22 August 2019

HARDMAN & CO.

Mining

Source: Refinitiv

Market data

EPIC/TKR	**PXC**
Price (p)	**12.45**
12m High (p)	36.0
12m Low (p)	11.0
FD shares (m)	50.01
Mkt Cap (£m)	6.23
EV (£m)	6.22
Free Float*	84.30%
Market	AIM

**As defined by AIM Rule 26*

Description

PXC is developing the former Empire deposit and the surrounding area in central Idaho into a potentially world-class copper and polymetallic mine. First production is expected in late 2021.

Company information

Chairman	M. Edwards-Jones
CEO	Dennis Thomas
COO	Ryan McDermott
CFO	Richard Wilkins

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phoenixcopperlimited.com

Key shareholders

Cheviot Capital	15.70%
JIM Nominees Ltd.	12.03%
Directors & mgt.	10.12%
Lynchwood Nominees Ltd.	6.36%

Diary

Sep'19	Interim results

Analyst

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PHOENIX COPPER LTD

First stage in potential world-class copper mine

Phoenix Copper Ltd (PXC) achieved a further milestone in its strategy for a staged development of the potentially world-class Empire copper mine in mining-friendly Idaho, US. The new economic model for an open pit "starter mine" is key to the Feasibility Study due by 2Q'20. Capital and cash operating costs have been cut by 25% and 7%, respectively, with minimal production impact. This mine will provide cashflow to explore far more extensive mineralisation in the deeper sulphide ore body and adjacent land package. While we evaluate PXC's upside in more detail, our estimated DCF valuation for the first mine is 32p/share, and 49p/share using the company's base-case assumptions.

- **Strategy:** PXC focuses on near-term cashflow and will maximise returns/minimise risk to shareholders by developing a potentially world-class copper-zinc-gold deposit in stages. Empire was formerly a (very) high-grade underground copper mine, which was shut down due to World War II. Access to historical workings will cut exploration costs significantly, e.g. drilling at depth.

- **New model:** Further mine planning has cut the capital cost of the open pit starter mine from $68m to $51m. The new plan sees 7,000 tons p.a. of copper and 1,600 tons p.a. of zinc production from late 2021-32. Cash costs of production have been cut from $1.85/lb of copper equivalent to $1.72/lb.

- **Upside potential:** Empire produced 694,000 tons of ore in 1901-42, recovering 3.64% copper, a very high grade vs. a current average of ca.0.5% for new mines. Only 1%-2% of PXC's potential ore system has been explored, which includes three other former mines in addition to Empire, the adjacent Navarre Creek gold zone and the recent "Red Star" polymetallic discovery.

- **Risks:** PXC is subject to the normal risks for a junior miner. These include volatility in copper and zinc prices, operational risks in executing the mining plan, running downstream processing facilities and funding risks. We believe that jurisdictional risk is significantly reduced in PXC's case.

- **Investment summary:** Our DCF valuation is 32p/share – based solely on the starter oxide mine and more conservative (vs. the company) assumptions of an 8% discount rate, and long-term copper and zinc prices of $3.10/lb and $1.25/lb, respectively. At this stage of development, PXC's share price is highly geared to the "supply crunch" upside thesis for copper ($0.25/lb = ca.19p/share).

Financial summary and valuation

Year-end Dec ($m)	2017	2018	2019E	2020E	2021E	2022E
Sales	0	0	0	0	0	48.800
Underlying EBIT	-1.058	-1.654	-1.371	-1.762	-2.082	0.787
Reported EBIT	-1.058	-1.654	-1.371	-1.762	-2.082	0.787
Underlying PTP	-1.056	-1.652	-1.366	-2.747	-5.069	-2.913
Statutory PTP	-1.056	-1.652	-1.366	-2.747	-5.069	-2.913
Underlying EPS (c)	-8.20	-5.82	-2.41	-3.16	-5.76	-3.32
Statutory EPS (c)	-8.20	-5.82	-2.41	-3.16	-5.76	-3.32
Net (debt)/cash	1.904	0.113	0.598	-22.899	-54.596	-36.846
Average shares (m)	16.498	28.273	45.242	69.452	87.633	87.633
P/E (x)	n/a	n/a	n/a	n/a	n/a	n/a
Dividend yield	n/a	n/a	n/a	n/a	n/a	n/a
FCF yield	n/a	n/a	n/a	n/a	n/a	96.2%

