Wednesday, October 1, 2014

HALLGARTEN & COMPANY

Coverage Update

Christopher Ecclestone
cecclestone@hallgartenco.com

Mkango Resources (TSX-V: MKA)
Strategy: LONG

Key Metrics		
Price (CAD)	$	0.235
12-Month Target Price (CAD)	$	0.58
Upside to Target		147%
12mth hi-low		$0.05-0.245
Market Cap (CAD mn)	$	17.23
Shares Outstanding (millions)		73.3
Fully Diluted (millions)		104.2
Float		68%

Mkango Resources

PFS Endorses Songwe Attractions

- + The long awaited Pre-Feasibility Study has been published showing robust numbers and a capex target that is not insurmountable
- + An after-tax NPV of US$293 million (using a 10% nominal discount rate)
- + Projected production of 2,840 tpa of REE concentrate
- + Maiden Probable Mineral Reserve Estimate of 8.5 million tonnes grading 1.60% TREO
- + The process flow sheet is NOT dependent upon novel or experimental technologies
- + Mkango has one of the strongest group of institutional/core shareholders that we have seen in a REE explorer
- ✘ The capex is slightly over $200mn (which is in the lowest quartile) and will require the company to find an offtake partner
- ✘ The Rare Earth space is not out of the woods yet and is only as fragile, or as strong, as the reactivation in the broader mining markets

PFS – Firing up the Stock Price

The long awaited results of Mkango's PFS arrived and gave the stock price an impressive kick upwards, as well it should have, as the numbers were attractive on both the potential ROI, the process worksheet and the likely capex for the project build. In this follow-up to our initiation of coverage several months ago, we shall review the PFS's findings and muse upon the implications for the future direction of the company.

The PFS Results

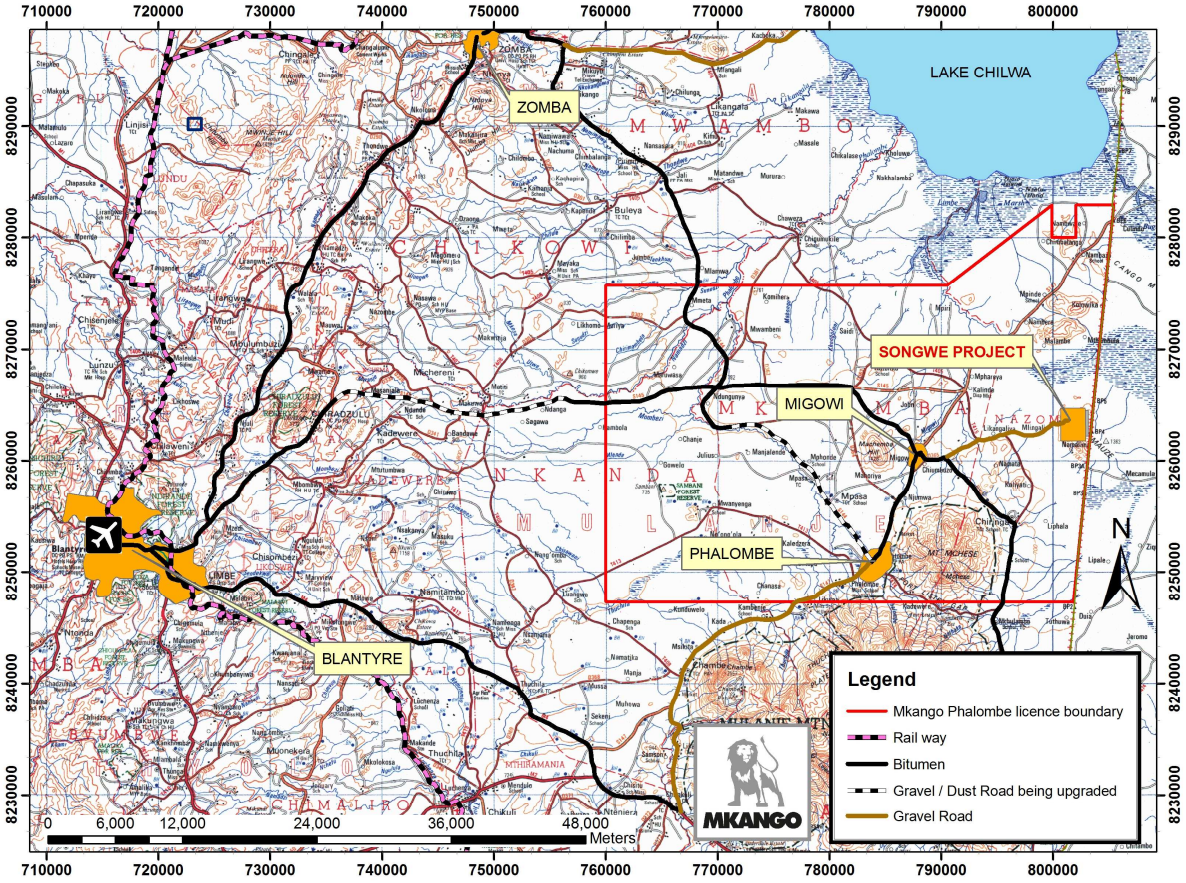
The results of the Pre-feasibility Study were published last week and its main finding was an after-tax NPV of US$293 million, using a 10% nominal discount rate, and 36% after-tax internal rate of return (IRR) for the Songwe Hill Project. The PFS was based on a total rare earth basket price of US$55 per kg REO. The basket price reflects the selective removal of a large proportion of the Cerium during the hydrometallurgical process which enhances the value of the product mix.

