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HALLGARTEN & COMPANY

Coverage Update

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Neo Performance Materials

(TSX:NEO, OTC:NOPMF)

Strategy: Long

Key Metrics			
Price (CAD)	$11.99		
12-Month Target Price (CAD)	$24.00		
Upside to Target	100%		
High-low (12 mth)	$9.86 - $18.49		
Market Cap (CAD mn)	$475.40		
Shares Outstanding (millions)	39.65		
Fully Diluted (mns)	41.81		
Dividend Yield @ 40cts	3.3%		
	FY18	**FY19e**	**FY20e**
Consensus EPS		$0.820	$0.97
Hallgarten EPS		$1.017	$1.13
Actual EPS	$1.02		
P/E	12	12	11

Neo Performance Materials

Risen from Molycorp's Ashes

- + Rare Earths have come back into focus with the threat of Chinese retaliation for US tariffs in the so-called "Trade War"
- + Neo Performance was born out of the ashes of Molycorp's failed Project Phoenix and managed to make off with all the best bits of the business
- + US$76mn in cash as at the end of March quarter
- + Dividend of 10 cents per quarter
- + Strong earnings position and looking like making EPS of over $1 per share in FY19
- + The Silmet refinery in Estonia is the Queen in the chessgame of non-Chinese REEs
- + China is past its peak in REE dominance and looking vulnerable
- + Chinese entities might take advantage of low valuation to neutralize a potential competitor
- ✘ The backwash from the failed Luxfer "merger" has left the stock price significantly lower than it was beforehand
- ✘ Neo's supply chain is vulnerable to Chinese restrictions of Rare Earth inputs to both users outside China and foreigners with processing in China (of which Neo is both)
- ✘ The company, with its low valuation, is vulnerable to a takeover offer

Constantine Rides Again

In the beginning there was Molycorp and it was not good. A defunct Rare Earths mine with a not particularly propitious mix of metals for the magnet revolution. Not to let that stand in the way of a good promote it was duly promoted. While the vast hordes of REE juniors were spawned on Bay Street, Howe Street and in West Perth, the one that Wall Street took to its heart was one of the least worthy (and there was much competition in the Least Worthy Category). Newly minted with an IPO, a gushing management and big backers, Molycorp went on to merge with Neo Material Technologies Inc (then ticker NEM.TO), a long established REE and specialty metals processor listed on the TSX. A real business. The cash-and-stock deal was worth roughly CAD$1.2bn (US$1.17bn at the time).

The rest is history with Molycorp imploding under its own fecklessness and leaving big investors with massive losses, indeed one might even speculate that as much "real money" was lost on this one company than on all the rest of the REE universe.

Out of the smouldering ruins of the wrecked company came a few survivors. The mine is by some reports working again and exporting REE concentrates to China (don't tell Donald Trump or he'll have a coronary) and the rest of the assets ended up in a reanimated (and relisted) Neo Performance Materials under the aegis of the same management as before the Molycorp intervention. Indeed, the new Neo

Performance Materials added to its asset pool the Silmet refinery in Estonia and the Magnaquench magnet powders business, both of which Molycorp owned from before its Neomaterials deal. So while it may be said that almost everyone came out of the Molycorp experience poorer, the revived Neo team came out with more strategic assets than they went in with.

The initial takeover was undertaken when the Rare Earth boom was past its prime but still with some sizzle.

The Molycorp Deal

In March of 2012, in what was probably the last blast of the Rare Earth boom, Molycorp launched an offer to buy Neo Material Technologies. Molycorp agreed to pay CAD$8.05 in cash plus 0.122 of a share for each share of Toronto-based specialty metals processor. That amounted to a total consideration of CAD$11.30 per share, based on Molycorp's 20-day average at that time.

Neo, which owns facilities in China, Thailand, Germany and North America, produces rare earth oxides, alloys and magnetic powders. The company also processes various minor metals like gallium, rhenium and indium.

The then CEO of Molycorp, Mark Smith, commented at the time that the deal will bring together the Molycorp's "massive" production capacity at the Mountain Pass mine in California and Neo's advanced rare earth processing capabilities.

"(We are) putting those two together and forming the best full supply chain capability known in the industry," he said.

