Central Asia Metals

Site visit

QuotedData's analyst, Paul Burton, shares his impressions from his site visit to Central Asia Metals (CAML)'s Kazakh operations.

In late April, QuotedData's analyst visited the plant site with a group of London-based analysts. The group witnessed the first copper (in solution) being leached from the new Western dumps at Kounrad. The commencement of production here reduces the perceived risk in the expansion project. Overall, we were very impressed with the efficiency of the operations. The focus of extraction is transitioning to the Western dumps and the visit suggested that CAML will be able to continue to produce low-cost copper from Kounrad.

Our observations on the new Shuak exploration property suggest that the prospects for finding economic copper mineralisation are much better than had been previously thought (based on initial reports).

If the transition continues to be smooth, CAML should have a long and stable future production profile. It is one of the lowest-cost copper producers in the industry and this supports its ability to continue to deliver a high dividend yield for many years.

The company had cash of US$40m at the end of 2016 and is debt-free.

Year	Cu prod (kt)	Cash costs (USc/lb)	Rev. (U$m)	EBITDA (U$m)	EBITDA margin (%)	EPS (USc)
2017f	13.5	50	78.3	46.6	60	0.27
2018f	13.2	52	81.6	49.4	60	0.29
2019f	13.2	53	87.0	54.3	62	0.32

Source: Marten & Co

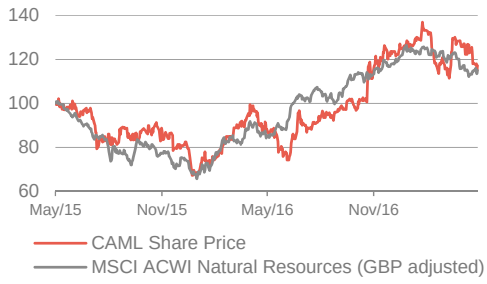
Valuation summary

QuotedData's model suggests that a sum-of-the-parts NAV valuation of CAML is 268.5 pence per share (based on an 8% discount rate and a range of assumptions listed on page 20), implying that the company is currently trading at a 19% discount to this NAV.

Listed	LSE
Ticker	CAML LN
Base currency	GBP
Price	218.00p
Daily volume (1-year avg.)	131k shares
1-year high	254.75p
1-year low	138.00p
1-month performance	(8.8%)
3-month performance	(12.1%)
1-year performance	36.3%
Calendar YTD perf.	(4.1%)
Yield	7.1%

Perf. vs MSCI ACWI Nat Res. rebased

Time period: May 2015 to May 2017



Source: Bloomberg, Marten & Co

Net cash	US$40.4m
NAV[8%]/share*	268.5p
P/NAV	85%
Market cap	£244.4m
Shares outstanding	112.1m
EV/EBITDA	4.5

* NAV based on 8% discount rate

Click here for QuotedData's annual overview note
Click here for QuotedData's most recent update note

Introduction

Further information about CAML can be found on the company's website: www.centralasiametals.com

CAML's Kazakh operations might be said to resemble a cashflow 'factory' which it is using to produce dividends. In QuotedData's recent annual review, 2016's impressive financial performance of the company was highlighted, particularly the 24% increase in dividends to 15.5p per share.

The company's 'factory' is a low-cost, copper dump operation treating material discarded by the now dormant Kounrad copper mine. For five years, CAML has worked the predominantly oxide Eastern dumps, extracting more profitable copper every year, reaching a record of 14.0kt in 2016. However, the Eastern dumps are nearing depletion and it is now time for the larger Western dumps to supply feed material to the plant.

In late April, we visited the plant site with a group of London-based analysts and were very impressed with the efficiency of the operations. The operators on the ground, under the guidance of technical director Howard Nicholson, remain focused on the production of low-cost copper as the focus of extraction transitions to the Western dumps.

The site visit reinforced our confidence in our numbers - our valuation has not changed

We came away from the site visit convinced that no changes are needed to the inputs into QuotedData's model and so the NAV used in this note is unchanged from that in QuotedData's previous note. We thought we should take this opportunity to explain what happens inside CAML's 'factory'.

When a factory, such as CAML's Kounrad plant, changes its raw material input it can be a concern for investors who worry that it may cause performance and quality of output to suffer. In this report, we start off by explaining the basic process and how CAML manages and controls it, and then look at the characteristics of the new feed from the Western dumps and implications for future production.

The operation is embarking on a new phase that could see it producing low-cost copper for at least another 14 years.

The new Shuak exploration property looks exciting

While in Kazakhstan, the group also visited the company's new Shuak exploration property and a report on the mineral occurrences and economic potential there has been included.

Key takeaways from site visits

The group was based in the country's modern capital, Astana, approximately 300km north of the Kounrad site. Astana, which means "the capital city", became just that in 1997. It is a 'planned city' and is populated with many impressive buildings of varied architecture, lining wide boulevards.

Figure 1: Mosque in Astana

Source: Marten & Co

Figure 2: View of the presidential palace

Source: Marten & Co

At the Kounrad site, we were given a guided tour of the existing leaching operations on the Eastern dumps as well as the initial leaching area in the Western dumps. Our visit also included a tour of the solvent extraction and electrowinning (SX-EW) plant and the new boiler and pumping stations installed to facilitate exploitation of the Western dumps.

The key points in relation to Kounrad are:

- CAML's Kounrad copper operation is now recovering the metal from the Western dumps on its property. This implies the continuation of long-term copper production in support of a steady dividend stream.
- The overwhelming impression given was that Kounrad is an efficient and well-organised operation.
- We were impressed by the competence, attitude and motivation of the technical staff and young middle-managers, all of whom are Kazakhs.
- The site has an impressive safety record and we were conscious throughout of the company's focus on safety awareness. Some indicators of the safety mindset were 'good housekeeping' and tidiness around the property, and these appeared to be exemplary.
- The infrastructure is in place and commissioned (under budget) for the Western expansion.
- CAML has a number of tools at its disposal to actively manage the leaching process and achieved its production targets from the Eastern dumps.
- To summarise the differences between the Eastern and Western dumps, the latter contains copper minerals that are expected to be less amenable to leaching, have longer leach profiles and thus exhibit lower copper recovery overall. However, they contain much more recoverable copper than the Eastern dumps and so can sustain copper production from Kounrad.

