

Nickel

A U S T R A L A S I A
Information and analysis on nickel and cobalt in Asia, Australia and the western Pacific

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Editorial

Late August brought the announcement of yet another innovation in the development of the nickel-cobalt laterite industry in Western Australia: the proposed toll-processing alliance between Centaur Mining & Exploration Limited and Heron Resources NL.

The essence of the alliance is the toll-processing of substantial quantities of nickel-cobalt laterite ore from Heron's wholly owned tenements through Centaur's wholly owned Cawse pressure acid leach (PAL) plant. Implementing the agreement will require the brownfields expansion of Cawse, and the delineation of appropriate ore reserves on Heron's tenements. Centaur has commenced a pre-feasibility study on expanding Cawse from its current nameplate capacity of 500,000 t/y to possibly 4 million t/y of PAL feed and from 9,000 t/y to 45,000 t/y nickel. Heron is about to commence a A\$3 million exploration program to upgrade the status of the laterite resources on its tenements.

The benefit for Heron is the ability to generate revenue from exploiting the nickel-cobalt laterite on its tenements without having to study, finance and build a PAL plant at a cost of up to A\$1 billion. The benefit for Centaur is access to ore reserves that will support a brownfields expansion of Cawse (which will lower unit capital and operating costs to adequately profitable levels), without having to spend money or issue shares to acquire ownership of those resources.

Ian Buchhorn, Heron's managing director, has been promoting the virtues of 'consolidation' in the burgeoning nickel-cobalt laterite industry in Western Australia for some time. Long accustomed to negotiating similar arrangements for toll-processing gold resources through existing gold processing plants, Mr Buchhorn sees overwhelming merit in conserving Heron's capital by paying an appropriate fee to have Heron's ore processed through Centaur's expanded plant.

Will other companies follow suit? The most fertile area for similar alliances appears to be in the processing of a high-grade nickel-cobalt intermediate product from a front-end PAL plant through an existing nickel-cobalt refinery. QNI has already signalled its interest in expanding Yabulu to treat such material, although perhaps not as a toll-processor.

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Industry news

A flurry of selling in the first three days, followed by inaction since then.

What if the DLA adopted WMC's style of offering cobalt for sale?

Avmin is confident that securing finance will not be difficult, and expects to have the financing in place by end-1999.

Mr Rick Menell, Avmin's chairman, foresees Avmin controlling over 20% of the world's cobalt production (Dow Jones Business News, 26 August).

Nkomati's concentrate is currently toll-smelted and refined in Southern Africa.

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Cobalt

The Metal Bulletin indicative price for high-grade (99.8%) cobalt metal was US\$19.05/lb on 29 August, little changed from US\$19.10/lb in mid-August.

During the first two weeks of operation of its Cobalt Open Sales System (COSS), WMC sold ten lots (nine of five tonnes, one of less than 5 tonnes) at US\$18.25–19.95/lb. On 30 August, WMC was offering high-grade cobalt for September delivery at US\$19.55/lb.

The auction of 709,500 lb of low-grade (99.3%) cobalt from the USA government stockpile on Wednesday 25 August resulted in the sale of 191,500 lb only, to five companies, at US\$16.23–17.12/lb. The DLA declined to accept bids from another six companies, at US\$13.10–16.04/lb. The next sealed-bid auction is scheduled for 22 September.

Chambishi Metals

Anglovaal Mining Limited (Avmin) has authorised Rand Merchant Bank to arrange a US\$70 million financing facility for the Chambishi Metals expansion project in Zambia. The project, owned 90% by Avmin and 10% by the Zambian government, is scheduled to be commissioned by late 2000. It should produce 4,200 tonnes per year of cobalt during the first five years of treatment of the Nkana slag dump.

Since Chambishi Metals was sold by ZCCM in September 1998, the existing plant has continued to toll-process material for other Zambian Copperbelt operators. In the ten months to 30 June 1999, it produced 1,844 tonnes of cobalt and 8,658 tonnes of copper, and reported an operating profit of R48 million (US\$8 million). Some US\$7 million was spent on rehabilitation, modernisation and upgrading of the plant.

Nickel

Anglovaal Mining (Avmin) reported a net profit of R640 million (US\$105 million) for the twelve months to 30 June 1999, its first full year of operation following a comprehensive corporate restructuring in 1998.