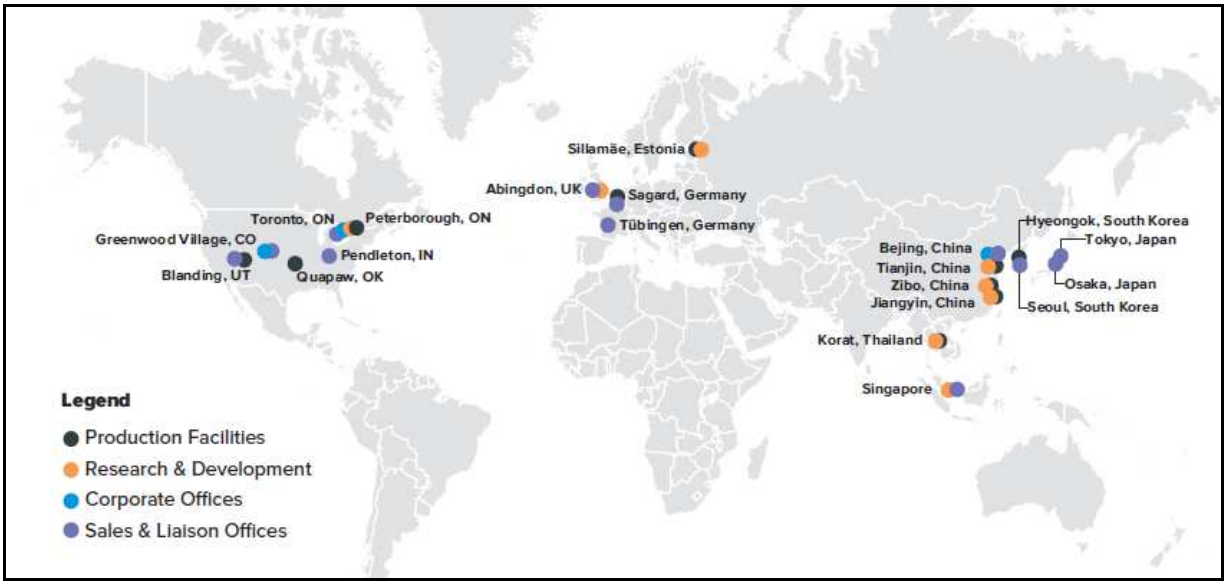
Famous last words….

The Revived Entity

The main business division of the company these days is called Neo Chemicals & Oxides, and it manufactures and distributes a broad range of light and heavy rare earth engineered products. The major rare earth elements produced and sold by the division are Cerium (Ce), Lanthanum (La), Praseodymium (Pr), Neodymium (Nd), Dysprosium (Dy), and Yttrium (Y). The company processes semi-finished light rare earth concentrate and heavy rare earth concentrate into standard- and highly-engineered rare earth oxides and salts.

The main production facilities are in Zibo, Shandong Province, China, and Sillamäe, Estonia, where the company processes light REE concentrates into Ce, La, Nd, and Pr oxides and salts, and produce value-added, engineered mixed oxide products for use in automotive emission-control catalysts, petroleum refining and other chemical catalysts, hybrid and electric vehicles, water purification, and a number of other applications. The Sillamäe plant also manufactures Tantalum (Ta) and Niobium (Nb), among other rare metals.

Neo has a global platform with manufacturing, R&D and sales offices in China, South Korea, Thailand, Japan, Singapore, Germany, Estonia, Canada, U.K. and the U.S.,



The Jiangyin production facility in Jiangsu Province, China, processes heavy REE concentrates into constituent elements for use in a multitude of industrial applications, including high efficiency lighting and displays, high-end optical lenses and consumer electronics.

Neo's business is organized into three operating business segments (Magnequench, C&O and Rare Metals) as well as a corporate segment. Each segment is run on a standalone basis under the leadership of a business segment head. These segments are responsible for their own production, R&D, sales and marketing and raw materials procurement.

Magnequench

The most modern part of the old Molycorp was its Magnequench segment In that it was at the curtting edge of manufacturing of magnetic powders. This was an activity in which it had over thirty years of manufacturing experience, and is the world leader in the production of magnetic powders used in bonded and hot deformed fully-dense NdFeB magnets. These powders are formed through a proprietary process to manufacture Magnequench Powder using a blend of REOs as the primary input.