Source: Hardman & Co Research

Background – finding the "right" project

PXC IPO in June 2017 following long search for "right" project by current CEO

Phoenix Copper Ltd (PXC), originally known as Phoenix Global Mining, was incorporated in 2013, followed by an IPO on London's AIM market on 29 June 2017. The CEO, Dennis Thomas, had screened numerous projects before identifying the Empire mine and the adjacent area in central Idaho as having the greatest potential upside, combined with the lowest manageable risks. An additional factor behind PXC's strategy was the dearth of major new copper mines being developed and that copper is widely expected to be in structural deficit for several years in the 2020s.

Mine development planned in stages

By staging mine development, PXC identified a rapid, low-cost route to cashflows to fund exploration of the much greater, and almost completely unexplored, mineralisation, both below and laterally adjacent to the shallow oxide ore. The system being explored by PXC has 5.4km of geologic strike incorporating the Empire mine and an additional ca.4,500 acres. It includes three more former mines (Horseshoe, Bluebird and White Nob), the Carlin-type (i.e. sediment-hosted hydrothermal) Navarre gold zone and the copper-lead-zinc-gold-silver Red Star discovery.

Potentially a world-class project

We made a three-day visit to the Empire project, including viewing the site of the proposed open pit mine, historical workings and drill cores, and we have followed up with in-depth questioning of the Phoenix team on several occasions. In terms of its potential, we concur with the view of consulting geologist, Nigel Maund, in a 5 April 2019 report:

"The Empire Granite Porphyry Breccia (GPB) – Endoskarn copper + gold + silver + zinc + lead + molybdenum + tungsten comprises a world class polymetallic ore system sitting astride a major N-S structure"

New economic model

Initial mine plan targets shallow oxide layer…

The new economic model incorporates an open pit mine to extract the near-surface oxide ore, which is located above the underground workings of the former Empire copper mine. The latter had targeted deeper and higher-grade sulphide ore. The oxide layer reaches a depth of about 120 metres below the surface; beneath this is a "transition layer" of mixed oxide and sulphide ore, after which the latter dominates. The plan assumes that oxide ore will be processed by a conventional heap leach SX-EW (solvent extraction electro-winning) operation.

…based on May 2019 resource update

The new model updated the November 2017 resource estimate and April 2018's Preliminary Economic Assessment (PEA) to incorporate subsequent exploration work, notably PXC's 2018 drilling programme. The new production plan encompasses 90,182 tons of (gross) copper production, which is 97% of the copper contained in the May 2019 Empire resource update shown below. It excludes the gold resource of 139,000 oz. of measured & indicated and 44,000 oz. of inferred, and the silver resource of 6,038,000 oz. of measured & indicated and 1,340,000 oz. of inferred – in addition to the initial resource for the nearby Red Star polymetallic sulphide discovery (copper-lead-zinc-gold-silver).

Empire – mineral resources and reserves (May 2019)

	Tonnes (mt)	Copper (t)	Zinc (t)	Gold (oz)	Silver (oz)	Copper (%)	Zinc (%)	Gold (g/t)	Silver (g/t)
Measured	6.176	30,419	12,864	51,000	2,419,000	0.49	0.21	0.26	12.2
Indicated	8.993	43,453	16,949	88,000	3,618,000	0.48	0.19	0.30	12.5
M&I	**15.169**	**73,872**	**29,813**	**139,000**	**6,038,000**	**0.49**	**0.20**	**0.28**	**12.4**
Inferred	4.271	18,993	5,449	44,000	1,340,000	0.44	0.13	0.32	9.8
Total resources	**19.440**	**93,865**	**35,262**	**183,000**	**7,378,000**				

Source: PXC, Hardman & Co Research

The key was greater confidence from the 46% rise in M&I

Instead of the increase in total resources, the major positive in the May 2019 resource update was the 46% rise in oxide ore categorised in the "Measured & Indicated" category from 10.42m tonnes to 15.17m tonnes.

