

HALLGARTEN & COMPANY

Portfolio Strategy

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Model Resources Portfolio: Out of the Stygian Gloom

Performance Review – September 2022

Model Resources Portfolio

Out of the Stygian Gloom

- + Some investors are already looking beyond the Russia-Ukraine war towards the sunny uplands of "peace in our time"
- + Base metals seem to have found a level
- + Lithium prices continue to hit new highs
- + Oil price stabilised
- **×** Interest rate rises might intensify
- Gold and silver saw their mid-month rallies nipped in the bud to return to recent year lows
- Energy crisis in Europe, for industries dependent upon natgas or electricity as power source or input (such as petrochems), is also impacting metal processing

Markets' Misery Intensifies

Glimmers of hope, such as silver briefly ticking above \$20 per oz, were firmly suppressed as negative vibes swamped the markets yet again. The base metals seem however to have found a safe zone where they have stabilized. However, specific metals, such as Tin, have still been subject to selective Chinese manipulation, as the stellar metal of 2020-22, continued its fall from grace.

On the bright side, Lithium kept making new highs and Antimony has held its ground. Thermal coal has, of course, been the stuff which gives the Green-set nightmares.

All in all, not a good scenario for the short term, however, the overarching dynamic of long-term underinvestment occasioning long term shortages still holds. Each month is a whole new world these days. In this note we look at some brighter points (and Niocorp... sigh).

Solvay – the Rip Van Winkle of Rare Earths Awakes

In the beginning there was *Societe de Terres Rares* (STER) and it was good. If one goes back far enough one finds that the company (then folded into French chemicals giant, Rhône-Poulenc) even held a 41 % stake in Baotou Luxi Rhône Rare Earths in a plan to exploit Bayan Obo. That was of course in the days when China was not viewed as the enemy in the Rare Earth world. The rest is history.

So how is it then that the most advanced REE processor in the world in the 1990s should have been overhauled by Silmet, which as an ex-Soviet facility, might best have been described as a pile of scrap metal?

Rhodia was a public company that was founded on January 1, 1998 following the spin-off of the chemicals, fibres, and polymers activities of Rhône-Poulenc when it merged with the German company Hoechst. On June 25, 1998, Rhône-Poulenc sold 32.7% of its share in Rhodia's capital to the public. Rhodia became a listed company. Embedded within the spin out was the old Rare Earths division of R-P.

In the first quarter of 2011, the Belgian chemicals group Solvay launched a friendly public take-over bid for Rhodia.

The Radioactivity Issue

The long time fly in the ointment for Solvay regaining traction in the REE space has been the historical legacy of radioactive wastes from production at La Rochelle. According to ANDRA, the French agency for waste management, until July 1994, Electronics and Catalysis (later renamed Rhodia Rare Earth Systems) used very slightly radioactive monazite as an ore, producing radium-bearing waste, which was initially stored at ANDRA's La Manche center until 1991, then in the French atomic energy commission's Cadarache facility. The treatment of the slightly radioactive monazite produced 8,023 tons, according to ANDRA, of slightly radioactive solid residue up until 1994. According to ANDRA, in 2007, this residue contained 2,000 tons of uranium and 2.6 tons of toxic lead.

The plant was subject to ICPE environmental surveillance. A project to launch a recycling plant for the Rare Earths contained in used lightbulbs was being considered earlier in last decade, but this would have been scarcely a gamechanger in the REE space as even a minuscule company such as Rare Earth Salts in the US Midwest had dabbled with that strategy.

The Latest Resurrection

In mid-September 2022 Solvay made a cryptic announcement of plans to expand its Rare Earths operations in La Rochelle "to enter the value chain for Rare Earths permanent magnets in Europe". However, by most accounts they were happy to announce this and then reticent to actually flesh out what they intended to do. The announcement thus came out rather half-baked.

For decades, Solvay's predecessor firms were technology leaders in Rare Earths separation, recycling, purification, finishing and formulation. Despite its low-profile of late they claim "the plant is already active in the separation and recycling of rare earths for captive use".

