. Examples of this are where the relocation of a stockpile needs to be included before a mining area can begin or where the coffer-dam needs to be constructed before pit development in that area can proceed.
17 RECOVERY METHODS

17.1 Introduction

Gold present in ore from Lihir consists primarily of sub-micron size particles in sulphide minerals and is therefore refractory to conventional gravity and cyanidation gold recovery techniques. The sulphide minerals must be oxidized to release the gold to make it amenable to cyanide leaching. The oxidation process selected for treatment of ore at Lihir is pressure oxidation whereby the ore is oxidised as a slurry using nearly pure oxygen. Heat evolved from the oxidation is controlled within operating limits to maximise the oxidation rate.

The Lihir gold processing facility commenced operations in 1997 treating HGO with lower grade ore stockpiled for later processing. Gold production has increased progressively since start up. The original process plant flow sheet consisted of ore grinding followed by auto-thermal whole ore oxidation in three pressure autoclaves, and then recovery of gold from washed oxidized slurry using conventional cyanidation techniques. The plant facilities were expanded in 2007 with the addition of a flotation plant which allows the sulphur content of lower grade ore types to be increased in autoclave feed.

The MOPU expansion approved in 2008 involves installation of one additional large autoclave as well as additional crushing; grinding, thickening, oxygen and cyanide leach plant facilities. Figure 17.1 presents the existing process flow sheet, and also shows the additional processing operations to be added as part of the MOPU.
17.2 Existing Operations

17.2.1 Crushing and Milling

Ore is crushed in two alternative primary crushers. Competent ore is crushed in a 42-65" gyratory crusher, while softer ore types are crushed in an Abon toothed rolls crusher. Both crushers discharge onto an overland conveyor up to a radial stacker for stockpiling ahead of the grinding circuits.

There are currently two grinding circuits. One circuit treats HGO that is fed direct to the downstream oxidizing autoclaves, and the second circuit grinds lower sulphur grade material known as “flotation grade” ore (FGO) which feeds a flotation plant. Both grinding circuits have a primary semi-autogenous (SAG) grinding mill, followed by a secondary ball mill in closed circuit with classifying hydrocyclones. The HGO circuit includes two cone crushers for oversize material from the SAG mill. The capacity of the HGO mill is approximately 4.4 Mtpa, while the FGO mill capacity is approximately 3.0 Mtpa. The annual throughputs through each circuit for the 12 months ending June 2011 are presented in Table 17.1. Ground ore is thickened and washed with raw water to minimize chloride concentration in autoclave feed.
Table 17.1 Ore Throughput by Circuit for the Year Ending 30 June 2011

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Tonnes Processed (Mt)</th>
<th>Gold Feed Grade (g/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGO Circuit</td>
<td>3.191</td>
<td>5.01</td>
</tr>
<tr>
<td>FGO Circuit</td>
<td>3.094</td>
<td>4.22</td>
</tr>
</tbody>
</table>

17.2.2 Flotation

Ground FGO ore is subjected to simple bulk flotation in a single roughing stage consisting of a bank of five 150 m³ flotation tank cells. The mass recovery to flotation concentrate is high at approximately 35-40%. The flotation concentrate is thickened to 50-55% solids (%w/w) and then blended with HGO slurry to achieve the required target autoclave feed sulphide grade.

17.2.3 Pressure Oxidation

Thickened ore slurry is pumped to the three parallel autoclave circuits. Conventional gold processing Sherritt autoclave technology at a temperature of 205°C and a pressure of 2,650 kPa is utilized. Feed slurry is first preheated in heat recovery vessels before being pumped under pressure to each of the six-compartment agitated autoclave vessels. Pure oxygen (O₂) from three operating cryogenic oxygen plants is injected into the autoclaves to oxidize approximately 90% of the contained sulphide minerals. Each autoclave has a heat recovery circuit involving a single stage of steam flashing and the flashed steam is used in the direct contact pre-heater vessel.

17.2.4 CCD Washing, Neutralization and Gold Recovery

Oxidised slurry passes through a two stage counter-current decantation (CCD) circuit where it is washed with process water and seawater as required minimizing slurry acidity.

The washed slurry is then neutralized with lime slurry prepared from slaking imported quicklime, and then gold is recovered from the neutralized slurry by cyanide leaching using conventional CIL technology and a series of agitated tanks. The slurry is conditioned with lime in the first tank and cyanide is added to the second tank. The slurry is then agitated with granulated carbon in the remaining tanks and passes through the tanks while the carbon is retained by screens.

