Long nickel mine, Kambalda

by

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Acquisition of the Long nickel mine

Independence Group NL's wholly owned subsidiary Lightning Nickel Pty Ltd (Lightning) acquired its first operation, the Long nickel mine, from WMC Resources Ltd in September 2002. This acquisition will provide a significant cash flow to the company over many years, with good prospects for further mine life extensions.

Lightning paid A$15 million to WMC Resources for the asset, funded by a combination of debt (A$10 million) and equity funds from the August 2002 A$7 million capital raising. The company also secured A$5.3 million in capital equipment financing, a A$3 million working capital facility, and a facility for up to A$2 million in environmental bond bank guarantees.

Apart from the tenure and reserves, Lightning also acquired a headframe and winders, office complex, underground communications system, air compressors, dewatering pumps, seismic monitoring system, and mining equipment valued at over A$4 million. This resulted in a considerable reduction in the capital required to bring the mine back into production.

Lightning has employed a highly skilled workforce at the Long nickel mine, most of whom have many years of underground experience in the Kambalda region.

The mine was successfully commissioned during the year and is now producing at an annualized rate of 160 000 t of ore. As well as getting the mine into full production, exploration and development activities have resulted in the discovery of an additional year of reserves (at current nickel prices and production rate) and, more importantly, have increased resources by 20% in terms of contained nickel tonnes.

Research and development studies to extract mine pillars outside reserves, and exploration success at Long South also have the potential to significantly increase the mine life.

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Kambalda history

In January 1966, Western Mining Corporation (WMC) intersected nickel sulfide mineralization in a drillhole near the abandoned gold-mining town of Kambalda. This discovery led to the development of a world-class nickel province, which has produced more than 1 million tonnes of nickel metal over a period of 30 years.

As a result, the Kambalda region is well serviced by established infrastructure, including grid power, sealed highways, and potable water supplies, and extensive mining industry support is available locally in the form of contract mining, haulage, engineering, and technical support services. A large and highly skilled labour pool is available in both Kambalda and Kalgoorlie.

Long nickel mine history

The Long shoot was first intersected by diamond drilling in 1971, with subsequent drilling indicating the presence of significant mineralization within both the Long and Victor nickel orebodies, collectively known as the Long Complex (Fig. 1).

Underground development commenced at Long in 1975 with the sinking of a vertical shaft to a depth of 971.4 m. Ore production began in 1979. The Victor decline was started in 1989 to access the Victor orebody and, by 1994, had provided mechanized access to the deeper levels of the Long nickel mine. After the mine was placed on care and maintenance in April 1999, WMC Resources maintained the underground infrastructure, shaft, and headframe in excellent condition for a planned resumption of mining. WMC Resources also refurbished the mine, undertook additional exploration, and completed a mine-operating plan, which was later used by Lightning.

Past production from Long shaft and Victor decline represents the second largest concentration of nickel in the Kambalda region, and qualifies Long as one of WMC's longest operating nickel mines, with a 21-year mine life. Total production to closure in 1999 was 5.43 Mt at an