Solvay has now pinned its flag to the mast with an ambition to "create a powerful rare earths hub in Europe in the coming years". The La Rochelle plant currently serves the automotive emissions control and semiconductors markets.

The unquantified new investment will expand and upgrade an existing sophisticated unit that will add the production of separated Rare Earth oxides for permanent magnets to the site. Solvay's new/old hub will help develop European autonomy for these critical materials and also address the shortage of Rare Earth key elements by playing a proactive role in the recycling of magnets. Unspoken in this is that the

EU still does not have any primary production of the Rare Earth minerals and attempts thereat (such as Norra Karr in Sweden are at the mercy of localist NIMBY tendencies/activists). Sigh....

The plant is state of the art and much bettered positioned geographically than Neo Performance Materials' Silmet facility.



We had to laugh at the statement that "Solvay has been continuously reinventing its rare earth business through numerous technology, legislation and market evolutions" when most players in the Rare Earth field didn't even know of this hidden gem until the announcement. We have long seen it as having the potential to become a French, or EU, champion in REEs, but instead it has been a long-ignored opportunity.

We are intrigued by the statement that "Solvay will pursue alliances with other global champions in this field, and has active participation in European consortia to secure partnerships and funding". This leaves us wondering who such "global champions" might be.

Portfolio Changes

The merger of Altus/Elemental slimmed down our portfolio, as well as some recent disposals. With so many bargains around it seemed time to restock in a cautious way. In this instance during the month we added a **LONG** position in Sheffield Resource (ASX:SFX). Several of the more "do-nothing" gold explorers in our Portfolio might find themselves candidates for relegation.

Sheffield Resources (ASX:SFX) – Funding in the Bag

We have never added a mineral sands project to the Model Resources Portfolio before. Late last year we were tempted when we had been introduced to this company, and then had a follow-up call with the London-based CEO. We held fire wanting to see if the financing could be put in place. Things have moved along substantially since then and the goal of fully-funding the project has been achieved and yet, such is the poor state of the market's mojo that no major rerating has been given to the valuation for achieving this Sisyphean task.

The focus of the company has been narrowed down to its Thunderbird Mineral Sands Project after a couple of smaller mineral sands projects in WA were divested in early 2022. The Thunderbird project is a 50/50 joint venture between Sheffield and YGH Australia Investment Pty Ltd (part of China's Yansteel grouping), formed in 2021 to develop the Thunderbird Mineral Sands Project.

Beyond the Titanium potential, Thunderbird's large-scale, high-grade, high in-situ Zircon content is globally significant. We would remind investors that we have previously written a dedicated report on the subject of Zircon/Hafnium.

Thunderbird(s) are Go

Despite the last piece of the funding having only just been announced, it was more of a chronicle of a deal foretold as the company has already completed some 38% of the mine/processing plant construction at the end of August. In recent days it issued a mining services contract to start the earthworks for the open pits. The project is on track for first production in Q1 2024. A schematic of the whole complex is shown below:





Thursday May 19, 2022

The Studies

Sheffield completed a Scoping Study in 2014 and Pre-Feasibility Study and PFS Update in 2015, leading to the announcement of a maiden Ore Reserve in January 2016 (to be discussed anon). A Bankable Feasibility Study (BFS) on Thunderbird was completed in March 2017 demonstrating the project could produce and market high-quality Zircon and ilmenite products at large volumes near to Asian markets.

An updated BFS completed in March 2022 confirmed Thunderbird as a sizeable mineral sands project based on a 36-year mine life and significant annual production of Zircon and ilmenite.

The Resource/Reserves

The Thunderbird BFS is underpinned by one of the world's largest and highest-grade, Zircon and ilmenite-rich mineral sands ore reserves. The ore reserve stands at 754mn tonnes @ 11% Heavy Minerals (HM), both proven and probable, while the Mineral Resource contains 3.23 billion tonnes @ 6.9% HM, including a higher grade component of 1.05 million tonnes @ 12.2 % HM with very high in-situ Zircon (0.93%) and ilmenite (3.3%) grades (Measured, Indicated and Inferred).