This first phase of development envisages production of a high grade, HREE-enriched, purified chemical concentrate for toll treatment or sale, with annual production of approximately 2,840 tonnes per year of REO in concentrate. The initial CapEx for this operation was estimated at US$217m (including a contingency of US$20m) putting the project at the low end of those out there in the Rare Earth space.

Cash operating costs average US$13.4 per kg REO for the first five years of production and US$17 per kg REO for the life of mine. The PFS assumes an additional cost of US$10 per kg REO to account for the cost or discount associated with toll separation or the sale of a mixed chemical concentrate.

The Songwe Hill Project

Mkango's Songwe Hill REE Project is located within the 100% owned Phalombe License, which covers a portion of the Chilwa Alkaline Province in Southern Malawi. The project area is located approximately 70 km SE of the city of Zomba and approximately 90 km ENE of the city of Blantyre in the Phalombe District. All-weather roads link these centers with the town of Migowi, approximately 15 km from Songwe Hill, and are currently being upgraded to bitumen. Secondary gravel roads provide vehicle access to the exploration camp. Migowi is connected to the national electricity grid. The Songwe Hill area has a sub-tropical climate. Maximum monthly rainfall is between 125 cm and 218 cm during the rainy season of December to March.



Early investigations of mineral occurrences in the license area date from the 1930's through 1950's. The first significant evaluation of REE in this area was a surface exploration and drill program carried out in

the late 1980's by the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ), in conjunction with the Geological Survey of Malawi.

Geology

Geologists have interpreted Songwe Hill as a volcanic vent that is expressed as a steep-sided hill with a diameter of approximately 800 metres. Surface mapping and drill core indicates that the vent complex consists of a multiphase intrusion characterized by diverse carbonatites and breccias exhibiting a range of alteration. The vent abuts against the western slope of the large Mauze nepheline syenite intrusion, but the outer contacts on the western and northwestern sides of the vent are hidden beneath recent surficial deposits. Below can be seen Songwe Hill in the middle, abutting Mauze Hill (to the right).

The consultants preparing the resource estimate conjectured that the carbonatite complex is in contact with Precambrian gneisses in this area because Chenga Hill, which is located less than 200 m west of the probable western margin of the Songwe vent, includes fenitised gneisses and breccias. The carbonatite is best exposed along the north-eastern slope of Songwe Hill and, together with a somewhat smaller area along its north western edge, is tentatively interpreted to form a ring structure in a high level vent system.

