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Graphex Mining Limited (GPX AU, \$0.25, market cap. A\$17m)

Where size really does matter

- Graphex has released highly encouraging results from test-work undertaken on behalf of the incoming Chinese partners. Test-work by the preeminent graphite laboratory in China, Suzhou Design and Research Institute, have been able to demonstrate that Chilalo can deliver a large proportion of very large flake graphite.
- The Suzhou test-work has delivered a product consisting of 42% above 500 microns, including 13% above 850 microns. This is by far the coarsest flake we have seen amongst the global graphite developers. (See peer group comparisons below). This compares with PFS work done by Graphex which delivered just 4% above 500 microns.

Company	Project	Location	Resource Flake Size Distribution				% Jumbo+
			S-D Jumbo	Superjumbo	Jumbo	Large	
			20 mesh >850um	35 mesh >500um	50mesh >300um	80mesh >180um	
Graphex Mining	Chilalo	Tanzania	13.0%	29.0%	16.0%	11.0%	58%
Walkabout	Lindi	Tanzania	-	19.6%	35.0%	19.0%	55%
Magnis	Nachu	Tanzania	-	9.0%	32.0%	59.0%	41%
Northern Graphite	Bissett Ck	Ontario	-	-	34.0%	40.0%	34%
Nextsource	Molo	Madagascar	-	-	23.6%	22.8%	24%
Black Rock	Mahenge	Tanzania	-	1.0%	20.0%	30.0%	21%
Kibaran	Epanko	Tanzania	-	2.1%	18.3%	31.2%	20%
Volt Resources	Namangale	Tanzania	-	1.0%	13.0%	29.0%	14%
Mason Graphite	Lac Gueret	Quebec	-	-	14.0%	13.0%	14%
Battery Minerals	Montepeuz	Mozambique	-	-	8.8%	21.6%	9%
Syrah Resources	Balama	Mozambique	-	-	8.5%	12.0%	9%

Note: size distributions only for large flake and above. Projects with PFS or DFS tabulated.

- **Why is flake size important?** Put simply, some industries require the use of coarser flakes of graphite. Some industries, such as those that manufacture storage batteries, fine flake sizes are suitable. It's all about value in use. As a result, coarse flake means higher prices.
- **Why does flake size vary?** The flake size will be driven by the nature of the deposit itself or by the processing/concentration methods. Graphite is a fairly fragile mineral in a milling circuit and large flakes can easily be damaged by overgrinding. All graphite deposits can produce a fine flake product. But fine flake deposits cannot produce a large flake product. This is very important in understanding graphite markets. Some deposits might be suitable for the battery anode market, some might be suitable for refractories, but only a very few can deliver suitable product for use as expandable graphite.

- We are not privy to the technology applied by Suzhou to produce large flake from Chilalo, but would guess that the process involves scalping the coarser flakes as they are separated in the mill and flotation circuit to avoid further comminution. It is interesting that the grade (total graphitic carbon or TGC) quoted for the very coarse flakes is around 90-92% against 98-99% from the PFS work of GPX. Clearly, the Chinese are more interested in flake size than grade.
- **For Chilalo, it's all about expandability and flake size.** We can only assume that Suzhou is working to the customers specification for graphite. GPX's partners, CN Docking and others who commissioned the work, have been attracted to Chilalo graphite for its flake size and expandability characteristics. While high purity graphite might be the prerequisite for use in battery anodes, flake size and expandability is critical for end uses for expandable graphite. Clearly carbon content is less of an issue.
- **Graphite prices march on.** Graphite is one of the hardest commodities to obtain an independent view of pricing. There are a multitude of graphite types for which there are very few public sources of data. We therefore note with interest the recent release that flake graphite prices have risen by as much as 50% over the course of 2017 (and this is from information provided by the Chinese partners). This is attributed to:
 - Supply restrictions from the main graphite producing regions in China.
 - The abolition of the graphite export tax in January.
 - Rising costs of production in China
- **We understand that the largest price rises have been seen in the very large flake material. These size fractions make up 58% of the Chilalo product.**
- These results validate GPX's "Markets First" approach. This has been a strategy which we have long supported, and one which differentiated GPX from others in the sector. It also confirms the reason that the Chinese partners are prepared to stay with Chilalo despite the turmoil in Tanzania. Chilalo is one of the very few deposits worldwide which has the capacity to deliver a quality raw material for the expandable graphite industry in China.

GPX valuation and leverage to the graphite price.

- As presented in earlier reports our valuation for GPX is now A\$1.05/share. In this valuation we have assumed that the Tanzanian Government exercises its right to take a 16% free carry in the project at no cost (see comments below). Post the deal with the Chinese partners, GPX will hold 42% equity in the Chilalo project.
- In this valuation we have used a graphite basket price of US\$1217 used by GPX in its 2015 PFS.
- Although quite a low-cost producer, GPX's valuation leverage to the assumed graphite price is strong, as illustrated in the following table.

	Basket price (US\$/t)	NAV/share (A\$)
Base case	\$1,217	\$1.05
+10%	\$1,339	\$1.31
+20%	\$1,460	\$1.59
+50%	\$1,826	\$2.35

- We await more details on Chilalo graphite pricing.

NOTE:

- That the number of shares used in our NAV/share includes some 3.1m 25c loyalty and other options, which are currently at the money.
- Note that the above valuation is an accounting/finance valuation based upon the company's financials and not a share price target or prediction.

Update on the situation in Tanzania

- Since our last note Acacia Mining has closed the Bulyanhulu mine and Tanzanian diamond producer Petra Diamonds has had a shipment of diamonds seized with the government claiming the company had undervalued the parcel for export purposes. This Petra claims is spurious as the government of Tanzania already has oversight on all diamond exports from the Williamson mine.
- There have been some **amendments to the draft legislation** which included significant changes to the Tanzanian Mining Act Regulations providing greater clarification of the legislation are due out shortly.
- The following paragraph might be relevant to GPX. The underlined section has been included as an amendment to the draft and has been included in the final legislation.

10(1). In any mining operations under a mining licence or special mining licence the Government shall have not less than sixteen percent non-dilutable free carried interest shares in the capital of a mining company depending on the type of minerals and the level of investment.

- The new wording of the Act, together with the fact that industrial minerals (such as graphite) were excluded from the increases in royalty rates, suggests that the Government may take a more lenient view of, say, industrial minerals. Perhaps this could include graphite and the smaller mining projects.
- On 17 July, GPX announced that the Tanzanian Government is funding **key infrastructure initiatives in SE Tanzania**. These include potential access to grid-connected power supply, an expansion of the Mtwara Port facility and upgrade of the road from Nanganga to Ruangwa. GPX states that this could significantly improve the economics of the already attractive Chilalo project.

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