Avmin's 75%-owned Nkomati mine reported an operating profit of R28 million (US\$4.6 million). It produced 3,900 tonnes of nickel in concentrate, some 32% more than budget, at a cash production cost of US\$0.84/lb after byproduct credits from cobalt, copper and platinum group metals. Avmin will continue a final feasibility study to assess the potential to expand Nkomati's operation, which would require the mining of areas of the large, lower-grade resource base. The study includes consideration of alternative downstream processing technologies and of open-pit mining.

Current operations

No nickel ore has been processed in the Philippines since Nonoc closed in 1986.

Taganito benefited from Rio Tuba's problems.

Rio Tuba apparently has very attractive limonite resources.

Hinatuan complements QNI's principal suppliers in Indonesia and New Caledonia.

The recent recovery in the LME nickel price will have been especially welcomed in New Caledonia.

Per wet tonne of ore FOB New Caledonia, the high-grade material shipped to Japan brings around twice the price of the lower-grade, higher-moisture material shipped to QNI.

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Philippines

The Philippines' three nickel laterite miners produced 371,000 dry metric tonnes (dmt) of ore in the six months to 30 June 1999, down 37.7% from 597,000 tonnes in first-half 1998. All the laterite ore mined in the Philippines is exported, with almost all shipped to Pacific Metals Company (Pamco) in Japan. A small quantity of lower-grade limonite ore has been shipped to QNI in Australia each year since 1996.

Taganito Mining produced 222,000 dmt at its operation on Mindanao in first-half 1999 (up from 145,000 dmt in first-half 1998). All of Taganito's laterite ore, which averages about 2.4% Ni, is sold to Pamco.

Rio Tuba produces ore averaging around 2.3% Ni. It is scaling back production as its high-grade resources diminish, although production is forecast to continue for another five years. Rio Tuba's first-half 1999 production was 111,000 dmt, down from 342,000 dmt in first-half 1998.

Hinatuan Mining, the smallest of the three companies, produced 38,000 dmt of laterite ore in the six months to 30 June 1999, down from 109,000 dmt in first-half 1998. Hinatuan's operations in Surigao were adversely affected by unusually heavy rainfall. Unlike the other producers, Hinatuan's output is split between high-grade ore grading 2.3% Ni, marginal ore grading 2.1% Ni, and limonite ore grading 1.5% Ni. The high-grade and marginal ore is sold to Pamco for processing at its Hachinhoe ferronickel smelter, while the limonite ore is sold to QNI for processing at its Yabulu refinery.

New Caledonia

The latest report from the Service des Mines et de l'Energie shows that New Caledonia's exports of nickel laterite ore in the six months to 30 June 1999 were well down on those in the corresponding period in 1998.

Total shipments to Japan fell sharply to 16,490 tonnes of contained nickel, down from 20,180 tonnes in first-half 1998. Shipments to Australia fell marginally from 7,480 tonnes of contained nickel to 7,169 tonnes. The closure of Cominco's Glenbrook ferronickel smelter saw shipments to the USA drop from 1,420 tonnes of contained nickel in first-half 1998 to zero.

SLN's shipments of nickel were down slightly. In the six months to 30 June 1999, SLN exported 22,200 tonnes of nickel in ferronickel from New Caledonia (1998: 23,200), and 4,300 tonnes of nickel in matte (1998: 5,400 tonnes). Production of nickel in matte and ferronickel at SLN's Doniambo plant in the five months to end-May 1999 was 22,200 tonnes (1998: 23,900 tonnes).

Aust. PAL operations

Preston reported cash on hand of A\$21.5 million at 30 June, with the funds required for the second interest payment (due 15 December 1999) remaining on deposit. The December payment, at the current US\$/A\$ exchange rate, should require around A\$17.5 million.

Bulong's ramp-up to design production levels appears to be progressing reasonably well, although plant operations continue to be adversely affected by unscheduled shutdowns, including those required to modify the flash tank choke valves.

Modification of the flash tank chokes appears to be achieving the desired outcomes, although it may take Bulong some time to reach the optimum circuit configuration.

Preston will be concentrating on understanding the reasons for the unexpected bonus. 'No surprises' is still a good management dictum.