Loaded carbon from the CIL circuit is stripped of gold in an elution system. The gold is eluted from carbon using hot caustic/cyanide solution and the carbon is then rinsed with water. The resulting gold solution is circulated through electro-winning cells where gold is recovered through electrowinning to form a gold sludge. The sludge is dried and then smelted to produce doré bars which are shipped to a refinery. Barren carbon is regenerated in a rotary kiln.
17.2.5 Residue Tailings

The CIL leach residue tailings are detoxified by formation of strong metal complexes such as ferrocyanide, and through dilution with seawater (cooling water return) in the junction box upstream of the de-aeration tank.

Under these conditions weak acid dissociable cyanide (CN$_{WAD}$) converts to stable ferrocyanide. The tailings gravitate to a common disposal system which also collects the flotation tailings; remaining CCD wash water as well as oxygen plant and power plant cooling water return streams. The tailings disposal method is by deep sea tailings placement (DSTP). The combined stream flow discharges through a de-aeration tank to the ocean via a pipeline outfall at a depth of 128 m below sea level. The depth of the outfall discharge is below the surface mixing layer of the ocean. Being denser than the receiving seawater, the tailings gravitate down the steep submarine slope.

17.2.6 Process Reagents

Key processing reagents are lime and cyanide. Quick lime is imported in dedicated shipping containers. Cyanide is imported as sodium cyanide briquettes in one tonne bags and then dissolved in water for distribution to the cyanidation circuit. Other minor reagents are for flotation (collector and frother) and flocculant for thickening. Grinding balls are imported in sea containers and stored in bunkers.

17.3 Plant Performance

Actual plant operating performance for the 12 months ending June 2011 is presented in Table 17.2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGO Ore Milled</td>
<td>Mt</td>
</tr>
<tr>
<td></td>
<td>3.191</td>
</tr>
<tr>
<td></td>
<td>Au g/t</td>
</tr>
<tr>
<td></td>
<td>5.01</td>
</tr>
<tr>
<td>FGO Ore Milled</td>
<td>Mt</td>
</tr>
<tr>
<td></td>
<td>3.094</td>
</tr>
<tr>
<td></td>
<td>Au g/t</td>
</tr>
<tr>
<td></td>
<td>4.22</td>
</tr>
<tr>
<td>Overall Gold Recovery</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>83</td>
</tr>
<tr>
<td>Gold Production</td>
<td>Moz</td>
</tr>
<tr>
<td></td>
<td>0.791</td>
</tr>
</tbody>
</table>

17.4 Future Expanded Operations after MOPU Completion

The process plant is currently being expanded to a nominal gold production capacity of one million ounces per year, equivalent to an ore treatment rate of approximately 11 to 12 Mtpa. The expansion is expected to be complete by the end of 2012. As well as providing additional capacity, the design of the new facilities allows additional redundancy in the plant, significantly reducing the need for full plant shutdowns in future operations.
The upgraded plant will use the same technology and unit operations as the existing HGO circuit. The flotation plant will not be expanded. Key additions and modifications to the plant are:

- Installation of two new jaw crushers and duplication of the overland crushed ore conveying system to the expanded stockpile area.
- Re-rating of the existing radial stacker at the stockpile area, addition of a second radial stacker, and addition of two new reclaim feeders.
- A new HGO grinding circuit consisting of a SAG mill and a ball mill, in closed circuit with hydrocyclones, similar to the current HGO circuit.
- Two new thickeners for thickening of ground product.
- Two additional pre-oxidation slurry storage tanks.
- One new 5.6 m internal diameter (ID) x 45 m long autoclave equivalent to 2.2 times the capacity of one of the existing autoclaves.
- Conversion of one of the existing grind thickeners to CCD duty, facilitating two trains of two-stage CCD’s.
- Duplicating the current cyanide and adsorption circuit by installation of two neutralization pre-mix tanks, one neutralization tank, one cyanidation tank and six CIL tanks.
- Upgrade of the carbon acid wash circuit and reactivation kiln facilities.
- Upgrade of the services and utilities including plant air and water to suit the higher production rates.
- Installation of a new 70 tph oxygen plant.
- A second de-aeration tank and a second independent DSTP outfall pipeline.
- Additional seawater pumping capacity.

The expansion of processing infrastructure to support the expanded plant is discussed in Section 18.

After completion of the MOPU, overall gold recovery is expected to be marginally higher than recent performance, due to a reduced proportion of ore treated by the flotation in plant feed plant.
18 PROJECT INFRASTRUCTURE

18.1 Mine Infrastructure

Mine facilities, including ROM ore stockpiles, crushing facilities, pit dewatering wells and mine support facilities, are located in the Ladolam Creek valley, immediately to the north of the ultimate pit boundary.

The ore processing plant is on the northwestern side of Putput Point on the relatively flat land adjacent to the shoreline and on the more gentle lower slopes of the eastern end of Luise Caldera.