While in the country we also travelled by road to see the company's new Shuak exploration property, 300km to the northeast of Astana in the middle of the northern Kazakhstan steppe. Spring had come late to the region and so the steppe was still waterlogged from meltwaters in places, which even our experienced drivers in 4x4 vehicles had problems with.

As far as Shuak is concerned:

- The licence area is large and in a geologically prospective region.
- There is high grade copper at the old pit and in the stockpiles.
- CAML's test work has indicated that it can obtain high metal recoveries using its existing leaching technology.

- There has been extensive exploration work undertaken on site since the Soviet days and CAML has access to some of the data.
- The evidence suggests that Shuak has much greater potential than we were led to believe from the brief reports in the company's annual results.
- In the short to medium-term, CAML plans to investigate the potential to establish an oxide heap leach mining operation feeding a SX-EW plant in a similar way to its well-established flowsheet at Kounrad.
- The scale of the project and the extent of geophysical anomalies and mineralisation is impressive. The historic work completed on the property is extensive although there were shortcomings in the comprehensiveness of the Soviet work programme.
- The indications for proving up a sizeable, heap leachable resource within the next 18-24 months appear to be very good. CAML could advance this part of the project to an evaluation stage quickly thereafter.
- The potential for discovery of a porphyry system is encouraging and there is the potential for a gold component in the southern portion of the licence area.
- The decision of the former Kazakh owners to opt for a long-term partnership instead of an outright sale of the property could be taken as a positive.

Key investment points

See QuotedData's **annual review of 25 April** for more detail

- In 2016, CAML posted earnings per share (EPS) of US23.7c, up 17%, and earnings before interest, tax, depreciation and amortisation (EBITDA) was US$39.1m, up 12% and representing a margin of 56%.
- Final dividend increased by 25% to 10.0p.
- Record copper production of 14,020t (14.0kt) in 2016, up 16% from 2015.
- Substantial reduction in C1 unit costs (see the glossary on QuotedData's website for an explanation of this and many other industry terms) in 2016, to US43c/lb (2015: US60c/lb)
- NAV[8%] of 268.5p per share.
- Shares currently trading at 19% discount to NAV.
- Company has cash of US$40.4m and no debt (31 December 2016).

Kounrad

Inside the ‘factory’

CAML’s Kounrad copper operation is now recovering the metal from the Western dumps on its property.

We saw PLS being collected from the Western dumps

In April, the company applied the first acid through an extensive drip irrigation system to an initial leach area on its dump no. 22 and when we visited the site we observed pregnant leach solution (PLS) pouring into the collection trenches.

In its first five years of operation, Kounrad produced 54kt of copper from the Eastern dumps, where the mineralisation is predominantly oxide. The successful exploitation of the more sulphidic Western dumps could extend production, at the current rate of 13-14kt/y of copper, for at least another 14 years.

Figure 3 below shows the position of the Western dumps, and the initial leaching area, in relation to the processing plant and the Eastern dumps.

Figure 3: Aerial view of the dumps

Source: CAML

As CAML’s producing asset embarks on a new and important phase of operations, it is worth reviewing the process by which the company extracts the copper from the dumps and taking a look inside the ‘factory’.

The extraction process at Kounrad starts with leaching. This involves the irrigation of the dumps with sulphuric acid at a controlled rate through a network of dripper pipes, as shown in Figure 4.

Figure 4: Part of the 4,000km dripper network on the site

Source: Marten & Co

The acid leaches (dissolves) the copper ions as it percolates through the material and the resultant copper-rich pregnant leach solution is collected in a trench surrounding the dump and then allowed to settle in ponds to release remaining solids before being pumped to the solvent extraction electrowinning SX-EW plant.

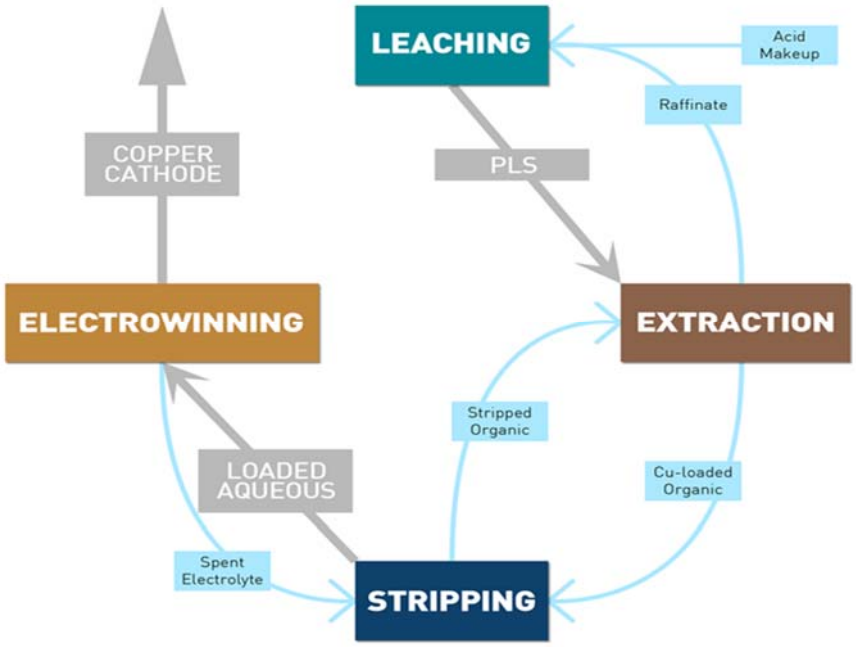
Figure 5: PLS collection trench at the bottom of the Eastern dumps

Source: Marten & Co

In the solvent extraction (SX) section of the plant, the pregnant leach solution is contacted with an organic solvent which extracts the copper, leaving an acidic aqueous solution (raffinate), which is pumped back to the dumps. The copper-bearing phase is

stripped of the copper by strong acid before being sent to the electrowinning (EW) stage, where the copper is reduced from copper sulphate in solution and deposited as copper metal on a cathode. The flowsheet is shown in Figure 6.

Figure 6: Schematic Kounrad process flowsheet



Source: CAML

SX-EW is a tried and trusted recovery technology in the copper industry.

Technical challenges…and CAML's solutions

Although the flowsheet at Kounrad seems simple, there are many technical challenges, particularly upfront in the leaching of the dumps. One must bear in mind that the dumps are composed of material mined by a third party and have accumulated over 70 years.