The REE mineralization is lithologically-controlled and the highest concentrations and greatest volumes of mineralization occur specifically within the carbonatite bodies. The carbonatites are believed to have been REE-enriched when they were intruded and the REE have apparently been redistributed and enhanced by late-stage hydrothermal activity and are now principally residing in synchysite and apatite.

REE mineralization is present in carbonatite, fenite and breccias, which are exposed intermittently over a surface area of approximately 350 m by 100 m. The REE mineralization is untested to the northeast and southwest beyond the limits of the present drilling and below the deepest vertical intersection of approximately 350 m below the surface of the hill.

The Resource

The company announced in November 2012, a maiden mineral resource estimate. For the purposes of resource definition, three geological domains were identified: namely a carbonatite domain, a fenite domain, and a 'mixed' domain consisting of breccia and/or finely intermixed carbonatite and fenite.

The resource estimate prepared by MSA Group indicated an Indicated mineral resource of 13.2mt, grading 1.62% and Inferred mineral resource of 18.6mt, grading 1.38 at 1% TREO cut-off grade.

Songwe Hill - In-situ mineral resources (1% TREO cut-off)

Indicated

	Tonnes (mns)	LREO %	HREO %	TREO %	TREO Tonnes	HREO Proportion
Carbonatite	11.10	1.50	0.12	1.62	179,499	7.30%
Fenite	1.37	1.51	0.10	1.61	22,145	6.50%
Mixed	0.69	1.58	0.07	1.65	11,454	4.50%
Total	13.16	1.50	0.11	1.62	213,098	7.10%

Inferred

	Tonnes (mns)	LREO %	HREO %	TREO %	TREO Tonnes	HREO Proportion
Carbonatite	8.64	1.24	0.11	1.35	116,967	8.20%
Fenite	8.27	1.24	0.1	1.35	111,318	7.50%
Mixed	1.68	1.59	0.06	1.65	27,863	3.80%
Totals	18.59	1.28	0.1	1.38	256,149	7.40%

The black carbonatite zone contains the highest REE grades (average 3.8 % TREO) and occurs as a distinct zone located in the north eastern part of Songwe Hill. It can be traced at surface for approximately 50 m in a N-S direction and to a depth of approximately 40 m beneath the surface of the hill. The black carbonatite is texturally more complex than the calcite carbonatite.

The higher TREO content in the black carbonatite does not reflect differences in REE mineralogy compared to the calcite carbonatite but a greater abundance of the REE-bearing minerals.

Indicated Resource @ 1% TREO cut-off																
	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Eu2O3	Gd2O3	Tb2O3	Dy2O3	Ho2O3	Er2O3	Tm2O3	Yb2O3	Lu2O3	Y2O3	Total
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Carbonatite	24.43	44.56	4.79	16.54	2.39	0.59	1.38	0.17	0.78	0.13	0.3	0.04	0.22	0.03	3.65	100
Mixed	27.36	46.48	4.69	14.97	2.03	0.38	0.9	0.1	0.48	0.08	0.18	0.02	0.13	0.02	2.19	100
Fenite	24.68	44.86	4.83	16.61	2.5	0.47	1.15	0.15	0.72	0.12	0.28	0.04	0.2	0.03	3.36	100

The PFS supports the declaration of a maiden Probable Mineral Reserve Estimate of 8.5 million tonnes grading 1.6% TREO (at a 1% TREO cut-off) for the Songwe Project.

The Pre-Feasibility Study

As part of the pre-feasibility study, in September 2013, Mkango appointed SNC-Lavalin to complete various aspects of the PFS, including the beneficiation and hydrometallurgical process plants and project infrastructure. They collaborated with Digby Wells Environmental, The MSA Group and Epoch Resources as the key partners in the completion of the PFS. Digby Wells Environmental was appointed in March 2013 to complete a comprehensive environmental and social pre-feasibility report, which is a critical component of the pre-feasibility study and future project development.