Support buildings include a main office, laboratory, training building, warehouse and bond store, plant workshop, and an emergency and security services building. An environmental laboratory has been built, and field and laboratory equipment provided for air and water sampling, steam gauging, sediment sampling, fish sampling, weather monitoring, oceanographic monitoring and industrial hygiene measurements.

Haul roads join the ultimate pit boundary to the crushing facilities and ROM stockpiles at Ladolam and to the barge loading dock in Luise Harbour. The haul road to that dock extends northwards along the shoreline to the low grade ore stockpile for Kapit.

Haul roads are designed for 140 t rear dump trucks, and have a width of 23 m between berms or shoulders. Road construction comprised a crushed rock base course on a sub-base of broken weak rock or coronous material.

Facilities for handling and transport of the various fuels, reagents, and consumables required by the processing plant are located near the general ship berth and the processing plant.

Heavy fuel oil (HFO) discharges from oil tankers to two bulk storage tanks using the supplying tanker's pumps. These HFO tanks measure 36.6 m in diameter by 14.6 m high and have a total capacity of 26,500 t. An estimate of average HFO consumption is 205 t/d.

Using the supplying tanker's pumps, distillate (diesel fuel oil) discharges to two bulk storage tanks of 18.3 m diameter by 14.6 m high. These tanks have a total capacity of 6000 t. Average distillate consumption is estimated at 70 t/d.

18.2 Power

Power is produced at site by a combination of HFO reciprocating engines and geothermal steam turbines.

The HFO power supply consists of twelve 6.3 MW units.
Geothermal power commenced in 2003. The initial geothermal plant was a pilot project consisting of a single 6 MW back pressure steam turbine. The success of this pilot plant led to a 30 MW geothermal power station commissioned in 2005 and then a 20 MW extension which was commissioned in 2007. The plant was designed and built by external contractors and is now operated and maintained by mine power station staff. The steam wells supplying the station are located around the mine pit area to meet the depressurization needs of mining activities as well power generation. Steam supply has dropped in recent years and a drilling program to replace steam supply is underway.

The existing total mine site power demand is around 72 to 76 MW with geothermal power providing approximately 30 MW and the balance from the HFO fired station. Additional geothermal wells are being drilled including the Kapit North steam field and are estimated to provide an additional 10 MW of geothermal power over a two year period.

The current MOPU expansion of the mill will result in an increased annualized average power demand to approximately 126 MW, with a maximum demand of between 140 to 144 MW. The additional demand is to be met by the installation of an additional 70 MW HFO fired power station mounted on a barge adjacent to the existing geothermal power station. The power barge has recently arrived at site and will be connected to the plant power supply systems. A new 33 KV supply system is being installed as part of the new installation. Options to expand geothermal power production are also under investigation.

### 18.3 Water

Fresh water required for mine and processing operations, as well as township requirements is sourced from a small weir on the Londolovit River approximately 8 km north of the processing plant. The water storage capacity behind the weir is relatively small, but due to the consistent rainfall all year the weir continuously overflows and provides water to downstream users.

Raw water is primarily utilized in the grind thickeners to facilitate washing of ground ore for control of ore chloride concentrations. Four large turbine pumps supply the plant via a pipeline which discharges to both the plant raw water storage tank and the thickener circuit. Supply capacity reduces under short term drought conditions. Sea water substitution measures are implemented under drought conditions.

Following implementation of the MOPU, the raw water demand will significantly increase to approximately 4,940 m³/h and additional supply capacity is required. Various options were considered to meet increased demand, with the development of a run-of-river intake on the Wurtol River identified as one alternative. The proposed development would comprise a weir approximately one km upstream of the existing road crossing on the Wurtol River and some 22 km of pipeline from the weir to the process plant.
The installation of the new Wurtol water supply has been delayed to meet all the requirements of community engagement and approval. As a result, the ore processing plant will increase seawater usage. This will increase ore processing costs until sufficient fresh water supplies are available. Another option is development of a borefield.

18.4 Public Roads

A public road was constructed from the village of Putput to the accommodation centre at the Londolovit plantation, and from there to the airstrip at Kunaie and on to the limestone quarry at Tanandon. Existing road alignment between Putput and Londolovit was used where practicable, with the road widened and strengthened to carry passenger vehicles, buses and trucks.

A public road from Putput to Palie Mission has also been widened and improved, and an island ring road has been completed from Palie Mission to Kunaie village. Public roads are 6.5 m wide, with a coronous pavement.

18.5 Port Facilities

Port facilities are installed to service oil tankers, general cargo ships, passenger ferries and work boats. Putput wharf can berth general cargo ships of up to 10,000 dead weight tonnes (DWT), and oil tankers of up to 12,000 DWT, with draughts to 11.5 m. The wharf is 75 m long and is constructed from steel sheet piling. General cargo ships breast against the wharf, from where most holds are accessible without warping. For fuel unloading at the wharf, oil tankers secure in position from mooring dolphins constructed on the edge of the coral reef away from each end of the wharf.