The chemical composition of the dumps is seldom uniform and ongoing chemical activity can alter the effectiveness and speed of the leaching process, affecting the strength of the copper in solution feed to the plant, which is the most important criterion for copper metal production. Moreover, management has to cope with severe winter climatic conditions, with temperatures down to -40°C at times, which can freeze solutions and effectively stop the leaching and transfer process.

Controlling the PLS grade is key and CAML has the capabilities to do this

As alluded to above, the key to achieving target copper cathode production is to control the grade of the pregnant leach solution (PLS) to the plant, which can be tricky given the variability of chemical composition within each weathered dump. However, the company has designed, constructed and operated a leaching network with inherent flexibility and has gained valuable experience in managing the leaching process, which means that it can exert a significant measure of control over the main variables that affect copper production.

Firstly, by working several individual blocks within the dumps at any one time, it can blend grades of PLS to deliver a relatively consistent product to the plant. Secondly, by

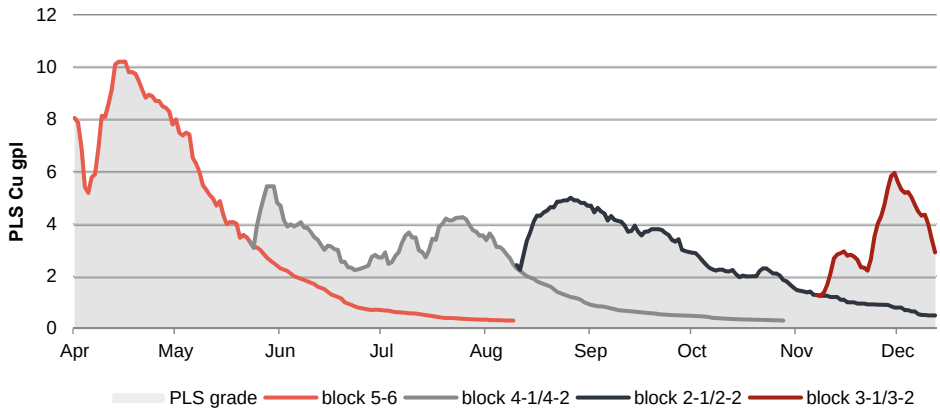
increasing the area under leach it can increase the flow of PLS. Finally, by varying the flow rate of the raffinate it can speed up or slow down the leaching process.

On the first point, CAML has notionally divided the dumps into blocks for planning purposes. Leaching of any one block is essentially a three-phase process, with a 'bloom' (high grade) phase, a steady phase and finally a tail recovery phase over a roughly eight-month time period. In the Eastern dumps, about 40% of the copper is recovered in the first 120 days, with the remaining 10-11% (for a total of 50-51% recovered) over the final 120 days, during which time the blocks are allocated rest periods.

Leaching at new ore blocks is started one after an another to form a 'nest' of blocks. By having a number of blocks undergoing leaching at any one time and phasing the commencement of leach, CAML aims to avoid major peaks and troughs in the grade of the PLS and deliver a fairly constant grade to the SX-EW plant.

Figure 7 shows how the company has managed the introduction of various blocks to maintain the PLS grade in the 2-3 g/l range.

Figure 7: Illustration of how CAML creates a 'nest' of blocks to maintain consistent PLS grade to the plant



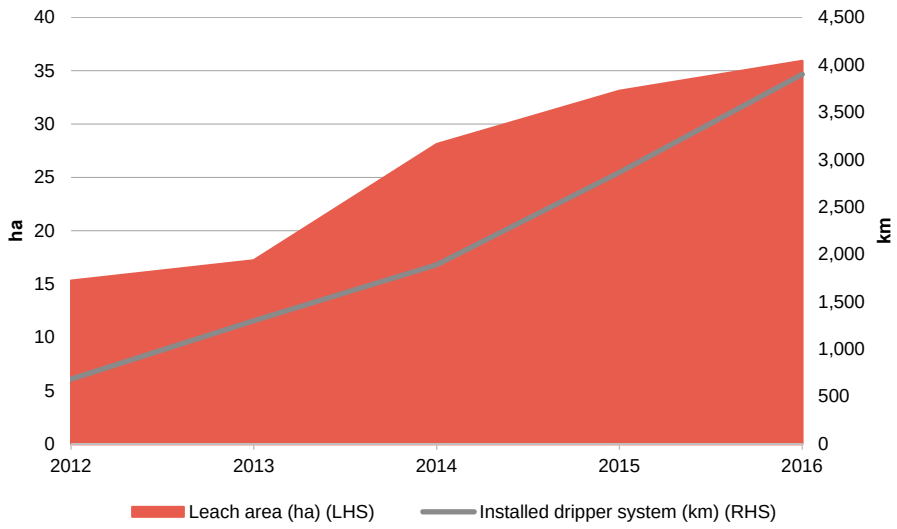
Source: CAML

The network of dripper pipes now extends for almost 4,000km!

On the second aspect, the company has gradually expanded the dripper irrigation infrastructure and thus the area of dump under leach each year since commencing operations. This has countered the decline in resource grades as the material in the individual blocks is leached out. The dripper network now extends for almost 4,000km.

Figure 8 displays how the area under leach has increased as the dripper network was extended.