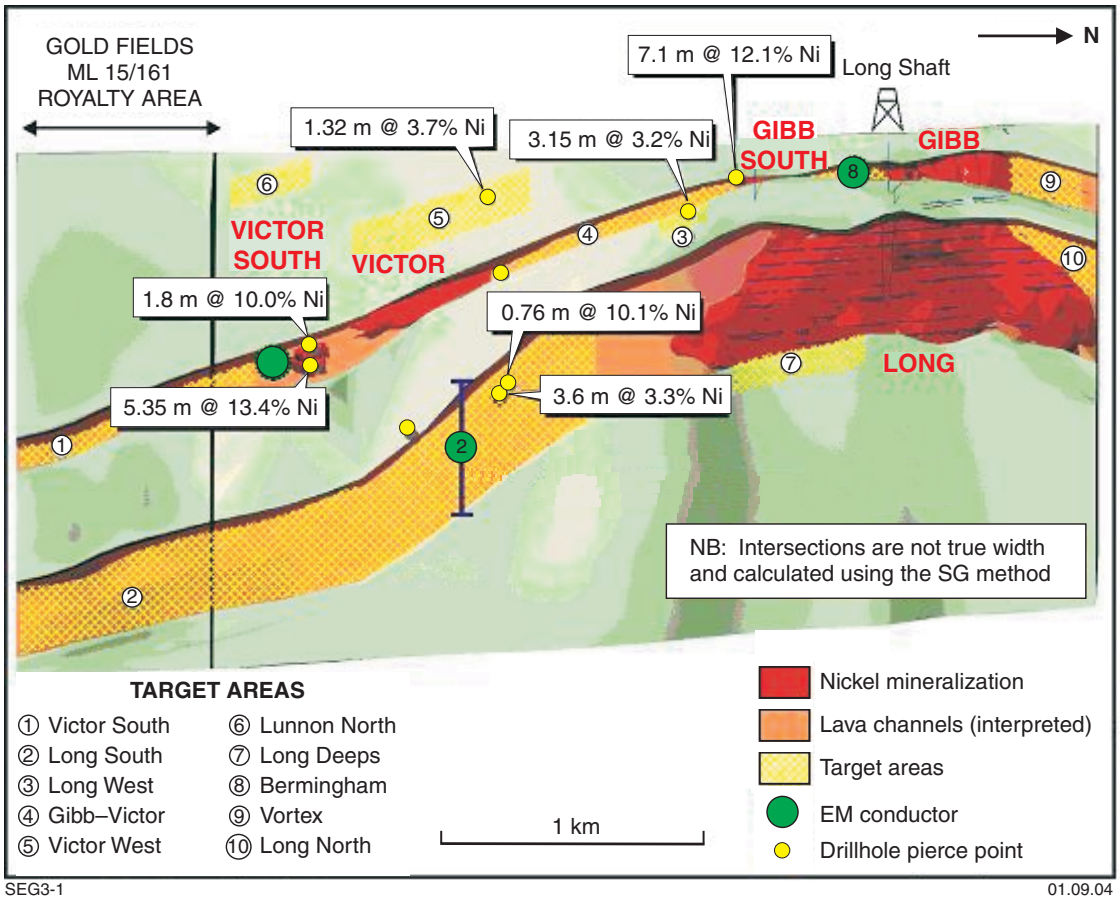

Figure 1. Interpretive long section for the Long Complex showing nickel orebodies

average reconciled grade of 3.7% nickel (>200 000 nickel tonnes).

Tenure

The Long Complex assets are located on three Western Australian Mining Act (1904) Mineral Leases (ML15/158, 159, and 160), and a portion of East Location 48 leased to Independence for ten years. Location 48 is one of a number of freehold land grants created in the Coolgardie district in 1890. Independence also has access, via a nickel royalty agreement, to mine nickel on five Gold Fields Australia Pty Ltd (Gold Fields) Mineral Leases (ML) to the east and south of the operation.

WMC Offtake Agreement

Lightning has an agreement with WMC Resources whereby the ore produced from the mine is delivered to the adjacent WMC Kambalda Nickel Concentrator for toll treatment and production of nickel concentrates, which are then sold to WMC Resources on terms set out in that agreement. The agreement expires on 27 February 2010, with WMC Resources having the option to extend for another nine years.

Ground conditions and seismicity

The risks of 'mine-induced' seismicity are well known and understood at Long. The orebody is disrupted by a swarm of crosscutting porphyries, some of which are stressed. These bodies have reacted in a consistent and predictable geotechnical fashion. When mining the discrete ore blocks that constitute the Long mining inventory today, the procedures to manage these events are built into the operating standards of Lightning, and are well understood by mining personnel.

Ground support

A combination of mesh and rock-bolting, cone and cable bolting, and shotcrete forms the standard practice for excavations of varying size and accessibility. No person is allowed to perform their duties beyond safe and secure overhead support.

Consultants

Lightning has retained the expertise of BFP Consultants Pty Ltd (Melbourne), and Dempers and Seymour Pty Ltd

(Perth), and received advice from Professor Will Bawden (Canada), to ensure that the mining methods, ground support, and sequence of activities at Long provide a low-risk workplace for employees while enabling optimum extraction of the orebodies.