Ore Reserve Category	Ore Tonnes (Mt)	In-situ HM Tonnes (Mt)	HM Grade (%)	Valuable Heavy Mineral Grade (In-situ) ²					
				Zircon (%)	HiTi Leucoxene (%)	Leucoxene (%)	limenite (%)	Oversize (%)	Slimes (%)
Proved	239	31	12.9	0.96	0.29	0.28	3.4	14	16
Probable	514	52	10.1	0.79	0.26	0.27	2.9	11	15
Total	754	83	11.0	0.84	0.27	0.27	3.1	12	15

Thunderbird Ore Reserves: Valuable Heavy Mineral in-situ grade1

The Economics

The Stage 1 Upfront Capex is AUD\$361mn, while the Stage 2 capex is AUD\$258mn.

The Stage 1 & 2 economics are:

- > Post-tax NPV8 of AUD\$1.28bn (of which the share for SFX shareholders is \$640mn)
- ➢ IRR post-tax 27.5%

The total funding required for Stage 1 amounts to AUD\$484mn (the difference with the \$361mn being working capital, financing costs and over-run contingencies).

Product Pricing for Thunderbird Products

The chart on the following page is rather self-evident as to the pricing progression in recent times of the metals targeted at the Thunderbird project.



The Yansteel Deal

As is well-known we are not unalloyed fans of having Chinese as partners in any Western mining venture. However, in the case of Sheffield it is the relationship with a Chinese group that has been instrumental in getting the ducks in a row on the financing front. In January 2021, Sheffield and Yansteel executed binding agreements for the formation of a 50/50 Joint Venture under the name Kimberley Mineral Sands Pty Ltd (KMS) to own and develop the Thunderbird project and adjacent tenements on the Dampier Peninsula. The parties agreed that the development concept for Stage 1 of the Project would be a 10.4mn tonne per annum mine and process plant producing a Zircon-rich non-magnetic concentrate and LTR ilmenite.

Yansteel is a wholly-owned subsidiary of Tangshan Yanshan Iron & Steel Co, a privately-owned steel manufacturer headquartered in Hebei, China, producing approximately 10mn tonnes per annum of steel products with annual revenues of ~AUD\$6bn. It is, however, a newbie in the titanium space.

The investment of Yansteel is thus AUD\$13mn in Sheffield for a shade under 10% of the equity, and AUD\$130mn for its 50% of the JV.

Offtakes

In March of 2022 the company announced that Yansteel and Thunderbird Operations Pty Ltd (TOPL - the wholly-owned subsidiary of Kimberley Mineral Sands Pty Ltd) had executed an amended offtake agreement representing 100% of magnetic concentrate forecast to be produced from Stage 1, with a similar offtake right of first refusal from later stages.

Yansteel is currently constructing a 500k tpa integrated titanium dioxide processing facility, including a titanium slag smelter. This complex will consume the Low Temperature Roast (LTR) ilmenite offtake from Stage 1 of the Thunderbird project.

The pricing of the material going to Yansteel will be via arms-length fixed price reflecting contained TiO² content for an initial five-year period; and an arms-length market price for the remaining mine life. The 100% offtake with Yansteel, as co-owner of KMS, mitigates the potential market risk associated with producing a magnetic concentrate.

The company had earlier executed Zircon concentrate offtake agreements in June of 2021. Some 75% of the Zircon concentrates is spoken for to three Chinese processors, with a potential to sell the balance to a non-Chinese buyer. The deals cover a minimum contract volume of 170,000 tonnes of Zircon concentrate annually for an initial five-year period, with annual contract extensions thereafter The terms are "take or pay" for the minimum contracted volume. Pricing is linked to the ZrO², TiO² and other saleable product content of the concentrate.

With these deals, KMS had secured offtake contracts for approximately 80% of the revenue from Stage 1 production.

Funding

As is well-known, markets are pretty gruesome for financing currently particularly when the amounts are large. Raising a debt piece by conventional means (such as a debenture) is made more difficult, indeed impossible, by the credit being a private JV vehicle rather than a listed corporation.