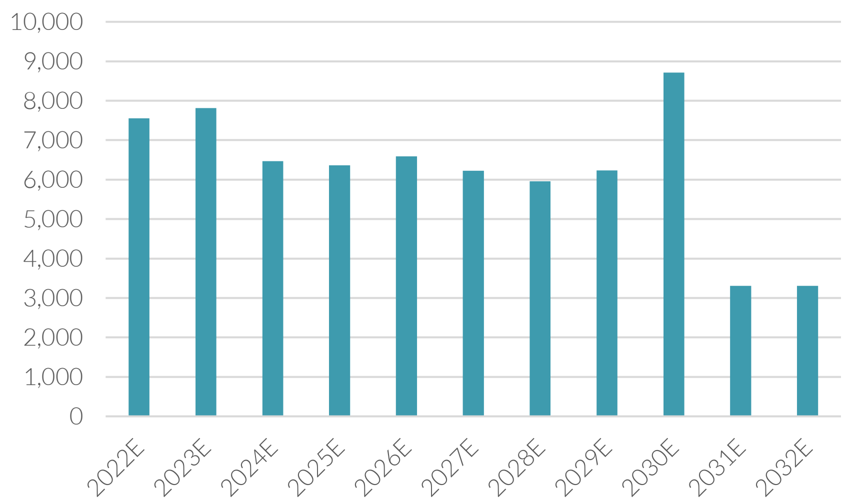
Ore production reduced by ca.30% in new model…

A major change from the previous model is the adoption of two copper cut-off grades, of 0.325% and 0.20-0.325%, respectively, vs. a single cut-off grade of 0.24%. The high-grade ore will be fed to the heap leach pad first, permitting ore production to be reduced by almost 30%, from 2.25m tons p.a. to 1.6m tons p.a. The reduction in mine production has led to a 25% reduction in the initial capital cost to $51m, compared with the most recent $68m estimate.

…with minimal impact on LOM metal production

The significant cut in ore production has had only a minor impact on life-of-mine (LOM) saleable copper production, which falls from 71,618 tons to 68,500 tons. Mine life is extended from eight to nine years, followed by an additional two years for processing low-grade ore.

Phoenix Copper Ltd – saleable copper production estimates, 2022-32 (tons)



Source: Hardman & Co Research

Zinc by-products contribute to 7% fall in cash costs

The estimated LOM cash cost of per pound of copper equivalent production has been reduced from $1.85/lb to $1.72/lb. This has been helped by another major difference compared with the previous PEA – the inclusion of significant zinc by-products, amounting to 16,500 tons. The gold and silver from the resource estimate are not part of the mine plan at this stage (see below).

Assumptions used in PXC's economic model

The company's base-case assumptions in the model include a 7% discount rate and long-term prices for copper and zinc of $3.25/lb and $1.35/lb, respectively. PXC estimates the ungeared project NPV at $55.5m (£45.9m). Some of the key assumptions are summarised in the table below. It's worth adding that a sensitivity analysis showed a ca.$15m (£12.4m) change in NPV for each $0.25/lb change in the copper price.