Small boats with a draught up to 2 m berth in a harbour excavated in the coral platform. Several small boats service the western side of Lihir Island and the outlying islands of Mahur, Masahet and Mali. Permanent marine facilities have been constructed at these locations for passenger loading and unloading.

18.6 Air Services

The Lihir airstrip is located at Kunaie and has a runway 1,200 m long and 23 m wide, with an unsealed coronous surface. It complies with the requirements for a standard PNG Class X airstrip and is suitable for use by such aircraft as the Dash 7 (40 passengers) and Dash 8 (36 passengers) as well as the Embraer Bandeirante (16 passengers), Super King Air (10 passengers), Twin Otter (18 passengers), and the Citation Jet (8 passengers).

The airstrip includes a taxiway and aircraft parking area for up to three aircraft. Runway lighting is provided for night operations, and there is a non-directional beacon to aid navigation.
A terminal building next to the aircraft parking area contains arrival and departure facilities and baggage handling equipment. Fuel storage and distribution facilities, equipped with regulation fire-fighting equipment, are sited adjacent to the aircraft parking area.

18.7 Housing

The Londolovit accommodation centre provides housing for senior staff living on site with their families and a number of government employees. Single persons’ quarters are provided for commuting personnel. Two kitchens and dining rooms, with toilet blocks, laundries, and an office have been constructed to service the accommodation centre.

Potable water is pumped from the Londolovit valley to a tank and water treatment plant for filtration and chlorination, before being distributed throughout the accommodation centre via a network of underground water mains. Fire protection is by a series of fire hydrants on the potable water mains, with pressure boosting during fire-fighting by diesel and electric fire pumps.

Sewage disposal is through underground gravity sewers, which flow to two sewage pumping stations. The sewage is then pumped to a packaged treatment plant located near Lakunbut Creek. The treated effluent drains through a gravity pipeline extending from the treatment plant to the shoreline near the Lakunbut Creek outlet and continuing as a sub-sea pipeline to a depth of 30 m.

Power supply is distributed by overhead power lines, and street lighting and area lighting is provided throughout the accommodation centre area.

Recreation facilities comprise a recreation centre, two tennis courts, a swimming pool, a general purpose sports field, a basketball court, two gymnasiums, a squash court, children’s playground, and barbecue areas.

Community facilities have been constructed including:

- Police station.
- Local and National Government Offices.
- Community Relations and Business Development Offices.
- Business Development area including supermarkets, maintenance shops, office spaces, and general trade.
- Bank, post office, and amenities block.
- Open market.
- Medical centre consisting of an eight-bed ward, a two-bed ward, an X-ray and treatment room, a trauma receival area, delivery room, a dental treatment room, pharmacy, and two consultation rooms.
• Central bus station.
• International primary school.
19 MARKET STUDIES AND CONTRACTS

Lihir produces gold doré containing 93% to 95% gold, 1% to 2% silver and 3% to 5% base metals. The bullion bars are security transported by air freight from the mine site to a refinery for further processing.

Within the Asian region, there are a number of acceptable refineries which have the capacity to refine doré and bullion. The Western Australian Mint (WAM) in Perth, WA, trading as the Perth Mint, W.C Heraeus – Precious Metals in Hong Kong, Metalor in Switzerland, Logam Mulia in Indonesia and Tanaka Kikinzoku in Japan. Currently WAM in Perth is Newcrest's preferred refiner due to the shorter transit time between the mine site and refinery, effecting lower freight costs and faster outturn of metal to realize revenue.

In 1999, an Integrated Benefits Package (IBP) was agreed with stakeholders to establish land access. A royalty of 2% of gold revenue (net of refining and transport costs) was set, divided between federal, provincial governments, and local level governments and landowners. The IBP is reviewed nominally every 5 years. In 2007, the IBP was updated with no change to the royalty agreement.

A mining levy of 0.25% (net of refining and transport costs) is also applied by the PNG Mineral Resources Authority.
20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Statutory Environmental Approvals and Compliance

Mine development and operations at Lihir commenced in 1995 and are conducted in accordance with the agreed development plans stipulated in the mining development contract. The original Environmental Plan associated with mine development was completed in 1995 (NSR, 1995).

More recently, the mine prepared an Environmental Impact Statement (EIS) under new guidelines (DEC, 2004) to incorporate all existing environmental permits into two new permits, including an extension to the mine life of 14 years, increases to total ore and waste mining tonnages, increases to tailings disposal and an enlarged mine footprint (LGL, 2005a). The EIS was subsequently approved by the PNG Department of Environment and Conservation (DEC) in March 2008, with new environmental permits for various discharges and water abstraction being issued in October 2008 (DEC, 2008a and 2008b).