The powders are used in the production of both bonded and hot deformed NdFeB permanent magnets. Bonded magnets consist of magnetic powder combined with a binding agent, which results in a slight reduction of the magnetic strength of the material, but allows it to be formed into a variety of shapes without further processing. Hot deformed magnets do not require a binding agent, and are instead heated and pressed to form particular sizes and shapes. Approximately 75% of Magnequench's products are used in bonded magnets with the remainder used in hot deformed magnets. Bonded permanent

magnets that are components in automotive motors, micro motors, traction motors, sensors and other applications requiring high levels of magnetic strength, improved performance, and reduced size and weight.

Magnequench produces over 30 grades of its powders, each with specific magnetic properties and performance characteristics demanded by its customers. These increase efficiency and enable reductions in the size and weight of motors relative to iron-based ferrite magnets, which are the most common permanent magnet material. These magnets also allow for net shape pressing, which provides greater flexibility to form a wide variety of shapes and sizes without further processing. These factors allow the manufacture of magnets for applications that require small sizes or complex shapes.

Magnequench has been developing grades of material designed specifically for certain applications by improving the powder's physical or mechanical properties, such as thermal stability. Superior thermal stability is particularly important for magnets subjected to higher than room temperature environments. Such materials maintain their magnetic properties in these relatively high temperatures (such as under the hood of a car) and thus suitable for automotive applications.

In 2016, Magnequench's top 10 customers accounted for over 84% of total segment's sales, with the largest customer accounting for approximately 36%. For example, longstanding customers of the Magnequench segment include Daido Electronics and Shanghai San Huan Magnets Co., Ltd., among others.

Within the ferrite magnet market, Neo primarily competes with TDK Corporation, Hitachi, Ltd. and Beijing General Research Institute of Metals & Metallurgy. Within the sintered magnet market, Neo primarily competes with ShinEstsu Chemical, Hitachi Metals, Ltd. and Beijing SanHuan New Material Hi-Tech, Ltd.

Prior to the expiration of patents protecting the production process of Magnequench Powders in 2014,management believed it accounted for approximately 90% of magnetic powders in the bonded and hot deformed magnetic powder market. Since the expiration those patents, according to management estimates, Magnequench's market share has stabilized at approximately 70 to 75% market share in the bonded NdFeB market. This modest decrease in market share in the face of increased competition post-patent expiration is a testament to the value that customers place on the quality product and technical expertise that Magnequench provides. The remainder of the market is primarily supplied by various Chinese producers. Within the hot deformed and bonded magnet markets, Neo primarily competes with Jiangwu Rare Metals New Material Co. Ltd. and Beijing Sanjili New Materials Co. Ltd.

Chemicals & Oxides

The C&O segment manufactures and distributes a broad range of light and heavy rare earth functional materials for applications such as auto catalysts, consumer electronics, petroleum refining, hybrid and

electric vehicles and wastewater treatment.

C&O separates light rare earth concentrate ("LREC") and heavy rare earth concentrate ("HREC") into standard and highly-engineered rare earth oxides and salts. In addition to the separation business, C&O is focused on using these REEs to produce higher value, engineered functional materials for use in auto catalysts, wastewater treatment and other end market applications.

From Neo's ZAMR and Silmet production facilities at Zibo in China and Sillamäe in Estonia, Neo processes LREC into products such as cerium, lanthanum, neodymium and praseodymium oxides and salts. From these Neo then produces engineered functional mixed oxide products for use in auto catalysts, petroleum refining and other chemical catalysts, magnets, hybrid and electric vehicles, water treatment, and a number of other applications.

Neo's JAMR production facility in China processes HREC into constituent elements for use in a multitude of industrial applications, including multi-layer ceramic capacitors ("MLCC"), high efficiency lighting and displays, high-end optical lenses and consumer electronics.

In 2016, C&O's top 10 customers accounted for approximately 68% of the total C&O segment's sales, with the largest customer accounting for approximately 26%. Longstanding customers include BASF, Umicore, Murata Manufacturing Co., Ltd., the Mitsui group of companies, the Mitsubishi group of companies and Johnson Matthey.