Figure 8: Leach area and length of dripper system



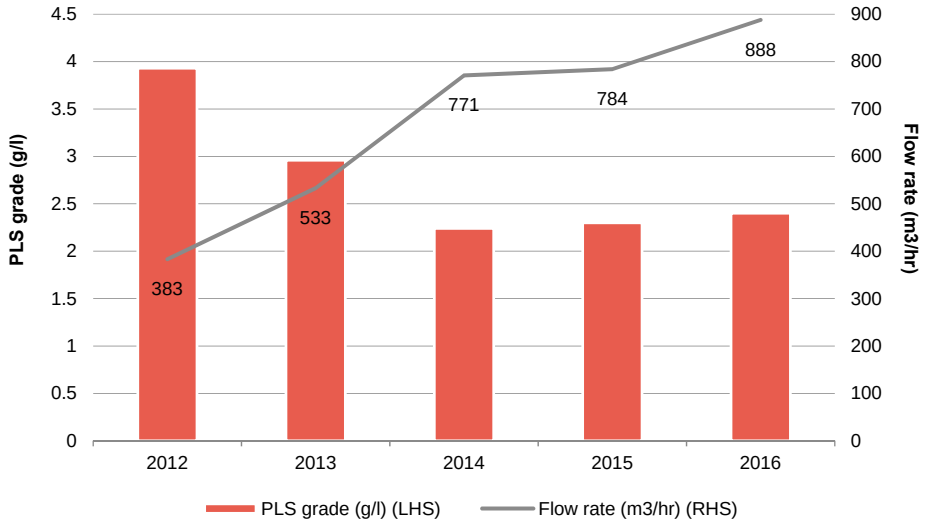
Source: CAML

The third main variable that CAML can control is the flow rate of the raffinate, which, to a large extent, determines the flow of PLS. The 2015 plant expansion gave it the additional capacity to treat higher volumes and the installation of boilers to heat up the raffinate to about 10°C before it was dripped onto the dumps, meant that the winter throughput was increased by about 25%. The plant now has a nominal capacity of up to 1,200 m^3/hr of PLS, although given the seasonal variations, the company expects to be able to feed at about 80% of capacity (960 m^3/hr) throughout the year.

CAML has increased flow rates each year since startup

CAML has increased flow rates every year since startup to compensate for the long-term decline in PLS to 2.0-2.3 g/l as projected in the feasibility study, as the following chart shows.

Figure 9: Average PLS flow rates and grade



Source: CAML

To summarise the situation at Kounrad, CAML has a number of tools at its disposal to actively manage the leaching process. It has proved that it can achieve its production targets from the Eastern dumps: now it must demonstrate that its systems can perform as well on the more chemically complex Western dumps over a sustained period.

What will the transition to the Western dumps mean?

For five years CAML has worked the predominantly oxide, Eastern dumps.

As mentioned earlier, the company is now actively leaching the Western dumps and the proof of this can be seen in Figure 10, which shows PLS streaming from the initial leaching area (ILA) into the collector trench on the west side of the site.

Figure 10: PLS pouring into the collector trench from the ILA

Source: Marten & Co

The initiation of production from the Western dumps marks the completion of an expansion and extension project that Kounrad embarked on in 2015. As well as expansion of the SX-EW plant capacity and the addition of two boilers, the company has installed new pumps and boilers adjacent to the Western dumps. It constructed 12 km of twin pipelines to transport the raffinate and PLS between the collection ponds in the west and the SX-EW plant. It also constructed a 15km pipeline to bring water for the process from Lake Balkhash.

Figure 11: The new collection, boiler and pumping infrastructure for the Western dumps

Source: Marten & Co

The cost of the first expansion phase was US$13m (US$2.5m under budget) and the final cost of the second stage is expected to come in at around 30% under the US$19.5m budget. CAML funded the capital for both projects entirely from generated cash flow.

Investors may be wondering whether CAML can maintain its copper output with the transition to the Western dumps.

The completion of the Stage 2 expansion programme helps to ensure steady copper production at existing levels into the future

Following the completion of the Stage 2 expansion programme, the company believes that it now has the necessary infrastructure, operational experience and metallurgical knowledge to deal with the mineralogically-different Western dump material. The combination of these attributes helps to ensure that the company can deliver steady copper production at existing levels into the future.

Characteristics of the Western dumps

The Western dumps are different in nature from the Eastern dumps in many ways, so let us examine those differences and their ramifications for production at Kounrad.

Both dumps contain copper mineralised material mined exclusively at the Kounrad open pit over a 70-year production period. However, chemically the dumps are different as they originate from different types of ore from different parts of the open pit mine. The mine extracted oxidised copper material from near surface and subsequently mined the primary sulphide ore that underlaid the oxides. However, the owners only treated the portion of the sulphide ore that was amenable to the ‘flotation’ technology (used for separation of copper from the ore) available at the time, and discarded the rest. They dumped oxide material in the east and disposed of low grade sulphide material to the west of the pit.

CAML has processed oxide material successfully for five years but now it is time to address the sulphide inventory.

Although sulphides are not usually so amenable to extraction by leaching, independent consultants Wardell Armstrong noted in its 2013 resource statement, that the Western material has been long exposed to the atmosphere and has undergone natural chemical and bacterial activity. This has broken down some of the sulphide minerals, making them more amenable to acid leaching.

The company is anticipating longer leach times for the material in the Western dumps, with an average leach time of perhaps 20 months instead of eight months as in the east. The profile of leaching curves for designated blocks within the individual dumps will be like those of the Eastern dumps, with an initial bloom period of similar duration to the east but with a longer tail to leach all that can be leached. CAML will initiate leaching sequentially and so should be able to manage the blooms and tails to deliver a fairly constant PLS grade as in the past.

It will be aided in this task by the fact that it has much more material to play with, for one very apparent distinction between the two sets of dumps is the disparity in their size.

Figure 12: Aerial view of Kounrad showing the vast expanse of the Western dumps

Source: Marten & Co

The Western dumps cover a much greater area – 741 ha against 392 ha. They are also much higher, with an average height of 40m compared with 20m for the Eastern dumps, which is another contributing factor to the longer expected leach times.

It follows, therefore, that in terms of tonnage on the heaps, the Western dumps eclipse the Eastern dumps by far. The quantity of material in the Western dumps was estimated in the 2013 JORC resource statement at 477.8Mt, almost three times the amount in the east.

The average grade of the copper in situ (0.10% copper) is about the same in each dump area, so it follows that the Western dumps contain much more copper. Again, according to the 2013 resource statement, they contain an estimated 446.7 kt of copper compared with 167.5 kt for the Eastern dumps.

The company will not be able to recover all the in-situ copper as the leaching process is not that efficient. In the Eastern dumps, the recovery has been about 50%, but CAML expects a lower overall figure in the range of 35-42% for the Western dumps.

Longer leach times but overall more copper recovered

So, to summarise the differences between the Eastern and Western dumps, the latter contains copper minerals that are expected to be less amenable to leaching, have longer leach profiles and thus exhibit lower percentage copper recovery overall. However, they contain much more recoverable copper than the Eastern dumps and so can sustain copper production from Kounrad.

Implications for copper production

Up until the end of Q1 2017, all production derived from the Eastern dumps. In April 2017, however, the company started to leach the Western dumps and, at least for the next four years, both dumps will supply pregnant leach solution to the plant.