Newcrest is currently in the process of completing the MOPU which does not require any change to the current rate of mining or to the extent of the pit footprint. Instead, the additional ore processing will be made possible by reducing the amount of stockpiled low-grade ore. An EIS for the MOPU expansion was submitted to the PNG DEC (Coffey, 2009) and the existing discharge and abstraction permits are being updated as part of the MOPU. The Lihir MOPU EIS was approved by the PNG Environment Council in February 2011.

An approved Environmental Management and Monitoring Plan for 2009 – 2012 is used to manage and monitor the known environmental issues associated with the project (LGL, 2009a). In addition, an annual environmental report is prepared and submitted to the PNG DEC (LGL, 2010). Newcrest has an operating environmental management system (EMS), which is ISO14000 compliant and in April 2010, the EMS was re-certified as part of a tri-annual certification process.

There are no requirements to post performance or reclamation bonds in PNG, however; Newcrest currently has provision of $US46M for mine closure at 30 June 2011.

The environmental studies listed above discuss known environmental issues that could materially impact the issuer's ability to extract the mineral reserves. Environmental issues include maintenance of discharge and abstraction permits; marine waste rock and tailings disposal operations; and low/medium/high grade ore stockpiling.
20.2 Waste and Tailings Management

Lihir operations comprise an open pit mine, ore processing plant, and associated supporting infrastructure. Higher-grade ore is processed via pressure oxidation and carbon-in-leach cyanidation methods, with lower grade ore stockpiled for later processing. Waste rock is disposed into Luise Harbour either by direct dumping from shore or by deep sea disposal via bottom-dumping barges. Tailings are disposed to the deep ocean via a deep sea tailings placement (DSTP) system adjacent to the ore processing plant. The tailings are treated and detoxified before being discharged below biologically productive upper ocean layers, with final settlement depth estimated at 1,500 m to 2,000 m below sea level. Tailings volumes and chemistry have been in compliance with regulatory criteria established by the DEC under one of the Environmental Permits (DEC, 2008a).

Given that the waste rock and tailings materials contain elevated concentrations of sulphide minerals (including pyrite), the most appropriate disposal option is to dispose of these material deep under water where oxidation of the sulphide minerals is essentially prevented and subsequent generation of acid rock drainage (ARD) is avoided.

Newcrest has conducted studies to investigate potential impacts from deep sea waste rock and tailings disposal (NSR, 2000), as has the PNG Government, independently of Newcrest (SAMS, 2008). The studies have found no significant environmental impacts from deep sea waste rock and tailings disposal.

Newcrest has also commissioned a number of studies to investigate any potential ARD issues associated with mining, low grade ore storage and waste disposal activities at the site (e.g. EGi, 2007). These studies have found some environmental issues associated with storage of sulphidic low grade, medium grade and high grade ore stockpiles at the site, which are generating ARD, as well as use of the sulphidic waste rock for building the harbour waste platform/coffer-dam to allow access to the Kapit open pit mineral reserves. The current five year plan indicates that the low grade ore stockpiles will be just less than 100 Mt for the next five years and will peak in FY20114. Increased stockpiling of medium grade ore peaks at 5.8 Mt in FY2013. The Kapit Flat Stockpile will be relocated to Kapit North or fed to the crusher over the next five years (NML, 2011).

Current monitoring data indicates that ore stockpiling at the site and exposure of sulphidic ore and waste rock at the pit wall areas does not appear to result in any significant increases in acidity or metal concentrations in Luise Harbour, probably due to interaction with alkaline groundwater and seawater at the site. However, it should be noted that the Kapit ore body contains comparatively higher sulphide concentrations than those mined previously and the alkalinity of the groundwater may be insufficient to provide the same level of in-pit neutralization as currently being provided at the existing pit areas.
Newcrest has conducted a number of studies to look at mine closure (LGL, 2005b and IBP, 2007). The latest of these studies indicates that at mine closure the harbour waste platform/coffer-dam will be left in place with tidal flushing of the final pit to ensure excess alkalinity and low concentrations of dissolved metals in the final pit.

20.3 Community Issues

The three key elements of Newcrest’s ongoing commitment to sustainable development on Lihir Island comprise its Corporate Sustainable Development Policy revised in 2008, a revised Integrated Benefits Package (IBP) Agreement signed in 2007, and the Lihir Sustainable Development Plan (LSDP) prepared by the local-level rural Government body and approved by the mine in 2007 (IBP, 2007). The LSDP forms the basis of the revised IBP and provides a framework for future development initiatives to be aligned and focused over the life of the project. Through these actions, Newcrest has made a strong commitment to support the local population and complies with the PNG Government guidelines for social impact assessment (DEC, 2008c).