Mine Plan

The PFS works upon the premise of a conventional open pit operation using contract mining, a mine life of 18 years commencing in 2017, and is focused on the aforementioned Probable Mineral Reserve.

The annual processing capacity was assumed at 500,000 tonnes per year of ore with a view to producing an average of approximately 2,840 tonnes of REO in mixed chemical concentrate per year with a large proportion of the cerium removed during the hydrometallurgical process. Cerium, rightly, is considered to have challenging market fundamentals and, under Mkango's current strategy to produce a concentrate, there is a strong economic rationale to remove as much as possible of the Cerium from the final concentrate. This would be stockpiled in the event that a market develops in the future.

A summary of the key outputs of the Study is presented in the tables below:

- Total ore mined and processed of 8,482,603 tonnes
- Average strip ratio of 4.5:1
- Total waste mined of 38,441,726 tonnes
- Average life of mine TREO grade of 1.6%
- Mine life of 18 years
- Total REO recovered to concentrate of 48,275 tonnes
- Annual ore processed of 500,000 tonnes

The company feels in the wake of the PFS that there is potential to significantly expand production or the mine life and to lower the strip ratio given the large additional Inferred Resource and potential to expand the Mineral Resource. For now though the company is "right-sizing" its operations and not indulging in overblown plans that then need to be scaled back. This shows admirable restraint and a differing path from the gigantism followed by so many in the Rare Earth space at their peril.

Metallurgy

This subject has become the latest battleground in the REE space. Firstly it was size, then grade, then it was LREE/HREE weightings, and now metallurgy is the focus. The topic has led to some bitter fights as some of the more vulnerable projects have resorted to slagging off others on the grounds of the catch-all of "questionable/novel/experimental metallurgy". In Mkango's case they have chosen to stick with a plain vanilla approach to their deposit. The company's goal is to produce a Cerium-depleted, high-grade, mixed rare earth hydroxide.