Empire mine economic mode – PXC base-case assumptions	
Production – total ore (mt p.a.)	1.634
Copper recovery (%)	76.0
Zinc recovery (%)	50.0
LOM copper cathode produced (tons)	68.500
LOM zinc produced (tons)	16,500
LOM average copper price ($/lb)	3.25
LOM average zinc price ($/lb)	1.35
LOM average cash cost ($/lb Cu equiv.)	1.72
Initial capital cost ($m)	50.578
LOM sustaining capital ($m)	25.306
Discount rate	7.0%
NPV 7% ($m)	55.457

Source: PXC

Jurisdictional benefit of Idaho

The location of the open pit of the planned oxide mine will be sited on "patented" land, allowing rapid permitting without the need for Federal approval. That said, the leach pad, SX/EW plant and part of the haul road/conveyance/power corridor are located on public land and will require the normal Federal approval. Environmental studies are ongoing and should be completed by mid-2020. No adverse issues are currently envisaged. In the Mining Journal's *Risk Report 2018*, Idaho was ranked first in terms of the lowest risk perception in world mining.

Feasibility study due 2Q'20, with production before end-2021

PXC's new economic model will form part of the upcoming Feasibility Study, which is due to be released in the second quarter of next year, with first mine production planned for late 2021. Our model currently assumes 1 January 2022.

Cashflow, P&L and valuation

We expected PXC to assume 100% of the Empire claim

In our cashflow model, we are assuming that the breakdown of the $50.6m initial capital cost for the oxide mine is $20.0m in 2020 and the remainder in the run-up to production in 2021. While PXC currently owns 80% of Konnex Resources Inc., which owns 100% of the Empire claim, we expect that the company will fully fund the investment. The remaining 20% of Konnex is owned by ExGen Resources Inc., which also holds 3.11% of PXC's ordinary share capital. Following the completion of a Bankable Feasibility Study, ExGen Resources has to contribute its share of funding for mine construction, or be diluted. We are currently assuming that it does not contribute and is diluted to zero.

Financing will be predominantly debt

In terms of financing, PXC has indicated its aim of minimising the amount of equity issuance in favour of debt and other types of project finance, possibly including production offtake deals. The company has appointed a specialist mining finance firm, Medea Natural Resources, as its lead financial adviser to arrange project financing to construct the oxide mine. Discussions with potential investors are taking place.

In 2019, we expect the company to raise a further $6.0m in equity, following on from the ca.$2.178m raised so far in 2019, with an additional $5.0m at the beginning of 2021. We estimate that equity financing will amount to $5.0m, reaching $11.0m by end-2021, with additional debt financing of $55.0m.

The table below shows PXC's cashflow in 2018 and our estimates for 2019-22, which includes the first year of full production from the starter oxide mine.

Phoenix Copper Ltd – cashflow statement, 2018-22E					
Year-end Dec ($m)	**2018**	**2019E**	**2020E**	**2021E**	**2022E**
Operating profit	-1.654	-1.371	-1.762	-2.082	0.787
Non-cash items:					
Depreciation	0.000	0.000	0.000	0.000	21.831
Depletion	0.000	0.000	0.000	0.000	2.832
Share-based payments	0.174	0.000	0.000	0.000	0.000
Operating cashflow	**-1.480**	**-1.371**	**-1.762**	**-2.082**	**25.450**
Change in inventories	-0.198	0.000	0.000	0.000	0.000
Change in receivables	0.000	0.000	0.000	0.000	0.000
Change in payables	0.292	0.000	0.000	0.000	0.000
Cash from operations	**-1.387**	**-1.371**	**-1.762**	**-2.082**	**25.450**
Tax paid	0.000	0.000	0.000	0.000	0.000
Net cash from ops.	**-1.387**	**-1.371**	**-1.762**	**-2.082**	**25.450**
Purchase of intangibles	-0.140	0.000	0.000	0.000	0.000
Capex on PPE & mines	-4.594	-6.000	-20.000	-30.578	-4.000
Net cash for investing	**-4.734**	**-6.000**	**-20.000**	**-30.578**	**-4.000**
Share issues	4.654	8.178	0.000	5.000	0.000
Share/debt issue costs	-0.326	-0.327	-0.750	-1.050	0.000
Inc./(decrease) in debt	0.000	0.000	25.000	30.000	-10.000
Net interest	0.002	0.005	-0.970	-2.980	-3.715
Net cash for financing	**4.330**	**7.856**	**23.265**	**30.963**	**-13.700**
Net change in cash	**-1.791**	**0.485**	**1.503**	**-1.697**	**7.750**
Cash: end of year	**0.113**	**0.598**	**2.101**	**0.404**	**8.154**
Debt: end of year	**0.000**	**0.000**	**-25.000**	**-55.000**	**-45.000**
Net (debt)/cash	**0.113**	**0.558**	**-22.899**	**-54.596**	**-36.846**