Newcrest has also developed and is in the process of implementing a Community Health Plan for 2009 to 2013 and a Social Impact Monitoring Program (LGL, 2009b). The overall approach to social and community related issues align well with the requirements of the Equator Principles (EPFI, 2009).

Newcrest has established a good working relationship with the local communities and occasional disruptions due to disputes are relatively minor in nature. There is an agreed formal process to manage dispute resolutions, which limits the potential for lost time.

Newcrest must obtain approval from the local community to access new areas for mining and exploration. Recent negotiations regarding use of the Kapit North area for storage of low grade ore have been successfully completed and stockpile development work is underway at the site. There are several other areas subject to negotiation, both inside the Luise Caldera area and elsewhere on the island including the proposed Wurtol River Weir. Water from the proposed Wurtol River Weir forms part of the MOPU.

Access to the Alaia Rock area of the coastal zone is required to allow the pit to extend eastwards into the Coastal Resource which is a key to increasing mineral reserves. Newcrest holds a granted ML that covers the Alaia Rock area; however, agreements relating to this area are not yet in place with local landowners or the community.

Whilst there are a number of potentially significant risks to the operation associated with sustainable development and community related issues. AMC concurs with Newcrest’s current assessment and notes that plans have been implemented to manage and mitigate these risks.
20.4 Mine Closure

Newcrest has conducted a number of studies to look at mine closure (LGL, 2005b and IBP, 2007). The most recent review of these studies for the period 2011 to 2015 was conducted in 2010 by the LSDP Mine Closure Committee in consultation with the community, and addressed issues associated with the MOPU including:

- The need to rehabilitate new areas of disturbance associated with the project.
- Management and maintenance of the proposed Wurtol River water and power supply infrastructure.
- The potential to bring forward the mine closure plans earlier than is currently the case.

The review indicates that at mine closure the harbour waste platform/coffer-dam will be left in place with tidal flushing of the final pit to ensure excess alkalinity and low concentrations of dissolved metals in the final pit. Ore stockpiles will be processed and stockpile footprint areas will be remediated and rehabilitated. The LSDP allows for transfer of the mine assets (works and facilities) to the State of PNG under the Mining Development Contract. The importance for closure planning is that both liability and risk are extinguished as soon as title is restored to the State.

Newcrest has a provision of $US46M for mine closure and rehabilitation at 30 June 2011.
21 CAPITAL AND OPERATING COSTS

21.1 Historical Costs

Lihir cash costs for the year ending June 2011 averaged A$419/oz.

Recent unit operating costs for Lihir for FY2009 to FY2011 are set out in Table 21.1, with actual operating costs for FY2011 in Australian dollars presented in Table 21.2. Table 21.3 presents historical capital costs in United States dollars for FY2009 to FY2011.

Table 21.1 Historical Production and Costs per Ounce of Gold Produced

<table>
<thead>
<tr>
<th>Item</th>
<th>Units</th>
<th>2009*</th>
<th>2010*</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Production</td>
<td>(oz)</td>
<td>929,383</td>
<td>764,442</td>
<td>790,974</td>
</tr>
<tr>
<td>Mine</td>
<td>(A$/oz)</td>
<td>233</td>
<td>278</td>
<td>252</td>
</tr>
<tr>
<td>Mill</td>
<td>(A$/oz)</td>
<td>173</td>
<td>196</td>
<td>192</td>
</tr>
<tr>
<td>Administration and Others</td>
<td>(A$/oz)</td>
<td>154</td>
<td>187</td>
<td>175</td>
</tr>
<tr>
<td>Third Party Smelting Refining and Transportation</td>
<td>(A$/oz)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Royalties</td>
<td>(A$/oz)</td>
<td>28</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>By Product Credits</td>
<td>(A$/oz)</td>
<td>0</td>
<td>0</td>
<td>(1)</td>
</tr>
<tr>
<td>Stripping and Ore Inventory Adjustments</td>
<td>(A$/oz)</td>
<td>(120)</td>
<td>(154)</td>
<td>(233)</td>
</tr>
<tr>
<td>Cash Cost</td>
<td>(A$/oz)</td>
<td>472</td>
<td>541</td>
<td>419</td>
</tr>
<tr>
<td>Depreciation and Amortisation</td>
<td>(A$/oz)</td>
<td>n/a</td>
<td>n/a</td>
<td>162</td>
</tr>
<tr>
<td>Total Cost</td>
<td>(A$/oz)</td>
<td>n/a</td>
<td>n/a</td>
<td>581</td>
</tr>
</tbody>
</table>

* Lihir was formerly owned by Lihir Group Limited and acquired by Newcrest Mining on 30 August 2010. As such, some historical cost information was not collected and is not available prior to FY2011.