Kambalda Nickel Royalty Agreement

Lightning reached agreement with Gold Fields to mine underground nickel extensions on ML 15/161, 167, 168, 169, and 170, south and east of the Long and Victor deposits. Gold Fields retains tenement ownership and the right to gold, both at the surface and underground.

The royalty payable to Gold Fields is on a sliding scale, and depends on the Australian dollar (A$) price received on nickel produced from the related area. This ranges from 0% when the price per nickel pound is less than A$5.00, to 5% when the price per nickel pound is A$8.30 or greater.

Mine work force

Lightning currently employs 72 full-time staff. Many employees, including the General Manager, are ex-WMC Kambalda employees, who brought an immediate pool of sound operating knowledge, experience, and skills to the project. The mining team has a combined underground experience of 1240 man years (average 19.4 years), with 240 years previously spent at Long.

Lightning's work force has been very stable, with a 99% retention rate, since the commencement of mining in October 2002. All miners, apart from the handheld team, are on salary, and a gain-share bonus scheme was introduced during the 2003–04 financial year to reward the mining team when safety, teamwork, and cost targets are achieved.

Mine production

Production was initially scheduled over a period of five years commencing in October 2002, using a variety of mining techniques designed to safely accommodate changes in orebody attitudes, thicknesses, and geometry.

Mining methods range from longhole open stoping with mullock or sand backfill, to mechanized Jumbo flatback stoping. A handheld mining team has also been established to extract remnant blocks in the upper levels of the mine, and in narrow stopes not suitable for mechanization. Wherever possible, non-entry, mechanized mining methods are employed for safety reasons and to maximize productivity. The spacing of stoping sublevels and other aspects of the mining methods have been designed to minimize opportunities for dilution.

From first firing on 24 October 2002 to the end of the March 2004 quarter, over 5000 t of nickel metal (Ni tonnes) have been produced by Lightning, as shown in Table 1.

Table 1. Reserves for Lightning's Long nickel mine from first firing on 24 October 2002 to 30 March 2004

	Tonnes ore	*Grade % Ni*	*Nickel tonnes*
Outside reserve	31 767	4.6	1 457
Inside reserve	90 101	4.3	3 858
Reserve estimate [(a)]	71 305	3.7	2 626
Total	**121 868**	**4.4**	**5 316**

NOTES: (a) expected ore reserve grade and tonnes as defined by the area mined 'inside reserves'

Production from the start-up reserve of 26 800 Ni tonnes was estimated to result in an A$60 million cash flow after tax and debt repayment, based on an exchange rate for A$/USD of 0.55 and a nickel price of US$6950 per tonne (A$12 636 per Ni tonne).

Development

Long mining blocks

During 2002–2003, development costs that were capitalized related to the initial access into Gibb South and Victor South. Mining at Long shaft involved re-establishing reserve blocks, which in some cases had not been in operation for more than a decade. The rehabilitation of these areas involved extensive shotcreting, re-meshing, and cone and cable bolting. Thus 2002–03 was a year of preparing the reserve blocks for safe extraction of ore.

Gibb South

To date, a total of 19 143 t ore at 7.1% Ni (1365 Ni tonnes) has been mined from Gibb South (June 2003 reserve: 28 000 t at 3.7% Ni; 1000 Ni tonnes). Gibb South's ore grade averages 7.1% Ni, significantly higher than the reserve grade. Mining has defined additional high-grade nickel ore outside the June 2003 ore reserve boundary. South of the current ore reserve block, transient electromagnetic (TEM) surveys have located new conductors, which the company plans to develop.

Victor South

Capitalized decline development to access the high-grade Victor South deposit commenced in July 2003. Victor South contains 5900 Ni tonnes in reserve, and an additional 14 900 Ni tonnes in resources. Ore reserve definition drilling has commenced, using the drill drive over the orebody, to convert existing resources to reserves by increasing drill density. Drilling will also test for extensions to the south (open) and around the open 5.35 m

at 13.4% Ni drillhole intercept in shoot 3 (not in the mining schedule).

Ore reserves and resources

Cube Consulting Pty Ltd (resource consultants) and BFP Consultants Pty Ltd (mine reserve consultants) were used to estimate the Long resources and reserves based on industry best practice.