Thus the funding is made up of:

- > AUD\$36mn from Sheffield (covered by its \$40mn currently in the bank)
- > The funds that Yansteel vested into KMS in taking up a 50% stake
- > An AUD\$160m debt financing package from the Northern Australia Infrastructure Facility (NAIF)
- > A US\$110m Production Linked Facility from Orion Mining Finance

NAIF Funding

In late July the company announced that the Western Australian government had signed off on the AUD\$160m debt financing package from the Northern Australia Infrastructure Facility (NAIF).

The borrower in this instance is TOPL. The guarantors (at least until project completion) are Sheffield Resources Limited and YGH Australia Investment Pty Ltd and Kimberley Mineral Sands Pty Ltd.

The aggregate facility amount is up to AUD\$160mn, inclusive of a term loan and cost overrun facility The term is up to 12 years from the date of financial close (subject to any earlier repayments and prepayments). There is a comprehensive senior security package over assets and rights of Thunderbird project.

Orion

In the first days of October the company announced that it had, with Orion Mining Finance, executed binding and definitive documentation for a US\$110m Production Linked Facility.

Over and beyond the interest rate component (at SOFR - subject to a minimum of 2%, plus a 5% margin) there is a royalty stream to Orion:

- Royalty Rate: 1.6% of FOB gross revenue (0.35% escalation provision applies where a Facility default circumstance takes place)
- Royalty Scope: Limited to Stage 1 production capacity (i.e. capped at an annual production rate of 8.2m tonnes of ore)
- Term: 25 years (subject to a buyback provision, curtailing the term to 12.5 years)
- Commencement: Earlier of full repayment of facility obligations or 7 years following the date of

the Production Linked Facility agreement



As for the SOFR plus 5%, management comments that this is around 150bps below market.

Disposals

The company has been narrowing its geographical focus also with the sale in mid-March 2022, to Image Resources NL (ASX:IMA), of its McCalls Mineral Sands Project, located 100km north of Perth.

The McCalls project consists of four exploration licences (ELs) covering two project areas (McCalls and Mindarra Springs) and contains Mineral Resources (JORC 2012) estimated at 5.8 billion tonnes at 1.4% total heavy minerals (THM) for 84 million tonnes contained THM, and 75 million tonnes of contained valuable heavy minerals (VHM) with Mineral Resources in the JORC Code 2012 Indicated and Inferred categories. Total consideration for the acquisition was AUD\$12mn in cash.

In a separate transaction, but with the same buyer, the Eneabba project was sold for AUD\$24mn.

Investment Thesis

The Orion facility completes the project financing requirements for Thunderbird. All of the production that needs to be sold forward to achieve this has been done, with still more product potentially to be

vended out of Stage 1 (25% of the Zircon without counting the monazite potential).

That the company has been able to bag all the financing without an equity issue is the truly impressive thing and indeed a Stakhanovite effort.

It's worth repeating that the company's cash balance was AUD\$40mn in cash at the end of June 2022 (enough to fully fund its equity contribution). The GS&A expenses are around AUD\$2mn per annum. The market cap is currently around about AUD\$160mn.

Therefore, as far as we can see, the only negative at the company is the clunker of a name... and that is easily solved. During September, we initiated a **LONG** position in Sheffield Resources in the Model Resources Portfolio with a 12-month target price of AUD\$0.72.

The Syphilitic Bride of Frankenstein

We were bemused to see one of the last (rather than merely the latest) transactions in the rapidly fading SPAC space was the pairing up of NioCorp Developments Ltd. and GX Acquisition Corp. II (GXII - Nasdaq: GXII) via a Business Combination Agreement. Under the agreement, NioCorp will acquire GXII, a SPAC, and intends to be listed on the Nasdaq Stock Exchange soon after the acquisition closes, which is expected in the first quarter of 2023. NioCorp has been a **SHORT** position in our Model Resources Portfolio for quite a while, due to its many and various non-attractions. The proposed transaction values the combined entity at an estimated enterprise value of \$313.5 million according to the news release.

Assuming no redemptions by GXII's wiser shareholders, upon deal close, the combined operating entity could have access to as much as \$285mn in net cash (after paying transaction expenses). This raises the frightening prospect of an even larger amount of money being thrown at the perennial non-starter, known as the Elk Creek project. The one consolation is that the company will no longer have an excuse to borrow money at usurious rates from its executives.