Source: PXC, Hardman & Co Research

Oxide mine should generate substantial cashflow

Once the oxide mine is commissioned, there should be an immediate swing, with PXC generating substantial free cashflow, e.g. in excess of $20.0m in 2023 (in contrast to reported profits – see below). We estimate that PXC will be able to repay the $55.0m of debt by the end of 2025, i.e. after four years. The next chart shows our estimates for free cashflow (net profit + depreciation & depletion – capex) during 2020-32.

Phoenix Copper Ltd – free cashflow estimates, 2020-32E

Source: Hardman & Co Research

Our P&L estimates for PXC for 2018-22, including the first full year of the oxide mine operation, are shown in the next table.

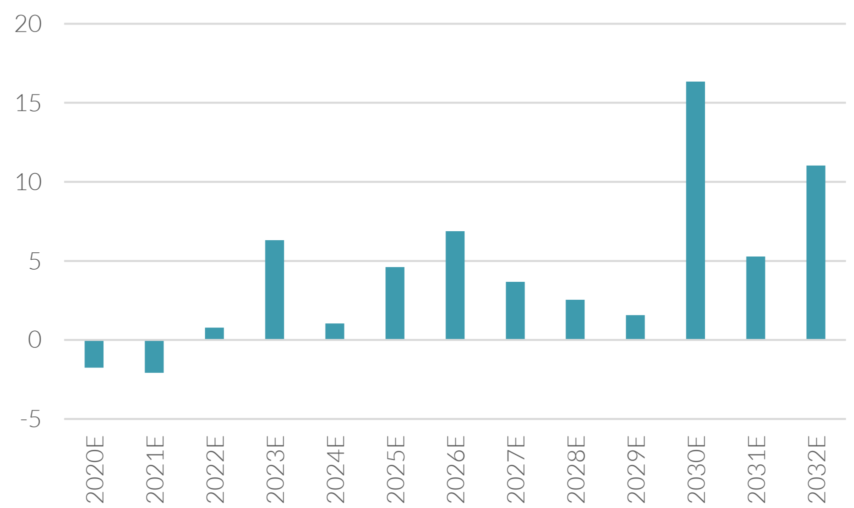
Phoenix Copper Ltd – profit & loss account, 2018-22E					
Year-end Dec ($m)	2018	2019E	2020E	2021E	2022E
Sales	0.000	0.000	0.000	0.000	48.800
Operating costs	-1.654	-1.371	-1.762	-2.082	-48.013
Operating profit	**-1.654**	-1.371	-1.762	-2.082	**-0.787**
Finance income	0.002	0.005	0.015	0.013	0.050
Finance costs	0.000	0.000	-1.000	-3.000	-3.750
PTP	**-1.652**	**-1.366**	**-2.747**	**-5.069**	**-2.913**
Taxation	0.000	0.000	0.000	0.000	0.000
Tax rate	n/a	n/a	n/a	n/a	n/a
Minority interests	0.017	0.273	0.549	0.025	0.000
Net income	**-1.635**	**-1.092**	**-2.198**	**-5.044**	**-2.913**
Basic no. of shares (m)	28.121	45.242	69.452	87.633	87.633
Basic EPS ($)	**-5.82**	**-2.41**	**-3.16**	**-5.76**	**-3.32**
FD EPS ($)	**-5.82**	**-2.41**	**-3.16**	**-5.76**	**-3.32**

Source: PXC, Hardman & Co Research

P&L estimates incorporate aggressive depreciation policy, but will not affect cashflow

Our assumptions in estimating PXC's P&L for the starter oxide mine include the company adopting an aggressive depreciation policy in the form of a 40% reducing balance method. While it severely affects reported profits, particularly in the early years of mine operation, PXC's strong cashflow is obviously unaffected. The next chart shows our estimates for EBIT in 2020-32E.