Although, after five years of production, the Eastern dumps only have a limited life remaining, the company estimates that there is still around 25kt of copper that can be recovered. In addition, CAML estimates that it will be able to recover approximately 175kt of copper from the Western dumps.

Figure 13 shows the estimated recoverable copper from each dump.

Figure 13: Remaining copper in dumps

	Copper contained (kt)	
	Eastern	Western
Total resources	167.5	446.7
Expected recovery	50%	39%
Recoverable	83.8	175.0
Recovered 2012-16	54.7	0.0
Remaining	25.2	175.0

Source CAML

The focus for 2017 in the Eastern dumps will be a continuation of leaching of dump no. 5 and commencement of leaching of dump no. 2. Together they contain 23.2kt of recoverable copper.

Management also plans to use what it calls an intermediate leaching system to attempt to recover additional metal from the Eastern dumps.

Under the intermediate leaching system scheme, the raffinate headed for the Western dumps will be diverted to the Eastern dumps and once pre-loaded with copper it will be pumped to the Western dumps for normal leaching.

This should improve the overall recovery from the Eastern dumps and ensure that the grade of pregnant leach solution extracted from the Western dumps remains in the target range. The intermediate leaching system will only incur the additional pumping cost of the loaded raffinate.

The company plans to leach blocks 6,7,9 and 10 this way.

Meanwhile, in the Western dumps, the initial leaching area covers 109 ha and 96Mt of material. The first two individual dumps under leach are 16 and 22, from which the

company expects to recover almost 37Mt of copper (at a recovery rate of 42%) within the initial leaching area.

Figure 14: Plan of Western dumps showing individual dump numbers

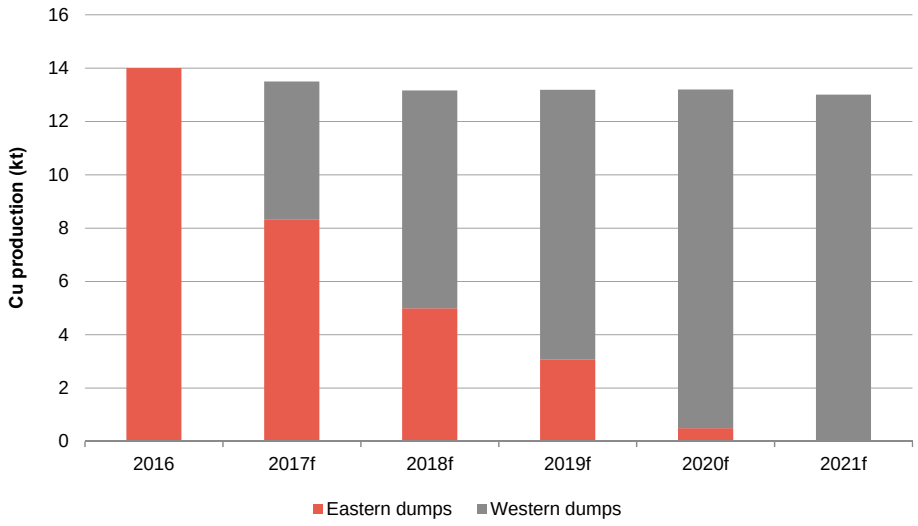
Source: CAML, Marten & Co

After achieving copper production at the top end of its guidance in 2016, the company expects to produce 13-14kt of copper this year, with about 38% originating from the new Western area.

In QuotedData's model, production is expected to fall slightly in 2017 as operations transition from the Eastern to the Western dumps. The model assumes an average PLS grade of 2.0 g/l, which is lower than that achieved thus far from the Eastern dumps.

Figure 15 shows QuotedData's production forecast assumptions for the Eastern and Western dumps.

Figure 15: Annual copper production forecast assumptions



Source: CAML, Marten & Co

The model assumes that CAML can maintain production of over 13kt/y for at least another 14 years until 2032

Thereafter, the model assumes that CAML can maintain production of over 13kt/y for at least another 14 years until 2032.

CAML's upper guidance for 2014 (14kt) should be a realistic upper production limit, unless it manages to achieve a PLS grade significantly higher than expected. Any meaningful increase in production will require further capital investment in additional plant capacity.

Shuak

Shuak is an exploration prospect in Kazakhstan in which CAML has an 80% interest. It represents the company's first venture beyond Kounrad in the country.

After securing a framework agreement with a local company in November 2016 and subsequently incorporating a company, Shuak BV, to hold the Shuak Subsoil Use Contract, CAML transferred 20% of Shuak BV to its local partners in February 2017. To retain its 80% interest in the property, CAML must spend US$2m on exploration within five years.

The 197km^2 licence area contains copper and gold mineralisation and lies in the Akmola Oblast region of north Kazakhstan, approximately 300km north of the capital city, Astana. The terrain is typical flat steppe and is covered with snow from about October to April each year.

The licence area measures approximately 20km long by 4km wide and extends northeast-southwest. Access is by partially-tarred and dirt roads from the town of Stepnogorsk, 60 km to the southwest.

A power line crosses the property and water is available from a nearby lake.

The property contains a small open pit that was developed and worked by the current Kazakh 20%-owners, as well as several other mineralised targets first identified by exploration in the Soviet era.

Figure 16: The dormant open pit at Mongel V on the Shuak property

Source: Marten & Co

Shuak is situated within a Cambrian-Silurian volcanic belt intruded by diorites and granodiorites. The region is host to a number of major copper and gold deposits, for example, Vasilkovka, Bestube, Zholymbet, Bozshakol, Rai-Gorodok and Maikain.

On the property itself, there are four types of mineralisation resulting from multi-stage events. These are near-surface, saprolite (weathered rock) - hosted oxide copper and secondary-enriched mineralisation; a deeper, disseminated sulphide copper porphyry-style mineralisation; stockwork and breccia-type mainly copper and molybdenum mineralisation; and gold bearing quartz-sulphide vein zones to the far south west.