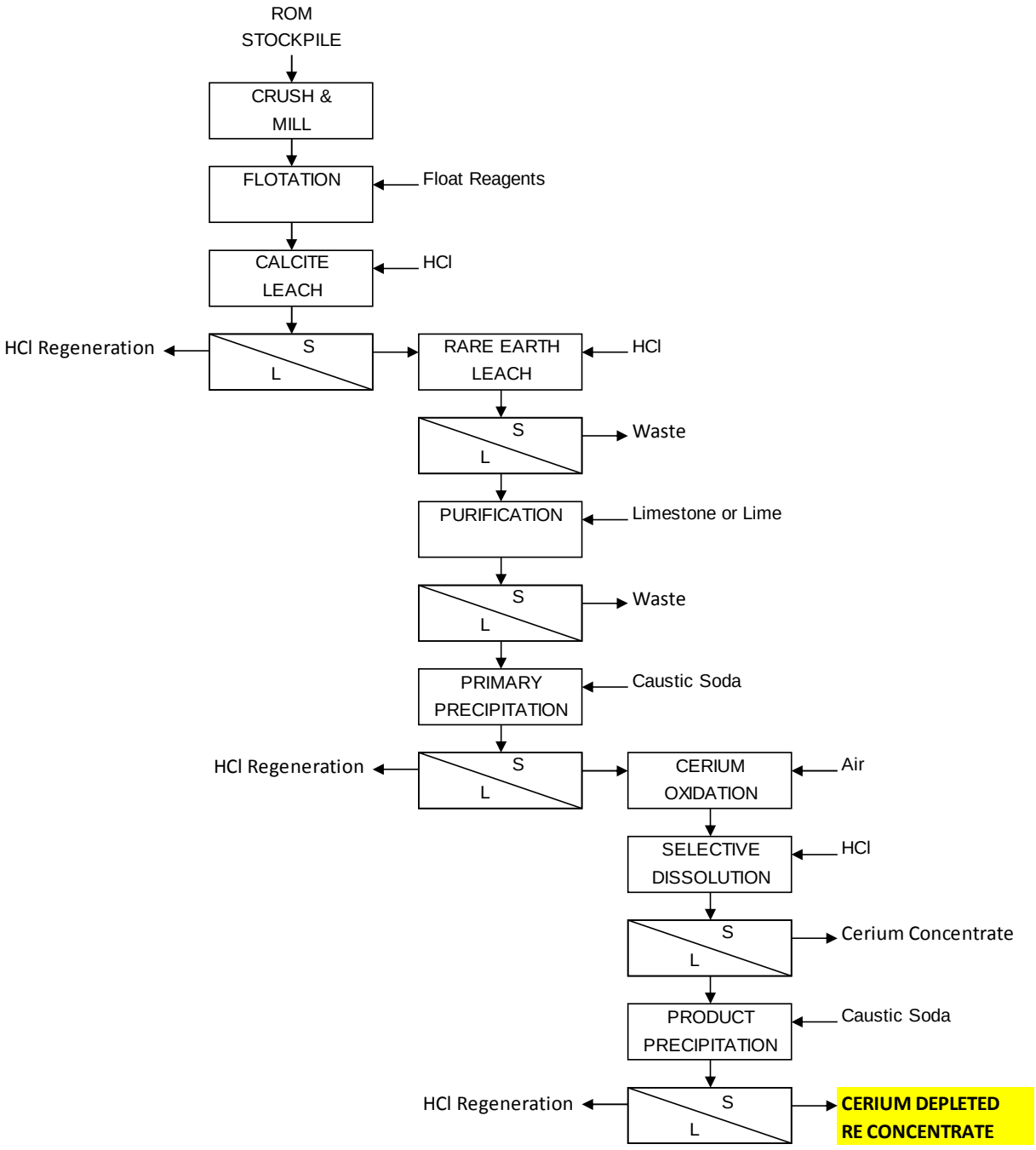
As a result of metallurgical work, it was decided that low-temperature leaching will be employed and therefore high capex (and energy intensive) kilns will not be required. Hydrometallurgy, or "hydromet" for short, is a metal processing technology that uses a chemical process combining water, oxygen or other substances in a pressurized or other vessel to dissolve a metal from its ore, concentrate or an intermediate product (such as matte). Further processing is required to produce high purity metal.

Results released in late May from metallurgical optimisation test work as part of the pre-feasibility study showed auspicious results. This caustic conversion and hydrochloric acid dissolution test work was undertaken at Nagrom, Australia on the residue from the previous bulk leach of a rare earth concentrate.

	Bulk Leach Recovery (Oct 2013)	Caustic Recovery Recovery	Total Leach Recovery
Lanthanum	75.0%	18.5%	93.5%
Cerium	79.5%	12.4%	91.9%
Praseodymium	83.3%	12.7%	96.0%
Neodymium	85.8%	10.8%	96.7%
Samarium	89.4%	8.0%	97.4%
Europium	90.9%	6.7%	97.6%
Gadolinium	92.1%	5.7%	97.8%
Terbium	92.6%	4.7%	97.2%
Dysprosium	92.6%	4.0%	96.6%
Yttrium	89.8%	3.8%	93.7%

This concentrate was produced via flotation of a representative composite sample of drill core from the project. The company feels that the results indicate that recoveries may be significantly enhanced by including a caustic conversion step in the flow sheet and this step was incorporated into the pre-feasibility study.