Phoenix Copper Ltd – EBIT estimates, 2020-32E



Source: Hardman & Co Research

DCF model for starter mine incorporates 8% discount rate, current resource estimate and further 26.67m shares issued this year

We have valued PXC using a DCF model, incorporating a discount rate of 8%, mine production to 2030 and processing of low-grade ore to 2032, when it is exhausted. Development of a second and larger mine aside, we believe that there is a strong possibility that the current oxide resource will be increased in the coming years. Our fully-diluted number of shares assumes that a further 26.67m ordinary shares are issued in the remainder of 2019 (raising an additional $6.0m), giving a fully-diluted 76.68m shares in issue at year-end. However, we acknowledge that this could be materially lower in favour of debt-financing, given the appointment of Medea and ongoing discussions. We would also note that, of the 7.225m options and warrants, 2.374m (3.0% of fully-diluted total) are exercisable at significantly out-of-the-money prices (44.0-45.0p/share during 2020-21) currently.

We base our valuation on a long-term copper price of $3.10/lb

Our long-term copper and zinc price assumptions are slightly more conservative at this stage than the company's base case (see above), at $3.10/lb and $1.25/lb, respectively. We ascribe to the "supply crunch" thesis in the 2020s due to the dearth of major new mines, falling grades, the impact of electric vehicles and the industry's knack of suffering a variety of unplanned outages. That said, we hesitate, for the time being, to base our valuation for PXC on some of the higher long-term forecasts we have seen in the 3.25-3.50/lb range given the current US/China uncertainty – and nor is it required.

Our DCF valuation is based on more conservative assumptions of 32p/share

Based on the assumptions we have outlined, our fair value for the company is 32p/share, vs. the current price of 12.45p, as shown in the tables below. Incorporating PXC's assumptions of a 7% discount rate, $3.25/lb copper and $1.35/lb zinc, we estimate a valuation of 49p/share.

Phoenix Copper Ltd – DCF valuation: part 1 (2020-26E)

$m (unless stated)	2020E	2021E	2022E	2023E	2024E	2025E	2026E
PTP	-2.747	-5.069	-2.913	3.794	-0.006	4.364	7.038
Tax	0.000	0.000	0.000	0.000	0.001	-1.306	-2.106
NOPAT	**-2.747**	**-5.069**	**-2.913**	**-3.794**	**-0.005**	**3.058**	**4.932**
Depreciation & amort.	0.000	0.000	21.831	14.903	10.257	7.273	6.250
Depletion	0.000	0.000	2.832	9.562	3.648	5.172	6.048
Change in working cap.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capex & exploration	-20.000	-30.578	-4.000	-4.511	-3.289	-2.796	-4.715
Free cashflow	**-22.747**	**-35.647**	**17.750**	**23.748**	**10.612**	**12.707**	**12.515**
Discount rate = 8%							
Discount factor	1.00	0.93	0.86	0.79	0.74	0.68	0.63
Disc. free cashflow	**-22.747**	**-33.006**	**15.218**	**18.852**	**7.800**	**8.648**	**7.886**

Source: PXC, Hardman & Co Research

Phoenix Copper Ltd – DCF valuation: part 2 (2027-32E & summary)