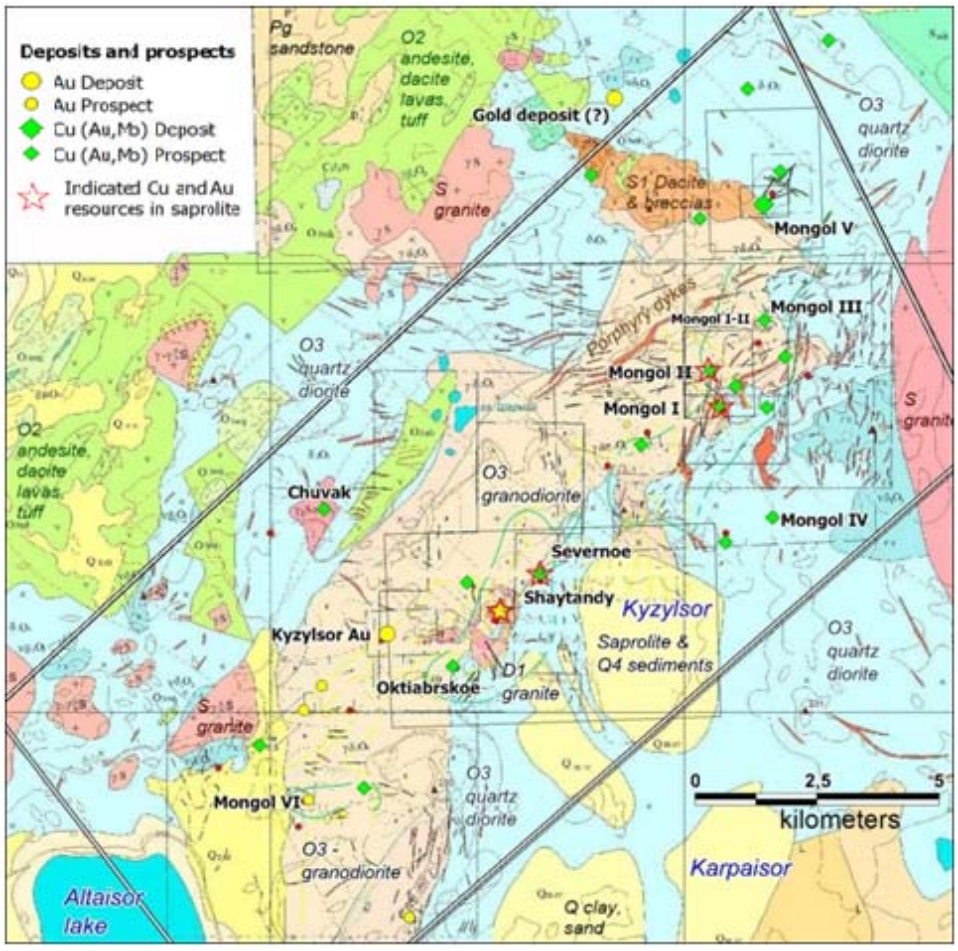
2017 exploration plans

In the short to medium-term, CAML plans to investigate the potential to establish an oxide heap leach mining operation feeding an SX-EW plant in a similar way to its well-established flowsheet at Kounrad. It plans to spend US$1.3m in 2017 on trenching (1,800m) and drilling (22,000m).

In the longer term, the company proposes to investigate the deeper, porphyry copper mineralisation.

Figure 17 shows the 2017 exploration targets overlain on a geological map of the licence area.

Figure 17: 2017 exploration targets at Shuak



Source: CAML

The initial and primary target is Mongol V, which is the site of the dormant open pit and hosts a non-JORC resource of 49.5 Mt at a grade of 0.66% copper for approximately 327kt of contained copper.

The mineralisation here is saprolitic copper oxide, which extends to a depth of approximately 100m and due to enrichment contains potentially higher grade copper than primary material.

CAML has obtained recoveries of 90% in leach tests

Before concluding the deal with its local partners, CAML tested some of the stockpiled material and achieved recoveries in excess of 90% in column leach tests at the Kounrad plant, indicating that it could be amenable to heap leach processing. The stockpiled material is high grade, running at about 2-6% copper and even the material in waste dumps adjacent to the pit has assayed 0.4% copper (which is much higher than the average grade of the dump material that the company is treating successfully at Kounrad).

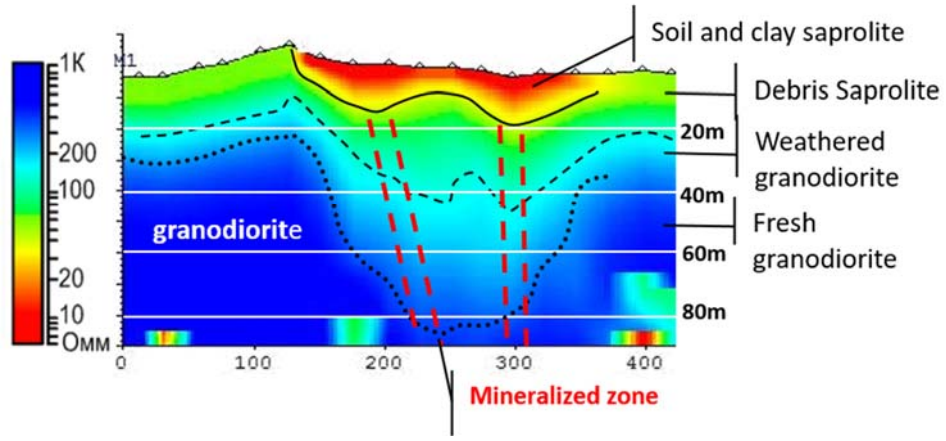
Figure 18: High grade copper mineralisation – azurite (blue) and malachite (green)

Source: Marten & Co

Just before the onset of winter last year, CAML geologists conducted a comprehensive geophysical survey consisting of 27 lines over 90km on the licence area using TEM-FAST. TEM (transient electromagnetic) is a commonly-used, non-intrusive, geophysical method for obtaining subsurface resistivity-conductivity data.

At Mongol V, the TEM survey demonstrated a weathering profile showing the limits of the saprolite oxidation zone with a deeper enrichment zone.

Figure 19: TEM profile at Mongol V



Source: CAML

CAML's exploration programme will follow up on this work with the aim of verifying the Soviet results and determining parameters of the oxide and sulphide copper mineralisation. It hopes to be able to declare a JORC-compliant resource within two years. (Note that it cannot use the historic resource for any published planning or evaluation studies as it is does not comply with modern stock exchange standards).

In 2017, the company will spend US$450,000 on drilling 75 core hydro transportation (CHT) holes and excavating nine trenches to test the saprolite, as well as drilling eight diamond drill holes down to about 400m to test the primary mineralisation. CHT is a rotary drilling system using water, similar to rotary air blast (RAB), and is an efficient and cost effective technique particularly applicable for drilling in soft rocks.