Ore tonnages and grades have been calculated at a 1% nickel cutoff on the basis of the new resource model, which takes into account the high value of the ore, its mode of occurrence, the geotechnical considerations to ensure successful and safe mining in the geological environment, and the depths at which the operations will be conducted. The resource was calculated using the 2D metal accumulation of grade, thickness, and density interpolated by ordinary kriging into 20 m × 20 m blocks for each mineralized surface, followed by subtraction of porphyry pillars and mining depletion.

The reserve, at 2% nickel cut-off, has been estimated by creating stoping block models and adding appropriate dilution according to the mining methods.

The Long Complex also contains significant resources and exploration targets that could considerably extend the current five year mine life.

A large geophysical and drilling program aimed at increasing the nickel reserves to 50 000 Ni tonnes for Lightning's Long nickel mine commenced during the March 2004 quarter. The program, which could take 12 months to complete, comprises:

- a systematic geophysical survey testing the Long, Gibb South, and Victor South ore positions using the company's proprietary EM Torch to locate and define new massive and matrix nickel sulfides up to 100 m from existing mine workings;
- a >10 000 m diamond drilling program, using up to five underground drill rigs on two shifts, to convert existing resources to reserves and test new targets defined by the EM Torch and geological studies;
- downhole TEM surveys.

It is anticipated that about 22 000 of the Ni tonnes defined in the June 2003 reserves will remain unmined by the end of the current financial year. An additional 28 000 t will be targeted from:

- existing mine resources outside reserves (60 000 Ni tonnes at June 2003);
- mine pillars outside reserves and resources (27 200 Ni tonnes at June 2003);
- new near-mine discoveries, which can be cheaply mined using existing underground infrastructure.

New ore blocks outside ore reserves continue to be defined in the upper and lower levels of the mine. To date, 31 767 tonnes of ore at 4.6% Ni have been mined outside reserve blocks this financial year, predominantly from previously unknown remobilized massive nickel sulfide hangingwall and footwall surfaces, mainly on the 15 and 16 levels. More importantly, these new surfaces are open in many directions, which should add further to the reserve base.

Remnant pillars

About 44 000 Ni tonnes were contained in mine pillars when Lightning purchased Long, which, based on previous handheld mining techniques, were thought to be unextractable. A total of 10 400 pillar Ni tonnes has been added to resources during the year.

Geophysics

The first underground trials of the portable underground EM system (EM Torch) have been completed and minor finetuning is in progress. The system, analogous to a large metal detector, is being used to produce real-time massive and matrix nickel sulfide location information, providing a vector to the mineralization. This will significantly reduce the cost of drilling, allow more accurate mine design, reduce expensive 'exploration' development, and locate missed oreblocks adjacent to existing workings. Lightning is applying for a Commonwealth Government Start Grant, which could provide 50% of the funding to refine the EM Torch, and other geophysical equipment and procedures.

Exploration

Nickel sulfide formation

The Long and Victor deposits are typical Kambalda-style nickel deposits, consisting of narrow, steeply dipping, shallowly plunging, ribbon-like accumulations of massive or semimassive sulfides, and located at the base of komatiitic ultramafic flows at the contact with an underlying basalt unit. Massive sulfide is overlain by matrix and then disseminated mineralization, with the bulk of the ore expected to be massive and matrix. The orebodies average 2.6 m in thickness.

The Long nickel oreshoots consist of shallowly plunging channels (therefore high tonnes per vertical metre), and the high nickel tenor of massive sulfides compared to many other deposits means that even small incremental discoveries can have a significant positive impact on the project's profitability.