Further metallurgical optimisation was completed including the incorporation of a gangue pre-leach step to provide a clean solution for hydrochloric acid recycling along with improvements to the flotation stage. With respect to the latter, recent test work has demonstrated an increase in heavy rare earth recoveries to a level similar to light rare earth recoveries. The tentative flowchart for the processing is shown as follows:


ROM STOCKPILE
CRUSH & MILL
FLOTATION
Float Reagents
CALCITE LEACH
HCl
HCl Regeneration
S
L
RARE EARTH LEACH
HCl
S
L
Waste
PURIFICATION
Limestone or Lime
S
L
Waste
PRIMARY PRECIPITATION
Caustic Soda
HCl Regeneration
S
L
CERIUM OXIDATION
Air
SELECTIVE DISSOLUTION
HCl
S
L
Cerium Concentrate
PRODUCT PRECIPITATION
Caustic Soda
HCl Regeneration
S
L
CERIUM DEPLETED RE CONCENTRATE

Plant & Processing

The goal of the first phase of the development is to produce a heavy and critical rare earth-enriched chemical concentrate. The Cerium will be removed and stockpiled during the hydromet flow sheet. This system will work with low-strength acid, by inference enabling the use of plastics or composite materials for tanks and pipework. This will also facilitate acid recycling using cheaper sulphuric acid. A short leach time allows for a significant size reduction for the hydrometallurgical plant. This will utilize conventional technology with the plant design largely comprised of tanks, pumps and filters.

Mkango's management is working on the basis of an initial modest scale operation. A modular plant is therefore envisioned which facilitates the potential for future expansions. The company feels the future expansion plans are underpinned by the current (and prospective) resource base. Throughput is expected to be around 1,400 tpd of ore with an annual output of 2,840 tonnes of rare earth oxides in concentrate. A purified mixed REE concentrate will be sent for separation outside of Malawi, utilizing the good, nearby, rail connections to ports on the Mozambique coast.

The plan to ship via a Mozambican port reminds us that Medallion's Rare Earth refinery planned for Oman plans to source its product from around the Indian Ocean and Songwe would be an obvious provider in the catchment area.

CapEx

The company skipped over the PEA phase in the usual Canadian project advancement ritual and, as noted, has instead proceeded directly to a Pre-Feasibility Study. In our Initiation of Coverage some months back we had operated on the basis of a "back of the envelope" total capex target of around US$200m, with the majority of this attributable to the processing plant ie mill, flotation plant, acid and hydromet plant.

Songwe - CapEx

	US$ mn
Mine	1.7
Site facilities / infrastructure	22.0
Mill / flotation plant	45.2
Hydromet plant	57.1
Sulphuric Acid plant	32.7
Tailings	12.7
Power supply	14.2
Other costs	12.0
Contingencies	19.8
Total	217.4

In the final wash the PFS came along with $197.5mn in CapEx plus $19.8mn in contingencies. Unless specified otherwise, costings have been undertaken at an accuracy level of +/- 25%.

Mining itself will be contract mining, so that becomes an opex rather than a capex issue. The operating cost of contract mining in the PFS is estimated at $4.10 per kg REO over the LOM and $23 per processed tonne over the LOM.

However, site works will still be needed as the company only has a minimal encampment at the moment and there is no network of roads suitable for the larger vehicles required for mining, neither is there connection to utilities or on-site power generation of a sufficient scale for the envisaged operations. The cost of both upgrading the roads to site and connection to the grid in Malawi is included in the capex number.

The company is estimating that a Definitive Feasibility Study might cost from $5-10mn depending how much, if any, additional resource drilling is undertaken. At the minimum, some additional geotechnical drilling will be required for around CAD$0.5m. Other major component include establishment of a pilot plant for around $1m.

Revenues

The proportions of the different REEs in the concentrate mix have changed somewhat since we prepared our revenue projection in our Initiation of coverage. Taking the likely amounts of each REE in the concentrate and valuing them as per our (unchanged) 2016 price projections one comes up with the following value for annual sales of end product.