Bulong

In mid-August, Moody's Investor Service downgraded its rating of Bulong Operations Proprietary Limited's senior secured debt (US\$185 million 12.5% notes due 15 December 2008) from B2 to B3. The downgrading reflected Moody's assessment that the remaining cash reserves of Bulong Operations, and of Preston Resources Limited, its parent, may be insufficient to fund operating and capital expenses should Bulong experience further significant commissioning problems. Moody's is concerned that further unforeseen commissioning problems cannot be ruled out, despite the recent good progress of commissioning, and despite management's confidence that the project will achieve full production by January 2000. In Moody's view, Bulong Operations and Preston have little additional cash reserves other than the debt service reserve set aside for the bond payment due in December 1999.

Preston responded the same day, pointing out that Bulong had experienced only one significant commissioning problem – the failure of the PAL autoclave agitator assemblies shortly after commissioning began. Preston has taken all reasonable precautions to ensure adequate back-up exists to counter unforeseen problems. In particular, a back-up boiler system has been installed to overcome problems experienced with boiler malfunctioning, and it will remain in place until no longer required. Work was underway to rectify the major remaining problems of flow restrictions in the leach circuit, gypsum precipitation in the nickel solvent extraction circuit, and materials handling difficulties in the cobalt refinery.

Preston subsequently reported that the PAL autoclave circuit at Bulong had achieved an average throughput of 60 dry tonnes per hour over a 24-hour period, not far short of the design target of 70 tonnes per hour. This was achieved after the installation, on 18 August, of the first of the larger size replacement valve inserts in the flash tank train. The other two replacement inserts were to be installed over the next few days. As well, the operation of the cobalt refinery continued to improve. Product quality had reached 99.11% Co, and cobalt recovery, which had risen steadily during August, had reached approximately 70%.

There was also good news on the resource front. Recent mining of two benches of the Albion pit has produced far more ore than expected (actual 174,000 tonnes instead of 120,000 tonnes) at very close to the expected grade (1.812% Ni instead of 1.84% Ni). The 43% increase in contained nickel was matched by a 47% increase in contained cobalt.

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Cawse

Difficult to tell how good this news is, without knowing the actual throughput rates. A ten-day uninterrupted PAL run augurs well.

Its the sustainable overall plant recoveries of nickel and cobalt that are critical to success.

300 tonnes of nickel in a non-shutdown month is probably 35% of design production. The forecast of 6,300 tonnes in 1999/2000 still appears a challenging target.

Access to higher-grade feed for longer than initially scheduled should benefit Cawse considerably.

Centaur Mining & Exploration Limited reported in mid-August that commissioning of Cawse is proceeding ahead of schedule. PAL autoclave throughput is running 44% ahead of budget, partly because daily throughput rates have been 10% above forecast, and partly because the shutdown scheduled for August was deferred until September. The PAL circuit had operated consistently at full design throughput for the ten days to 19 August.

Nickel and cobalt extraction in the PAL autoclave were consistently above 95%, and overall recoveries improved to around 85% with the longer operating runs. Nickel product quality continues to improve.

Centaur expects to produce 300 tonnes of nickel and 70 tonnes of cobalt in cobalt sulphide in August, and 6,300 tonnes of nickel and 1,450 tonnes of cobalt in the twelve months to 30 June 2000. Work continues on overcoming two major problems: scaling of the desalination unit, and premature failure of the PAL autoclave isolation valves.

Centaur has acquired access to significantly larger ore resources through a recently announced strategic alliance with Heron Resources NL (see p. 8) and a farm-in agreement with Gilt-Edged Mining NL (see p. 7). This has triggered the commencement of a pre-feasibility study on a brownfields expansion of Cawse. The expanded plant could process up to 4 million tonnes per year, producing over 45,000 tonnes of nickel metal, and at least 3,000 tonnes of cobalt, per year.

Murrin Murrin

Might Murrin Murrin's misfortunes be in any way linked to the 'fixed price' EPC contract arrangements?

It would be surprising if much of the front-end PAL circuit could operate with the sulphiding system shut down.

A power failure at Murrin Murrin caused 'normal venting' of hydrogen sulphide gas on 16 August, according to a report issued by Anaconda Nickel Limited. The gas affected five workers, two of whom were flown to hospital in Perth. On 25 August, Mr Andrew Forrest, managing director of Anaconda, reported that all five people were expected to recover fully, and to return to work.