In the rare earth separation market, Neo competes primarily with six state-owned enterprises in China as well as Lynas Corporation Ltd.

In the engineered functional materials market, Neo currently competes in the auto catalyst segment with Rhodia S.A. a division of Solvay S.A.), Magnesium Elektron Ltd. (a division of the Luxfer Group) and Daiichi Kigenso Kagaju Kogyo Co. Ltd. ("DKKK") and in other high value applications with ShinEtsu Chemicals Co., Rhodia and DKKK.

Neo is subject to annual REE separation quotas in China of approximately 1,600 tonnes at ZAMR and 1,200 tonnes at JAMR that provide a degree of vertical integration as they have the ability to purchase and separate rare earth concentrate for their own internal use or to sell to third parties. The balance of the separated REEs can be purchased from a number of alternative suppliers in Russia and China. Neo's ability to produce separated rare earths is contingent upon quotas received from the Chinese government.

Rare Metals

The Rare Metals segment sources, produces, reclaims, refines and markets high value metals and their compounds. These products include both high temperature metals (tantalum, niobium, hafnium and rhenium) and electronic metals (gallium and indium). Applications from products made in this segment primarily include superalloys for jet engines, medical imaging, wireless technologies and LED lighting.

Other applications include their use in flat panel displays, solar, steel additives, batteries and electronics applications.

Rare Metals	Source		Neo Processing		
	Minerals /Ore	Recycled	Extracting / Separate	Upgrade / Purify	Value-Add
High Temperature Metals					
Tantalum	✓	✓	✓		
Niobium	✓		✓		
Hafnium		✓	✓	✓	✓
Rhenium		✓	✓	✓	✓
Electronic Metals					
Gallium		✓	✓	✓	✓
Indium		✓	✓	✓	✓

The Rare Metals segment has six production facilities across three continents in North America (Canada and the U.S.), Europe (Estonia and Germany) and Asia (South Korea).

In 2016, the Rare Metals segment's top 10 customers accounted for over approximately 77% of the total segment's sales, with the largest customer accounting for approximately 43%. For example, longstanding customers include the PCC Group, AXT Inc., Polymer Chemicals, LLC, H.C. Starck and Cannon-Muskegon Corporation.

Location	**Sillamäe Estonia**	**Sagard Germany**	**Blanding Utah**	**Quapaw Oklahoma**	**Peterborough Ontario**	**Hyeongok South Korea**
Type	Refinery	Recycling & Alloy production	Recycling Upgrading Chemicals	Chemicals	Recycling	Chemicals
Products	Nb Ta	Ta REE (metal & salt) Hf compounds	Ga	GaCl3 GaO3 InCl3	Ga In	GaCl3
Nameplate Capacity (Tonnes)	Ta: 78 Nb: 381	Ta: 40 REE (metal): 4 Hf: .25	Recycling Ga: 30 Refining/ Upgrading: 50	GaCl3 GaO3 InCl3	Ga/In: 15-20	GaCl3: 105
Primary Applications	Superalloys Superconductive Wires	Superalloys	Semiconductors	LED lighting Li Batteries	LED lighting Recycled solar Li Batteries	LED Lighting Li Batteries
Employees	235	14	7	12	20	10
Neo - Ownership	100%	50.10%	100%	80%	100%	80%

Silmet Facility

The backstory on this asset is that, at the start of April 2011, Molycorp announced that its wholly owned subsidiary Molycorp Minerals, LLC had acquired a 90.023% in AS Silmet, the Rare Earth processing

company in Estonia. Molycorp acquired 80% of the outstanding shares of AS Silmet from AS Silmet Grupp (which retains a 9.977% ownership interest). Molycorp acquired the other 10.023% from the Austrian company, Treibacher Industrie AG. The value of both transactions was approximately $89 million.

The acquisition provided Molycorp with a European base of operations as well as doubling the company's current Rare Earth production capacity from approximately 3,000 tonnes per year of REO equivalent to 6,000 tonnes. AS Silmet was to begin sourcing its REE feed stocks for production of its products from Molycorp's Mountain Pass, California rare earth mine and processing facility.

The facility's main focus was on the production of rare earth oxides and metals: including didymium metal, a critical component in the manufacture of Neodymium-Iron-Boron permanent rare earth magnets. This was a significant change from the historic supply-source chain of the Silmet facility.