Oxides	%	Total REO in Concentrate (tonnes)	Export REO in Concentrate (tonnes)	2016 Price USD per kg	Value $mn	Value %
Yttrium	5.8%	165	165	32	5.3	3.1%
Lanthanum	37.8%	1,074	1,074	6	6.4	3.7%
Cerium	12.0%	341		6	-	
Praseodymium	8.0%	227	227	90	20.5	11.9%
Neodymium	26.6%	756	756	92	69.5	40.3%
Samarium	4.0%	114	114	11	1.3	0.7%
Europium	0.9%	26	26	760	19.4	11.3%
Gadolinium	2.2%	63	63	30	1.9	1.1%
Terbium	0.3%	9	9	930	7.9	4.6%
Dysprosium	1.2%	34	34	830	28.3	16.4%
Other	1.2%	34	34	350	11.9	6.9%
	100%	2,841	2,500		172.4	100.0%

However, Mkango will NOT be selling an end-product REO, therefore this revenue number will need to be discounted by the transport cost, the tolling cost at the refinery and adjusted for the recoverable grade in the concentrate which would differ for each REE mineral.

Financing and Partners

It is worth remembering that the company did a financing around the end of the first quarter of 2014. In total, 22,707,853 units (consisting of shares and warrants) were issued for gross cash proceeds of CAD$2,270,785.

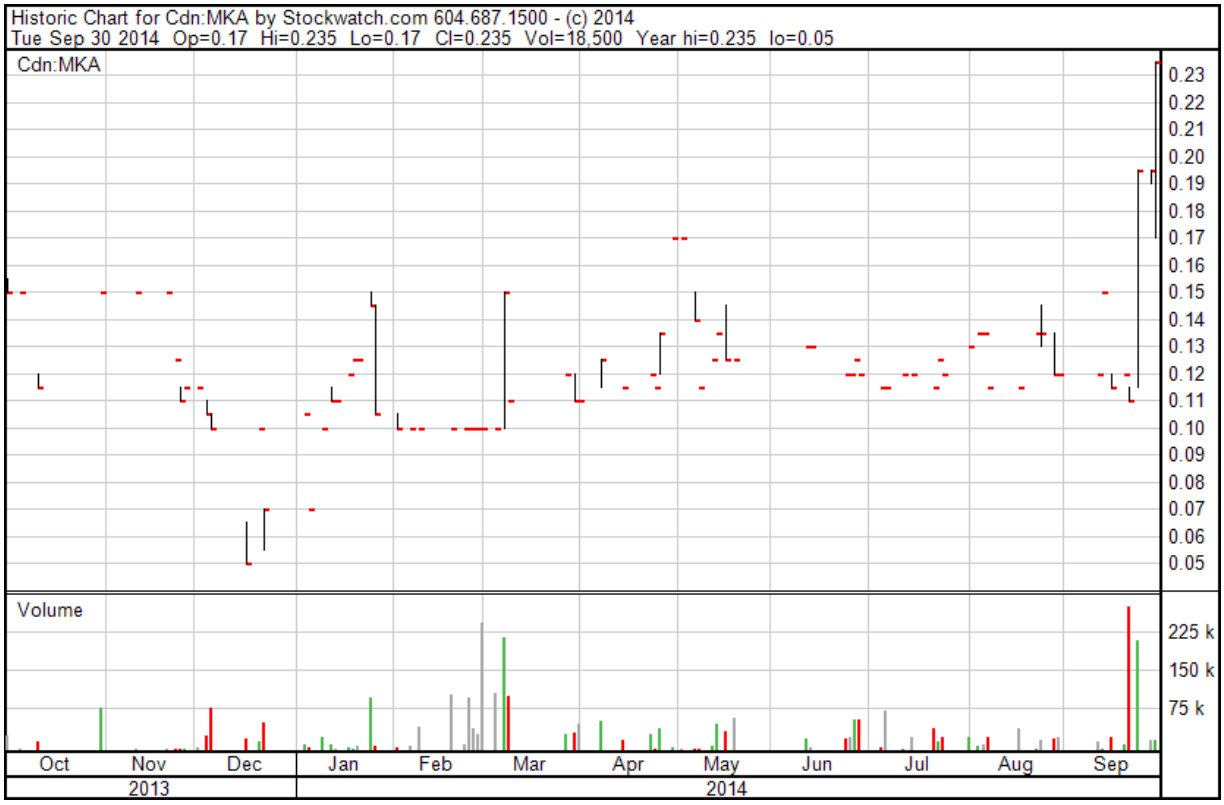
We might mention that back in May 2014 the company was allocated a grant from the South African Department of Trade and Industry (DTI) for R7,967,804 (CAD$835,000) under its Capital Projects Feasibility Programme. The grant will be dispersed to Mkango between June 2014 and March 2015 as it meets certain milestones in relation to a number of activities including environmental and social impact studies, mine planning, design of the processing plant and tailings storage facility, flotation and hydrometallurgical optimisation and marketing studies.