Long nickel mineralization is associated with Archaean ultramafic lava channels (analogous to river channels), where molten liquid nickel sulfides pooled at specific points along the channel. Subsequent folding has tilted the channels to a 60° dip to the east, and also resulted in the remobilization of some of the original sulfides into new structurally controlled positions (Victor South). During these deformation events and resultant sulfide remobilization, the massive sulfide can be thought to behave like a tube of toothpaste when squeezed, with weak massive sulfides squeezed into surrounding country rocks under extreme pressure. To date, two channels have been recognized:

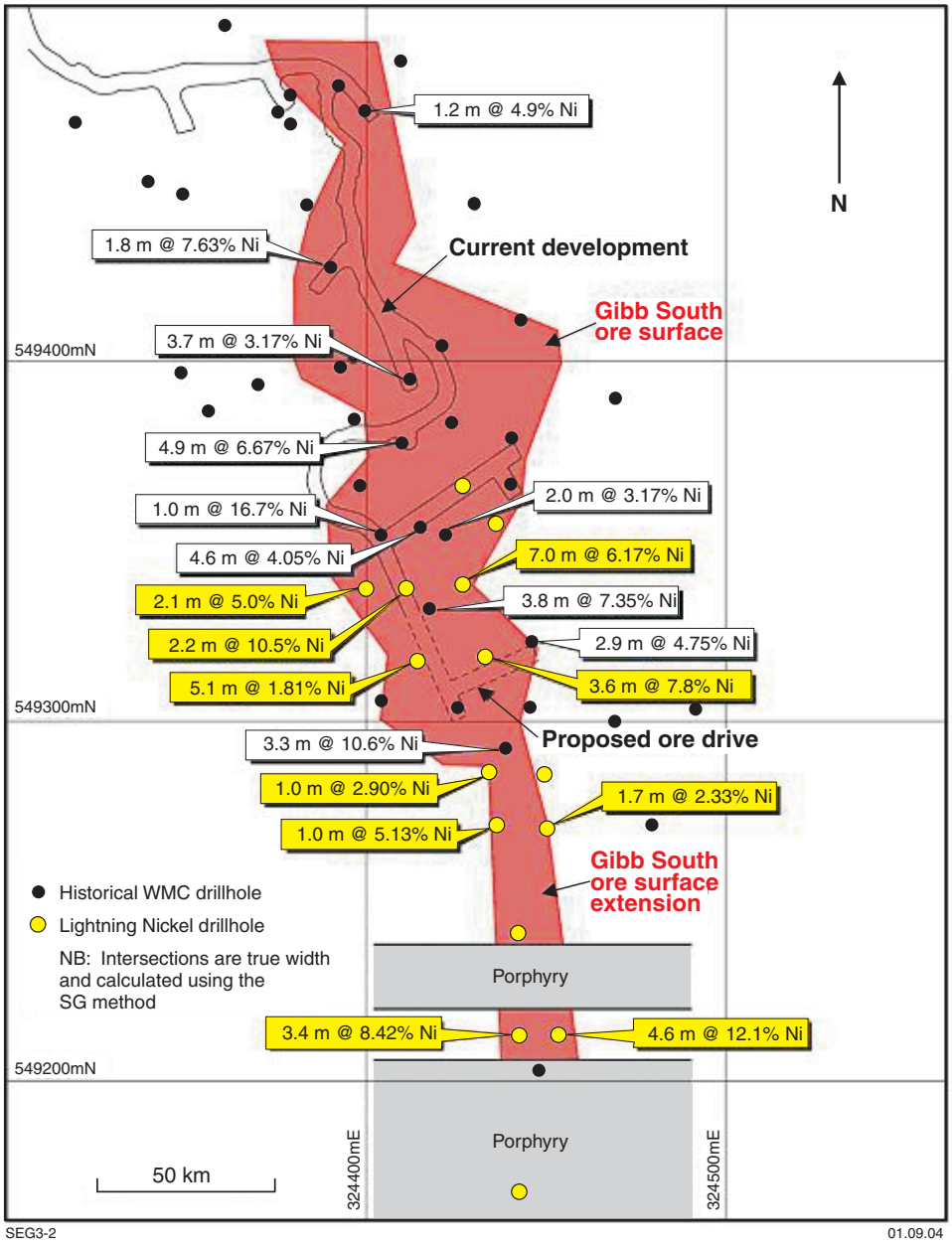

Figure 2. Plan showing ore intercepts in Gibb South

- Channel 1 — the upper, high-tenor nickel channel is interpreted to contain, from north to south, the Gibb, Gibb South, Victor, and Victor South deposits;
- Channel 2 — the lower, wider, moderate-tenor nickel channel contains the Long deposit and nickel sulfides to the south.