Figure 20: Copper mineralisation in weathered granodiorite in the Mongol V open pit

Source: CAML

A little to the north of Mongol V lies a target called Mongol North. Geologists believe that this may be part of the same mineralised structure as Mongol V, although downthrown by fault activity.

In 2017, CAML plans to drill 100 CHT holes and four diamond drill holes at Mongol North to check the oxide and sulphide mineralisation.

Moving southwest within the Shuak licence area, CAML has identified targets at Mongol I and II, Severnoe, Kyzyl-Sor and Shaytandy (a gold-copper target), and will be conducting drilling and trenching at all the zones, along with a limited TEM-FAST survey.

CAML plans to complete the above field work during the 2017 exploration season, which extends from May to October.

The scale of the project and the extent of geophysical anomalies and mineralisation is impressive. The historic work completed on the property is extensive although there were shortcomings in the comprehensiveness of the Soviet work programme.

The indications for confirming a sizeable, heap leachable resource within the next 18-24 months are very good

The indications for confirming a sizeable, heap leachable resource within the next 18-24 months appear to be very good. CAML could advance this part of the project through to an evaluation stage quickly thereafter.

There is the potential for the discovery of a porphyry system and, possibly, gold in the southern portion of the licence area.

In the short term, Shuak may have little effect on the company's share price (and no value is attributed to it in QuotedData's model) but it could offer the potential for significant upside in the future.

Valuation

QuotedData's model ascribes a value to CAML based on a sum-of-the-parts basis, taking into account the NPV of the Kounrad operation using a discount rate of 8%. No value has been placed on the Shuak exploration property at this time. The model is described more fully in QuotedData's annual overview note.

NAV @ 8% of 268.5 per share

This analysis results in an NAV for CAML of 268.5p per share.

Figure 21 summarises QuotedData's NAV model.

Figure 21: Valuation model for CAML

	US$M	£M	Pence per share
Kounrad NPV8%*	338.7	264.6	236.0
Investments (Copper Bay)	6.2	4.8	4.3
Investments (Shuak)	0.0	0.0	0.0
Cash	40.4	31.6	28.2
NAV	385.3	301.0	268.5

Source: Marten & Co. * net present value discounted at 8%

The model for Kounrad assumes that the company successfully brings the Western dumps into operation in H1 2017 as activities at the Eastern dumps wind down over the next few years according to the schedule shown in Figure 15.

Copper production is assumed to dip to 13.5kt, in 2017 and then settle back to a steady state rate of just over 13 kt/y until 2032. CAML has guided production of between 13kt and 14kt for 2017.

A copper price of US$5,800/t (US$2.63/lb) in 2017 has been assumed (as was the case with the previous note), notwithstanding the 3% fall in copper prices at the beginning of May as a result of a dip in Chinese PMI. The model uses US$6,200/t (US$2.81/lb) in 2018 and thereafter a long-term price of US$6,600/t (US$3.00/lb). A discussion of copper prices is included in the previous note.

Mine modelling and production forecasts

The following parameters and assumptions have been used to calculate a sum-of-the-parts valuation for CAML (LOM = life of mine).

Figure 22: Model assumptions and parameters

Parameter	Value	Source
Resources		
Eastern dumps: Indicated	89.7Mt @ 0.10% Cu	2013 resource estimate
Eastern dumps: Inferred	79.6Mt @ 0.10% Cu	2013 resource estimate
Western dumps: Indicated	275.4Mt @ 0.10% Cu	2013 resource estimate
Western dumps: Inferred	169.4Mt @ 0.09% Cu	2013 resource estimate
Recoverable copper remaining (Eastern)	25.2kt	CAML
Recoverable copper remaining (Western)	175.0kt	CAML
LOM avg PLS flow rate	1,000l/hr	Marten & Co
LOM avg PLS grade	2.00m^3/l	Marten & Co
LOM avg plant recovery	74%	CAML
LOM avg copper production	13.1kt	Marten & Co
LOM total copper production	200.0kt	Marten & Co
LOM avg C1 cash cost	US$0.61/lb	Marten & Co
LOM avg all-in cost	US$1.53/lb	Marten & Co
Long term copper price	US$6,600/t (US$3.00/lb)	Marten & Co
LOM avg sustaining capital	US$2.0m	CAML
Kazakhstan taxation rate	20.0%	Marten & Co
LOM	16 years	Marten & Co

Source: CAML, Marten & Co

Sensitivity analysis

Figure 23 shows the sensitivity of the model to changes in the key variables; copper price and discount rate.

Figure 23: NAV sensitivity analysis

	Copper price (US$/lb)						
NAV (p/sh): discount rate	-30%	-20%	-10%	Base	+10%	+20%	+30%
NAV @ 5%	173	219	266	312	358	405	451
NAV @ 8%	152	191	230	268	307	346	385
NAV @ 10%	141	176	211	246	281	315	350
NAV @ 12%	131	163	195	226	258	290	321

Source: Marten & Co. Assumptions: US$1.28/£; shares outstanding 112.1 million

Because of its low cost of production, the company is cushioned against downturns in the copper price and should continue to generate free cashflow even at prices lower than have been seen in the recent seven-year low

Because of its low cost of production, the company is less sensitive to downturns in the copper price than higher-cost producers and CAML should continue to generate free cashflow even at prices lower than have been seen in the recent seven-year low.

If the copper price were to remain at the current price of US$5,563/t, CAML's NAV would be 213.7p.

Previous research publications

Readers interested in further information about CAML may wish to read our previous research notes as detailed in Figure 24. You can read the notes by clicking on them in Figure 24 or by visiting our website. The contents page from our most recent annual overview note is reproduced below.

Figure 24: QuotedData previously published research on CAML

Title	Note type	Date
Dividend-paying, low cost copper producer	Initiation	24 February 2016
Defending the dividend	Update	21 April 2016
Profits soar as costs slashed	Update	13 September 2016
A consistent dividend payer with a high yield	Annual overview	25 April 2017

Source: Marten & Co.