At the moment Mkango has a number of contracts out with South African providers, such as SNC-Lavalin (Pty) Ltd., (Beneficiation and hydrometallurgical plant, and associated infrastructure), Digby Wells Environmental (Environmental and social impact studies), Epoch Resources (Pty) Ltd., (Tailings storage facility), Mintek, (Metallurgical optimization) and The MSA Group (Pty) Ltd.(Mining studies and associated infrastructure). Frankly this is the first time we have heard of this program and it is impressive that Mkango have been able to tap into it.This represents a significant amelioration in costs as this would otherwise have had to come out of the current cash reserve.

Conclusion

Mkango has spent the "downtime" of the last two years, proving up its resource and getting its thoughts in order for a cogent production plan. This has now born fruit in the recent announcement of the PFS results, which broadly matches our expectations on capex and profitability. As projections of where REE prices will go are all over the place with no two pundits having the same set of assumptions, the only ground for argument is where the prices of the most preponderant REEs in the production might go. The PFS has opted for a stable price scenario. While prices didn't move for years under the Chinese dominance period, it is unlikely that prices will stay stable and it's more likely that the prices of the most sought after REEs will trend up particularly over the life of what is a rather long-lived project at Songwe.

Mkango adds to our theory on the 2010 REE "stars" that the "first shall be last and the last shall be first" as Mkango draws ahead of the onetime stellar stories that have fizzled and burnt, becoming Black Holes sucking in money and producing nothing of consequence. The recent financing showed it has friends in high (financial) places and is doing all the right things in diligently aligning the ducks for eventual production. We reiterate Mkango as a **Long** opportunity and we are upgrading our twelve-month target price from CAD$0.45 to CAD$0.58.


Historic Chart for Cdn:MKA by Stockwatch.com 604.687.1500 - (c) 2014
Tue Sep 30 2014 Op=0.17 Hi=0.235 Lo=0.17 Cl=0.235 Vol=18,500 Year hi=0.235 lo=0.05
Cdn:MKA
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
Volume
225 k
150 k
75 k
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
2013
2014

Important disclosures

I, Christopher Ecclestone, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

Hallgarten's Equity Research rating system consists of LONG, SHORT and NEUTRAL recommendations. LONG suggests capital appreciation to our target price during the next twelve months, while SHORT suggests capital depreciation to our target price during the next twelve months. NEUTRAL denotes a stock that is not likely to provide outstanding performance in either direction during the next twelve months, or it is a stock that we do not wish to place a rating on at the present time. Information contained herein is based on sources that we believe to be reliable, but we do not guarantee their accuracy. Prices and opinions concerning the composition of market sectors included in this report reflect the judgments of this date and are subject to change without notice. This report is for information purposes only and is not intended as an offer to sell or as a solicitation to buy securities.

Hallgarten & Company or persons associated do not own securities of the securities described herein and may not make purchases or sales within one month, before or after, the publication of this report. Hallgarten policy does not permit any analyst to own shares in any company that he/she covers. Additional information is available upon request.

Hallgarten & Company acts as a strategic consultant to Mkango Resources and as such is compensated for those services, but does not hold any stock in the company not has the right to hold any stock in the future.

Web access at:

Research: www.hallgartenco.com

60 Madison Ave, 6th Floor, New York, NY, 10010