Table 21.2 Lihir FY 2011 Actual Operating Cost*

<table>
<thead>
<tr>
<th>Lihir Island</th>
<th>Unit</th>
<th>FY11 Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Production</td>
<td>koz</td>
<td>791</td>
</tr>
<tr>
<td>Total site cash costs</td>
<td>A$M</td>
<td>489</td>
</tr>
<tr>
<td>Stripping and ore inventory</td>
<td>A$M</td>
<td>(185)</td>
</tr>
<tr>
<td>Third party smelting refining and transporting</td>
<td>A$M</td>
<td>3</td>
</tr>
<tr>
<td>Royalty</td>
<td>A$M</td>
<td>24</td>
</tr>
<tr>
<td>Depreciation</td>
<td>A$/oz</td>
<td>162</td>
</tr>
</tbody>
</table>

*Relates to full twelve months of production, rather than ten month period of ownership.
Table 21.3 Historical Capital Expenditure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MOPU</td>
<td>69</td>
<td>291</td>
<td>499</td>
</tr>
<tr>
<td>Resource Drilling and Exploration</td>
<td>0</td>
<td>4.2</td>
<td>15</td>
</tr>
<tr>
<td>Kapit Coffer-dam</td>
<td>3.4</td>
<td>3.6</td>
<td>39.7</td>
</tr>
<tr>
<td>Mine Development Projects</td>
<td>0</td>
<td>8.6</td>
<td>38.9</td>
</tr>
<tr>
<td>Mobile Equipment Projects</td>
<td>0.5</td>
<td>23.5</td>
<td>53.5</td>
</tr>
<tr>
<td>Power Projects</td>
<td>3.7</td>
<td>18.4</td>
<td>55.7</td>
</tr>
<tr>
<td><strong>Total capital expenditure</strong></td>
<td>163</td>
<td>476</td>
<td>784</td>
</tr>
<tr>
<td>Sustaining Capital</td>
<td>86.4</td>
<td>126.7</td>
<td>82.2</td>
</tr>
</tbody>
</table>

21.2 Forecast Costs

The major capital expenditure at Lihir is the MOPU mill expansion project. Total expenditure on MOPU is expected to be US$1.3B. Other major capital investments include additional processing capacity (additional flotation is being evaluated), construction of a coffer-dam to assist development of the Kapit pit, relocation of low grade stockpiles, development of the ROM and coastal mine areas, power station projects and resource drilling.

Lihir estimated operating cost for FY 2012 is shown in Table 21.4.

Table 21.4 Lihir FY 2012 Estimated Operating Cost

<table>
<thead>
<tr>
<th>Lihir Island</th>
<th>Unit</th>
<th>FY12 Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total site cash costs</td>
<td>A$M</td>
<td>500 - 520</td>
</tr>
<tr>
<td>Stripping and ore inventory</td>
<td>A$M</td>
<td>(190) - (200)</td>
</tr>
<tr>
<td>Third party smelting refining and transporting</td>
<td>A$M</td>
<td>3 - 8</td>
</tr>
<tr>
<td>Royalty</td>
<td>A$M</td>
<td>23 - 30</td>
</tr>
<tr>
<td>Depreciation</td>
<td>A$/oz</td>
<td>190 - 200</td>
</tr>
</tbody>
</table>
22  ECONOMIC ANALYSIS

Lihir was developed in 1995 and is a well established mining and ore processing operation. Lihir earnings before interest, tax, depreciation, and amortization reported by Newcrest for the period 30 August 2010 to 30 June 2011 were A$594M.

Incremental increases in production from MOPU, additional processing capacity and ongoing optimization are collectively expected to take production from approximately 0.85 Moz to beyond 1.4 Moz per year during the five year period. Cash costs are expected to be around US$450 per oz.
23 ADJACENT PROPERTIES

There are no adjacent properties to Lihir and there is no other mining undertaken elsewhere on Lihir Island.
24 OTHER RELEVANT DATA AND INFORMATION

No additional information is included.
25 InterpretaTIon and ConclusIons

Lihir is a robust mining operation with substantial mineral reserves. The company has a successful track record for developing and operating the project, as well as maintaining good relations with the local community and PNG government bodies. The current expansion to mine production is progressing well and there is no reason to doubt that mine production will increase significantly once the expansion has been completed.

The key future challenges and risks are as follows:

- The ability to successfully implement and maintain the long-term integrity of the coffer-dam is required for expanding the mining of Kapit pit seaward. Delay in completion of the dam would have an impact on the mining schedule but major leaks or instability of the wall would have a major adverse impact on the mineral reserve and the LOM plan.

- The ability to successfully maintain stability of open pit walls in a complex geological environment is required to achieve the mine plan. Management plans to account for variable rock strength, seismic activity, geothermal activity, high rainfall, and significant groundwater are regularly updated to ensure pit stability is not compromised.