Strategy

Exploration at Long is divided into two categories:

- incremental ore targets — targets that could replace depleting reserves or resources in and around known orebodies;
- long-life targets —targets that have the potential to significantly enhance overall project parameters, such as doubling mine life at twice the capacity, and require major new development.

Lightning's exploration team is focusing on both target types using the integration of geological mapping, structural studies, and magnetic and EM geophysical surveys to produce a three-dimensional picture of the ultramafic stratigraphy. To date, exploration has been very successful, given the small (A$0.33 million) exploration expenditure in 2002–03. The 2003–04 Long exploration budget has been increased to about A$2 million.

Incremental ore targets

Gibb South

Infill and extension drilling was completed during 2003 year to test for additional ore extensions and successfully convert resources to reserves (Fig. 2). Drilling and

downhole EM surveys indicate the Gibb South sulfides are terminated at 549 200N, where the Gibb South lava channel is crosscut by a large felsic porphyry intrusion. However, ground magnetic highs south of the porphyry suggest a possible continuation of the untested channel ultramafic units that requires further exploration.

Long 11–12 level

Underground drilling at the southern end of the 11 level in 2003 returned a number of significant intersections in a previously undrilled section of the mine. These intersections added new reserves to the Long orebody, and confirmed the potential for additional discoveries and reserves within the proximal mine environment.

Re-interpretation of the felsic intrusive model has also lead to the discovery of more high-grade nickel sulfides above the 11 level, in an area previously thought to be stoped out by intrusions.

Long-life targets

Long South

Drilling to test for a possible repetition of the 1.6 kilometre long and 0.5 kilometre high Long orebody (past production: 4.66 Mt at 3.7% Ni; 173 600 Ni tonnes) beneath Victor and Victor South has commenced. Previous WMC drilling intersected 0.76 m at 10.09% Ni in drillhole KD6067B, 0.7 km south along strike from the most southerly known point of the Long orebody. No previous drilling has effectively tested the 1.2 km of prospective Long lava channel south of this hole.

Drillhole KD6067B was re-entered and a new hole drilled to test the area just south of the previous WMC hole. This wedge hole, KD6067BW7, intercepted the prospective contact about 24 m south of the original intercept, and returned 3.6 m at 3.3% Ni, including thin, high-tenor massive sulfide units assaying 0.29 m at 14.6% Ni.

Follow-up underground diamond drillhole LSU001 was drilled to 869 m depth in late 2003. The hole was drilled from the footwall at a low angle to the interpreted position of the prospective ultramafic–mafic contact in order to give maximum downhole geophysical coverage over the prospective contact. The drillhole ended in footwall pillowed mafic basalt after passing through a narrow interval of faulted ultramafic rocks containing significant concentrations of disseminated sulfides. Geological interpretation suggests a slightly higher degree of structural complexity in the area, with a resultant flattening of the main target contact. The hole failed to reach the prospective ultramafic–mafic contact because the drilling rig reached the limits of its capacity. The hole has been surveyed by downhole EM from the surface to 756 m. The remaining 113 m closer to the prospective contact remains to be surveyed, and an off-hole EM anomaly has been defined. The anomaly is currently being followed up with an updip wedge off drillhole LSU-001.

Victor South extensions

Significant potential exists at Victor South to define additional high-grade ore along strike and downdip from the known mineralization. To date, the Victor South reserves and resources are contained in three shoots. WMC Resources intersected 5.35 m at 13.4% Ni in shoot 3. This intersection is open along strike and downdip, and follow-up drilling is planned. Reinterpretation of WMC Resources downhole geophysical logs has defined numerous conductors outside the current resource areas. These targets will be followed up after the Victor South decline development has been completed, and drill cuddies established to provide better drilling angles and shorter drilling distances.

Drilling to test for shoot 1 and 2 extensions to the north of the current Victor South resource outlines in 2004 has been successful, possibly extending both shoots 40 m north.

Long Deeps

Reinterpretation of the lower levels of the Long orebodies suggests the potential for additional nickel sulfide shoots below the southern end of the deposit, in an area structurally complicated by thrust faulting.