The sulphide precipitation plant at Murrin Murrin was shut down after the leak, and was expected to restart on 27 August, following separate investigations of the incident by Anaconda and by the Western Australian Department of Minerals and Energy. During the shutdown, Anaconda progressed planned maintenance and rectification activities on the PAL autoclaves and the counter-current decantation (CCD) circuits.

The first flash vessel to be converted from bottom-entry to top-entry has been put into operation, but no report on its performance had been issued by 29 August.

Feasibility studies

The LME nickel price stayed sufficiently high for sufficiently long to allow Jubilee to put in place price-protection that was satisfactory to the lending syndicate.

The formal due diligence exercise is unlikely to turn up any surprises at this stage.

An open-pit mine feeding a simple concentrator, with concentrate sold to Inco. Nickel projects don't come any easier than this.

Apparently, Nord Pacific is claiming that the joint venture operating committee no longer has authority to act on behalf of the joint venture.

Black Range, keen to gain access to leases close to Syerston, has negotiated a conventional farm-in agreement with Rimfire.

Cosmos

Jubilee Gold NL has accepted an offer from a syndicate of Australian banks to provide funding for the development of its Cosmos nickel sulphide project between Leinster and Mt Keith in Western Australia. The syndicate, led by the Bank of Western Australia (BankWest), includes the Commonwealth Bank (one of the four major Australian banks), and NM Rothschild & Sons Limited. It will lend Jubilee up to A\$52 million, of which A\$37.7 million is earmarked for the construction of the Cosmos open-pit mine and concentrator, with the remaining A\$14.2 million to be applied to working capital and to the retirement of previous loans.

Mr Kerry Harmanis, managing director of Jubilee, expects formal due diligence and documentation to be completed by mid-September, allowing site work to begin by around end-September. Plant commissioning is expected to begin six months later, in late March or early April 2000.

Mining reserves at Cosmos are currently 420,000 tonnes at 7.52% Ni, and the project is scheduled to produce around 10,000 tonnes per year of nickel in concentrate for three years. All the concentrate to be produced has been sold to Inco Limited. At a nickel price around US\$3.00/lb, Cosmos is expected to generate pre-tax profits of around A\$130 million.

Ramu

Highlands Pacific Limited has filed with the National Court of Papua New Guinea an originating summons seeking declaratory orders in relation to the Ramu Joint Venture. This legal action has been taken to resolve the ongoing dispute between Highlands Pacific and one of its Ramu joint venture partners, Nord Pacific Limited, over the correct interpretation of the Ramu joint venture agreement.

Syerston

Black Range Minerals NL and Rimfire Pacific NL have signed an agreement providing for Black Range to farm-in to Rimfire's two exploration leases adjacent to the southern boundary of Black Range's Syerston project in central New South Wales. The leases contain intrusions which are prospective for nickel, cobalt and platinum.

Black Range can earn a 50% joint venture interest in the leases by sole-funding A\$200,000 of exploration expenditure over two years, and can earn an additional 30% interest in the joint venture by spending a further A\$200,000 over the subsequent two years. Black Range has also secured the right to apply for a 100% owned mining lease over part of the joint venture leases, for residue disposal.

Marlborough

Barclays Bank plc is understood to be closely involved in the Marlborough financing work, although it would appear that Barclays' earlier option to arrange bond financing may no longer exist.

No announcement has yet been made about final nameplate capacity, nor about any product being sent to Yabulu.

Preston Resources NL expects the mining leases necessary for the development of its Marlborough nickel-cobalt laterite project to be granted by end-September. The granting of the mining leases will provide requisite security for project financing, and Preston plans to appoint one or more banks to advise on the most beneficial form of financing. Subsequently, Preston will mandate a bank to raise the capital required for the development of Marlborough.

In its press release announcing the successful conclusion of the Marlborough project's Native Title negotiations, the Queensland government indicated that the project would produce 19,400 tonnes per year of nickel, some of which would be railed to the nickel refinery in Townsville, and the remainder exported through Gladstone.

Early stage projects

C\$8.2 million already spent. The overall resource is very large, but it consists of many separate deposits, of varying mineralogy, which necessitates extensive pre-feasibility work.

The Centaur-GEM agreement is a very conventional farm-in arrangement, in contrast to the agreement Centaur struck with Heron (see p. 8).

Weda Bay

Weda Bay Minerals Limited has updated the results of its 11-hole reconnaissance drilling program on its Santa Monica prospect, Halmahera Indonesia. The final 11-hole average intercept was 11.37 metres at 1.46% Ni and 0.15% Co, using a 1.0% Ni cut-off grade.