$m (unless stated)	2027E	2028E	2029E	2030E	2031E	2032E	Total
PTP	3.943	2.864	1.917	16.820	5.914	11.754	46.306
Tax	-1.180	-0.556	-0.249	-4.574	-1.616	-3.365	-16.342
NOPAT	**2.763**	**2.007**	**1.343**	**11.786**	**4.144**	**8.237**	**29.964**
Depreciation & amort.	4.229	3.421	3.120	2.859	1.816	-0.030	75.929
Depletion	2.530	0.208	0.000	11.804	1.585	0.046	43.435
Change in working cap.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capex & exploration	-1.198	-2.208	-2.669	-2.467	-0.253	2.800	-81.884
Free cashflow	**8.324**	**3.428**	**1.794**	**23.982**	**7.293**	**11.052**	**67.444**
Discount rate = 8%							
Discount factor	0.58	0.54	0.50	0.46	0.43	0.40	
Disc. free cashflow	**4.857**	**1.852**	**0.897**	**11.108**	**3.127**	**4.389**	**28.882**
Cum. disc. FCF	28.882						
Net (debt)/cash	0.598						
Total	**29.480**						
Basic shares year-end (m)	69.452						
Add: options/warrants	7.225						
FD shares year-end (m)	76.677						
Valuation ($)	0.38						
$/£	1.21						
Valuation (£)	**0.32**						

Source: PXC, Hardman & Co Research

PXC valuation is highly geared to copper price

At this early stage of its development, the company's share price is highly geared to the copper price, unsurprisingly. Performing an in-depth sensitivity analysis on our financial model, we estimate that each $0.25/lb change in the LOM copper price affects our valuation of PXC by ca.19p/share. It obviously cuts both ways, but is clearly indicative of PXC's gearing to the supply crunch upside thesis for copper.

For the time being, we are excluding from our valuation of PXC:

- potential gold and silver credits from the oxide mine;
- two cobalt claims with mineralisation confirmed from initial sample results; and
- the potential for developing a world-class copper mine at Empire and the surrounding area.

Our valuation currently excludes any contribution from gold and silver by-products…

As noted above, the gold and silver contained in the oxide ore are expected to be left on the leach pad under the current plan, although this assumption might be altered at a later stage. It is worth noting that, based on approximate current gold and silver prices ($1,500/oz and $17.00/oz, respectively), the gross value of gold and silver from the May 2019 Empire resource estimate (measured, indicated and inferred) is $399.9m – and could be highly significant for PXC shareholders.

…or its cobalt claims…

PXC has two 100%-owned claims to properties in the Idaho cobalt belt – Bighorn and Redcastle – amounting to 1,180 acres in aggregate. Most noteworthy in this regard was the C$149m acquisition of First Cobalt in June last year, with a project adjacent to Redcastle. The project was in the early stage of development, having an inferred resource only. During the 2018 exploration programme, all of PXC's sample results confirmed cobalt mineralisation, with two at Bighorn showing significant copper values. With the current focus on the development of the starter oxide mine, we expect further exploration at Bighorn and Redcastle to resume in spring 2020.

…or much larger sulphide mineralisation beneath and adjacent to Empire

Going forward, the deeper sulphide ore body and targets on the expanded land package will be the main focus of the ongoing exploration programme. This will allow PXC to evaluate multiple stages of mine development in the coming years.

Ore grade mined during 1901-42 at Empire was 6%-8% copper

Prior to its closure due to World War II, it was by targeting the high-grade narrow vein sulphide mineralisation that the former underground mine was able to extract 364,000 tons, recovering 3.64% copper. This level of recovery implied significantly higher ore grades, estimated at 6%-8% in mine inspectors' reports, which is phenomenally high compared with the current era. New mines scheduled for commissioning in the next few years have an average ore grade in the range 0.5%-0.6% and slightly lower recovery.

Recent drill hole into sulphide ore body intercepted up to 7.16% copper equivalent

We should note that the 2018 drilling programme achieved some initial sulphide intercepts at a depth of more than 100m. Drill hole KX-18-52 intercepted 4.6m of 3.88% copper equivalent and 1.5m of 7.16% copper equivalent, which augurs well for the next phase of exploration and the multiple-stage mine strategy.

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