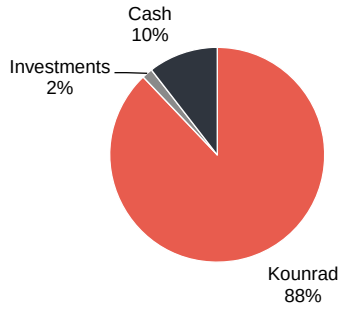
A consistent dividend payer with a high yield- 25 April 2017

Contents – continued

Figure 25: Central Asia Metals summary

Sum of the parts valuation – May 2017	US$M	Pence per share
Kounrad NPV8%	338.7	236.0
Investments - Copper Bay	6.2	4.3
Investments - Shuak	0.0	0.0
Subtotal	334.9	240.3
Net cash/(debt)	40.4	28.2
NAV	385.3	268.5

Asset valuation summary

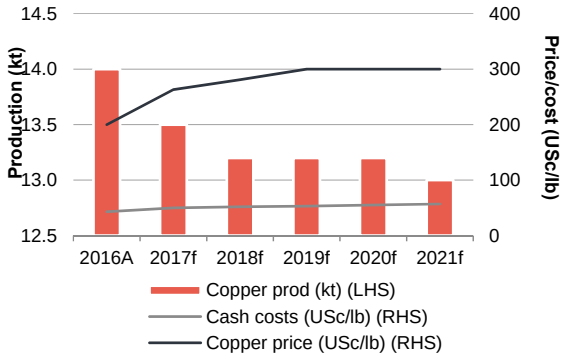


CAML share price

NAV sensitivity analysis (pence per share)

Cu price	-30%	-20%	-10%	Base	10%	20%	30%
5%	173	219	266	312	358	405	451
8%	152	191	230	268	307	346	385
10%	141	176	211	246	281	315	350
12%	131	163	195	226	258	290	321

Production summary



Copper resources (2013)	Mt	Cu %	kt
Kounrad			
Indicated	386.0	0.10	368.2
Inferred	261.1	0.09	246.0
Copper Bay*			
Measured & Indicated	53.4	0.24	92.2
Inferred	14.4	0.23	33.7

Y/E 31 Dec, all forecast figures in 2017 US$M unless otherwise stated

Forecast assumptions	2016a	2017f	2018f	2019f	2020f
Copper price (US$/t)	4,994	5,800	6,200	6,600	6,600
Copper price (US$/lb)	2.27	2.63	2.81	3.00	3.00

Production summary	2016a	2017f	2018f	2019f	2020f
Kounrad – Eastern dumps					
Avg. flow rate (m³/hr)	888	550	380	260	50
PLS grade (Cu g/l)	2.40	2.30	2.00	1.80	1.50
Recovery (%)		75.0%	75.0%	75.0%	75.0%
Copper production (kt)	14,020	8,311	4,993	3,075	493
Kounrad – Western dumps					
Average flow rate (m³/hr)	-	400	600	780	980
PLS grade (Cu g/l)	-	2.00	2.10	2.00	2.00
Recovery (%)	-	75.0%	75.0%	75.0%	75.0%
Copper production (kt)	-	5,186	8,168	10,113	12,706
Copper Bay					
Copper production (t)	-	-	-	-	-

Company					
Total copper production (kt)	14.0	13.5	13.2	13.2	13.2
C1 cash costs (US$/lb)	0.43	0.50	0.52	0.53	0.55
Fully absorbed costs (US$/lb)	1.06	1.24	1.28	1.30	1.33

Profit & loss summary	2016a	2017f	2018f	2019f	2020f
Gross revenue	69.3	78.3	81.6	87.0	87.1
Cost of production	(9.5)	(10.1)	(10.5)	(10.6)	(11.0)
Mineral extraction tax	(3.9)	(4.5)	(4.7)	(5.0)	(5.0)
Selling costs	(2.6)	(2.5)	(2.4)	(2.4)	(2.4)
G&A	(14.1)	(14.6)	(14.6)	(14.7)	(14.9)
EBITDA	39.2	46.6	49.4	54.3	53.8
Depreciation & amortisation (D&A	(5.0)	(5.1)	(5.0)	(5.0)	(5.2)
Interest	0.0	0.0	0.0	0.0	0.0
Taxation	(6.7)	(11.2)	(11.9)	(13.2)	(13.1)
Net income	34.2	30.4	32.5	36.1	35.6
Average shares outstanding (million)	112.1	112.1	112.1	112.1	112.1
EPS (US$)	0.24	0.27	0.29	0.32	0.31
Dividend (pence per share)	15.5	15.5	18.0	22.0	22.0

Abridged balance sheet Y/E	2016a	2017f	2018f	2019f	2020f
Cash & equivalents	40.4	48.2	59.1	69.4	75.3
Fixed assets	93.8	87.7	85.2	82.8	80.1
Total assets	138.5	140.2	148.6	156.5	159.7
Current liabilities	6.0	6.4	6.4	6.4	6.4
Long-term debt	0.0	0.0	0.0	0.0	.00
Other long-term liabilities	10.6	10.6	10.6	10.6	10.6
Total liabilities	17.0	17.0	17.0	17.0	17.0
Shareholders' equity	121.5	123.2	131.6	139.5	142.7

Cash flow summary	2016a	2017f	2018f	2019f	2020f
Cash from operations	35.5	33.0	35.0	38.5	38.2
Capital expenditure	(12.3)	(2.50)	(2.00)	(2.00)	(2.00)
Cash from investing activities	(13.3)	(2.50)	(2.00)	(2.00)	(2.00)
Dividends	(20.4)	(22.7)	(22.1)	(26.2)	(30.3)
Cash from financing activities	(22.8)	(22.7)	(22.1)	(26.2)	(30.3)
Cash at end	40.4	48.2	59.1	69.4	75.3

Profitability	2016a	2017f	2018f	2019f	2020f
EBITDA margin (%)	56%	60%	60%	62%	62%

Note that financial tables above are summaries and totals may not always agree

Source: CAML, Marten & Co. * 2017

QuotedData

QuotedData is a trading name of Marten & Co which is authorised and regulated by the Financial Conduct Authority
123a Kings Road, London SW3 4PL
0203 691 9430

www.quoteddata.com

Registered in England & Wales number 07981621,
2nd Floor Heathmans House
19 Heathmans Road, London SW6 4TJ

Edward Marten
(em@martenandco.com)

Christopher Bunstead
(cb@martenandco.com)

Research contacts:

Resources analyst - Paul Burton
(pb@martenandco.com)

James Carthew
(jc@martenandco.com)

Matthew Read
(mr@martenandco.com