In the six months to 30 June 1999, Weda Bay Minerals spent C\$644,000 on its Weda Bay prospect, bringing expenditure to date to C\$8,216,000. At 30 June 1999 Weda Bay Minerals had C\$937,000 cash on hand, having realised C\$500,000 through a private placement of 1 million shares in March 1999.

Siberia-Wongi

Gilt-Edged Mining NL (GEM) and Centaur Mining & Exploration Limited have entered into a farm-in agreement covering GEM's Siberia-Wongi Hill tenements some 25 kilometres north of Centaur's Cawse PAL plant in Western Australia. Centaur may obtain up to an 80% joint venture interest in the nickel-cobalt mineralisation on the tenements by sole-funding exploration expenditure of at least A\$1.3 million and by making staged cash payments totalling A\$4 million to GEM over five years. GEM's 20% interest is free carried until a decision to mine is taken, when GEM has the option to convert it to a 2% net smelter return royalty.

GEM's tenements include 15 kilometres strike length of the Walter Williams formation, the geological horizon that hosts all known nickel-cobalt laterite mineralisation in the Siberia-Cawse region. Limited drilling by GEM has given encouraging results, including one intercept of 14 metres at 1.19% Ni.

Kalpini

A win-win outcome. Heron provides the resources, and Centaur provides the brownfields processing capacity.

Centaur will find the high-grade deposits in Heron's resources especially attractive.

Heron had A\$1.3 million cash on hand at 30 June 1999.

The brownfields expansion will almost certainly require Cawse to generate sulphuric acid on-site, as the supply from WMC's Kalgoorlie is fully committed.

The existing PAL operation at Cawse has been described as a large-scale pilot plant, and Heron and Centaur will use it as such.

Heron's ore may be put through Cawse in batches, or it may be blended with Centaur ore.

Increasing the nickel grade of the autoclave feed may well be critical to the economics of the Cawse expansion.

Heron Resources NL has announced an alliance with Centaur Mining & Exploration Limited. The alliance links Heron's ownership of extensive nickel laterite resources near Kalgoorlie with Centaur's ownership of the Cawse PAL plant, 50 kilometres north-west of Kalgoorlie. The alliance, to be formally executed by mid-September, provides for:

- Centaur to pay Heron A\$3.132 million to acquire (a) an option over Heron's nickel laterite resources at Kalpini, Goongarrie and Ghost Rocks, estimated to contain 166 million tonnes at 0.78% Ni and 0.05% Co, including 67.6 million tonnes at 1.1% Ni and 0.07% Co, and (b) an option to acquire a 15% interest in Heron at any time over the next two years, at no additional cost.
- Heron to spend A\$3 million on exploration at Kalpini, Goongarrie and Ghost Rocks, to upgrade the status of the current resources, and to test for potential substantial increases in the resource base. Centaur has the right to second a geologist to Heron for the exploration project.
- Centaur to immediately commence a pre-feasibility study on a brownfields expansion of Cawse, based on processing ore from Centaur's and Heron's tenements. If the pre-feasibility study (to be completed by June 2000) demonstrates sufficiently attractive economics, Centaur will commence a bankable feasibility study (to be completed by June 2001). Heron estimates the feasibility study will cost over A\$20 million.
- Heron to be able to have high-grade ore toll-processed through Centaur's existing Cawse PAL plant, even prior to any decision on the brownfields expansion. Heron expects the toll-processing to generate important technical information for the feasibility studies, as well as generating cash for Heron – cash which could fund the development of Heron's other projects.
- Heron to supply at least 20% of the ore to be processed through the expanded Cawse PAL plant, and Centaur to have a first right of refusal to treat – on commercial terms – any other Heron ore offered for toll treatment. Centaur will have pre-emptive rights to Heron's gold interests on the Kalpini, Goongarrie and Ghost Rocks tenements.

The ore types at Kalpini, Goongarrie and Ghost Rocks are very similar to those at Cawse. They are amenable to beneficiation by screening out the coarser fractions of the ores, and can be processed using the current Cawse flowsheet. The agreement covers 44 existing Heron tenements, and any nickel-cobalt laterite resources within 100 kilometres of Cawse subsequently acquired by Heron.

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