To add to the impression that Elk Creek might even be developed was the announcement of the signing of non-binding LOIs for two separate financing packages with Yorkville Advisors Global, LP. Subject to entering into definitive agreements, these financings could provide Niocorp with access to up to an additional \$81mn to "help advance" the Elk Creek Project. The financings contemplated by the LOIs include \$16mn in convertible debentures that are expected to be funded at the closing of the business combination, and subject to certain limitations can be repaid by NioCorp in either cash or NioCorp common shares, and a standby equity purchase facility pursuant to which NioCorp will have the ability to require Yorkville, subject to the conditions set out in the definitive agreements, to purchase up to \$65mn of its common shares. Lucky Yorkville....

The reality here is that this is a sunset deal in the SPAC space. It was either this or liquidation. Frankly getting one's money back looks a better outcome. We reiterate our **SHORT** stance on Niocorp with a target price of 40 cts.

Essential Metals – Ramping Up

We are circling back briefly to this sometime Cesium producer in Western Australia (which is in the Model Resources Portfolio for that rationale).

We noted during the month that, during the last month, the company announced that it has a Scoping Study for the Pioneer Dome Lithium Project is underway, with metallurgical test work results imminent (end of September). The engineering firm, Primero, has commenced preparation of the Scoping Study. Mining engineering consultancy, Orelogy has been selected to provide mine optimisation and scheduling modelling to feed into the Study.

The company has lodged a Mining Lease application. To this effect a Mineralisation Report and Supporting Statement that underpins the application were prepared by SRK Consulting and were reviewed by the Geological Survey of Western Australia (GSWA) in early September.

Formal notification of the Mining Lease Application has been received from the Department of Mines, Industry Regulation and Safety (DMIRS). The granting process is anticipated to take approximately six months.

Financing and off-take term sheets are being formulated for circulation to selected interested parties by the end of September.

The Scoping Study outcomes will form a basis to finalise the framework for selection of the partner/partners to assist with advancing the project into production. We reiterate our **LONG** stance on this company, with a revised 12-month target price of 55cts.

Parting Shot

Can anybody tell us what "world-class" actually means? This term is bandied about in the mining space at an increasing pace and ranks up there with statements such as "Canadians are nice". Can we say that Chuquicamata or Oyu Tolgui or Olympic Dam are "world-class" or are they <u>better than world-class</u>? For surely most of the projects touted as world-class are not in the same category as these three?

And yet these days, every project seems to be "world-class" when a more appropriate term might be bloated or over-sized. Maybe however it is the capex that is "world-class". This is a good way of uplifting a middling project and trying to retrofit its bad economics or Brobdingnagian capex by moving it into a (very crowded) "class" of its own. Maybe we should start making a list of self-proclaimed "world-class" offerings and we might be shocked to see just how many there actually are out there using this term to tout their virtues.

Dare we say it, but maybe the TSX and ASX might ban the use of the term as unscientific. Where does it fit into the JORC or NI43—101 terminology? Was Bre-X's Busang project "world-class"? Say no more....

"World-class" must be consigned into the same linguistic garbage bin as "shovel-ready". Who digs a

mine with a shovel except a garimpeiro?

Recent & Upcoming

In the last month we published updates on American Rare Earths and Crestview Exploration and launched a Special Situations note on Thomson Resources.

In coming weeks, there is likely to be an Initiation on Auxico Resources and on Thomson Resources main silver/gold/base metals operations in northern NSW. We also expect to launch coverage on Xantippe Resources, which shares a lithium *salar* in Argentina with Lake Resources.