- Geothermal depressurization of the Kapit pit is required in advance of mine operations. The maintenance of steam relief wells is a critical requirement and delays to expected depressurization trends could have an adverse impact on mine production schedules.

- Geothermal power represents an important source of power for the operation, a means to reduce future operating cost and a way to reduce reliance on HFO for power generation. The sustainability and expansion of this power supply must be managed closely given there have been periods in which declines of geothermal steam supply and reservoir pressure have resulted in shortfalls in geothermal steam for power generation.
26 RECOMMENDATIONS

Lihir is an established mining operation with mineral reserves sufficient for an extended mine life. Newcrest has sophisticated procedures for investigating and evaluating mineral resources and mineral reserves, and in operating projects for their efficient exploitation.

In view of the nature of Lihir and the substantial mineral reserve inventory, no recommendations are included.
27 REFERENCES


DEC (2008a). Environment Permit WD-L3 (191) issued to Lihir Gold under Section 65 of the Environment Act 2000 to carry out works within SML 6, ME73, ME72, ME71, ML126, LMP35, LMP38, LMP39, LMP40, ML125, LMP34 and LMP1, (the "premises") on Lihir Island in New Ireland Province; and to discharge wastes into the environment from the premises while carrying out a Level 3 (Sub-category 17.1) activity associated with mining activities which require the issue of a Special Mining Lease under the Mining Act 1992. Issued 15 October 2008.

DEC (2008b). Environment Permit WE-L3 (143) issued to Lihir Gold under Section 65 of the Environment Act 2000 to extract water from surface and groundwater sources within the premises on Lihir Island in New Ireland Province while carrying out a Level 3 (Sub-category 17.1) activity associated with mining activities which require the issue of a Special Mining Lease under the Mining Act 1992. Issued 15 October 2008.


28 QUALIFIED PERSONS’ CERTIFICATES

Mark Berry
AMC Consultants Pty Ltd
Level 12, 179 North Quay
Brisbane, Queensland 4000
Australia

1. I, Mark Berry, do hereby certify that I am Geology Manager and Principal Geologist employed by AMC Consultants Pty Ltd.

2. I am a graduate of the University of Melbourne and hold a Bachelor of Science with a geology major.

3. I am a Member of the Australian Institute of Geoscientists.

4. I have worked as a geologist for a total of 32 years since my graduation from university. My relevant experience includes eleven years mining geology and resource estimation experience (gold, copper, nickel, base metals, iron ore), four years exploration experience (gold, base metals), four years experience in project evaluation, feasibility and development (nickel, gold, base metals), five years consulting experience (resource estimation, mining geology, due diligence, independent expert reports), and eight years research management with a mining geology focus.

5. I have read the definition of “Qualified Person” set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a “Qualified Person” for the purposes of NI 43-101.


7. I have had prior involvement with the property that is the subject of the Report. This involvement was via my role as Principal Geologist with AMC where I participated in a technical review of the operation in 2009 for LGL.

8. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

9. I have read National Instrument 43-101 and Form 43-101F1, and the Report has been prepared in compliance with that instrument and form.

10. As of the effective date of the Report, to the best of my information, knowledge and belief, the part(s) of the Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

31 December 2011
Original signed by
Mark Berry
Colin Moorhead  
Newcrest Mining Limited  
Level 8, 600 St Kilda Road  
Melbourne, Victoria 3004  
Australia

1. I, Colin Moorhead, do hereby certify that I am the Executive General Manager, Minerals employed by Newcrest Mining Limited.

2. I am a graduate of the University of Melbourne and hold a Bachelor of Science (Hons.) in Geology with a geophysics major.

3. I am a Fellow of the Australasian Institute of Mining and Metallurgy.

4. I have worked as a geologist for a total of 24 years since my graduation from university. My relevant experience includes 16 years fulfilling the roles of exploration geologist, mine geologist, geology manager and technical services manager at Newcrest’s Australian open pit and underground mining operations, two years as geology manager at Newcrest’s Indonesian mining operation, two years as General Manager Technical Services responsible for technical excellence and resources and reserves governance and four years in the role of Executive General Manager, Minerals responsible for exploration, mine geology and resources and reserves governance throughout Newcrest.

5. I have read the definition of “Qualified Person” set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a “Qualified Person” for the purposes of NI 43-101.


7. I have had prior involvement with the property that is the subject of the Report. This involvement is via my role as Executive General Manager, Minerals with Newcrest where I am the executive responsible for exploration, mine geology and resource and reserves governance throughout Newcrest.

8. I am not independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

9. I have read National Instrument 43-101 and Form 43-101F1, and the Report has been prepared in compliance with that instrument and form.

10. As of the effective date of the Report, to the best of my information, knowledge and belief, the part(s) of the Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

31 December 2011

Original signed by

Colin Moorhead