	S PORTFOLIO @ END SEPTEMBER					Change	
	Security	Ticker	Currency	Price	last 12 mths	last mth	Target
ONG EQUITIES			-	-	-	-	
Diversified Large/Mid-Cap	Hochschild	HOC.L	GBP	0.5759	-57%	-9%	£1.00
	Sherritt International	S.to	CAD	0.38	-10%	-3%	\$0.95
Uranium	Sprott Physical Uranium	U.UN.to	CAD	16.31	15%	-1%	\$20.00
	GoviEx	GXU.v	CAD	0.23	-34%	-26%	\$0.45
Zinc/Lead Plays	WisdomTree Zinc ETF	ZINC.L	USD	9.35	0%	-15%	\$14.00
	Altaley Mining	ATLY.v	CAD	0.13	-68%	-13%	\$0.70
Silver Explorer	Southern Silver Exploration	SSV.v	CAD	0.18	-45%	0%	\$0.40
Silver ETF	IShares Silver ETF	SLV	USD	17.5	-15%	6%	\$24.00
Gold Producer	Soma Gold	SOMA.v	CAD	0.29	-19%	-15%	\$55.00
	Orvana Minerals	ORV.to	CAD	0.21	-42%	-16%	\$0.60
Gold/Antimony Developer	Perpetua Resources	PPTA.v	CAD	2.77	-57%	-18%	\$16.00
Metallurgical Coal	Colonial Coal	CAD.v	CAD	1.43	-3%	-19%	\$2.45
Royalties	Elemental Altus Royalties	ELE.v	CAD	0.90	-33%	-24%	\$1.52
Copper Explorers	Panoro Minerals	PML.v	CAD	0.12	-14%	9%	\$0.30
	Phoenix Copper	PXC.L	GBP	0.255	-60%	11%	£0.54
	C3 Metals	CCCM.v	CAD	0.05	-78%	0%	\$0.20
Tungsten Producer	Almonty Industries	AII.v	CAD	0.63	-32%	-21%	\$0.95
Graphite Developer	Blencowe Resources	BRES.L	GBP	0.033	-46%	5%	£0.09
Cobalt	Jervois Global	JRV.ax	AUD	0.52	7%	2%	\$1.00
Vanadium Developer	Vanadium Resources	VRB.ax	AUD	0.10	67%	43%	\$0.22

	PORTFOLIO @ END SEPTEMBER				Change		12-mth
	Security	Ticker	Currency	Price	last 12 mths	last mth	Target
LONG EQUITIES							
Lithium	Neometals	NMT.ax	AUD	1.13	31%	-16%	\$1.50
	Lithium Power Intl	LPI.ax	AUD	0.54	69%	-11%	\$0.80
Cesium/Lithium	Essential Metals	EXX.ax	AUD	0.46	188%	5%	\$0.55
Scandium Developer	Scandium International	SCY.to	CAD	0.09	-44%	0%	\$0.15
Gold Explorer	Cabral Gold	CBR.v	CAD	0.25	-34%	-26%	\$0.60
	BTU Metals	BTU.v	CAD	0.03	-57%	0%	\$0.06
	Gunpoint Exploration	GUN.v	CAD	0.45	-24%	-27%	\$0.75
	Bold Ventures	BOL.v	CAD	0.10	0%	-17%	\$0.18
	Desert Gold	DAU.v	CAD	0.08	-38%	-11%	\$0.32
	MetalsTech	MTC.ax	AUD	0.41	-38%	46%	\$0.68
Rare Earths	Rainbow Rare Earths	RBW.L	GBP	0.1125	-25%	7%	£0.30
	Neo Performance Materials	NEO.to	CAD	10.19	-42%	-30%	\$24.00
	Aclara	ARA.to	CAD	0.32	n/a	-14%	n/a
Tin Miners	Alphamin	AFM.v	CAD	0.66	-18%	-1%	\$1.35
	Metals X	MLX.ax	AUD	0.27	-25%	-4%	\$0.38
Mineral Sands	Sheffield Resources	SFX.ax	AUD	0.40	23%	-9%	\$0.72
Oil & Gas	Shell	SHEL.L	EURO	22.55	38%	-1%	£24.00
HORT EQUITIES							
Shorts	NioCorp	NB.to	CAD	1.43	43%	44%	\$0.40
	Galane Gold	GG.v	CAD	0.08	-20%	44 % 0%	\$0.40
	Texas Mineral Resources	TMRC	USD	1.93	-20%	-3%	\$0.00

Important disclosures

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