The transaction also expanded Molycorp's manufacturing capabilities beyond Rare Earths into the production of the rare metals Niobium and Tantalum as Silmet was one of the world's leading producers of pure niobium and tantalum metal selling products to customers in Europe, North and South America, Asia, Russia, and other previous Soviet Union countries.

Historical Background

Silmet's REE plant was converted from a former uranium processing plant around 1970 when this was a major uranium producing area of the USSR. The origins go farther back though for the facility was built in 1927 by Swedish investors as an oil shale production plant that was largely destroyed during World War II.

In 1945 the Soviets re-commissioned the facility for uranium processing and enrichment and named it "Factory No. 7". Uranium beneficiation in the Sillamäe metallurgy factory was started in 1948. During the Cold War era the surrounding town of Sillamae was an off-limits area.

From 1947–1952, 270,000 tons of Dictyonema Shale was mined from an area of five hectares from the coastal cliff at nearby Türsamäe. The estimated amount of elementary uranium in the concentrate produced from the Dictyonema Shale was 22.5 tons. The very small yield, less than 0.1%, was a result of primitive technology; consequently a large part of the uranium was left in solid waste. This production was found to be inefficient and the factory switched to other raw materials.

In 1970, the plant started production of Rare Earth and specialty metals products, and uranium processing ceased in 1990 concurrent with the fall of the USSR. The company was privatized in 1997 as Silmet AS. In 2002, Triebacher Industrie AG, the large Austrian REE processor, bought a 25% stake in the company. In 2006, Zimal, a Swiss group bought 50% and the remnant 25% was in the hands of the Estonian-owned Silmet Group.

Zimal S.A., at the time, also controlled a majority of the Revda loparite mine in Russia's Kola Peninsula

and the Solikamsk Magnesium Works. These were major sources of Tantulum and Niobium to the Silmet plant. Rather ironically this transaction seemed to put back in place a vertical integration torn asunder in the breakup of the Soviet Union with the first stage of treatment of the raw material being performed at Solikamsk at Perm in Russia then the pure metals/compounds production is in Sillamäe and in Treibacher AG in Austria.

The Facilities

Silmet's plant (shown below) is one of only two rare earth processing facilities in Europe (the other being Solvay's at La Rochelle in France, that they picked up through their acquisition of Rhodia).

Source: US Embassy, Estonia

This facility consists of various manufacturing, research and administration buildings located on 67 acres of land in Sillamäe, Estonia, approximately 200 kilometres from Tallinn, the Estonian capital. The company employs around 550 people and has three plants: one for REE separation, one for REE production and a metallurgical plant. The plant is organized into 25 divisions, and, under the USSR, had annual capacity to supply 3,000 tonnes of separated LREE products, 700 tonnes of specialty metals (mainly Niobium), and substantial fertilizer and chemical by-products per year.

Silmet's Rare Earth element separation factory, according to the USGS, can produce REE fluorides, hydroxides, oxides, carbonates, and solutions, as well as liquid nitric fertilizers. The specialty metals factory can produce metals, hydroxides, oxides, and ammonium bi-fluoride. The metallurgical factory can produce metallic Niobium and Tantalum chips, metallic powders and hydrides, neodymium metal ingots, neodymium-iron-boron alloys, and *mischmetal* (a mixture of light Rare Earth elements in the proportion contained in the host mineral). Silmet also produces small quantities of "samarium-europium-gadolinium " (SEG) concentrate.

Inputs

As previously mentioned the main input source for the Silmet plant has hitherto been the Revda loparite deposit. The mineral loparite (Ce, Na, Sr, Ca)(Ti, Nb, Ta, Fe+3)O_3 is the principal ore of the light-group rare-earth elements (LREE) in Russia. The complex oxide has a perovskite (ABO_3) structure with coupled substitutions, polymorphism, defect chemistry and a tendency to become metamict. Ore was beneficiated to produce a 95% loparite concentrate containing 30% rare-earth oxides.

Source: Deutsche Welle

At the Solikamsk Magnesium plant the loparite concentrate is refined by either a chlorination process or acid decomposition process to recover Rare Earths, Titanium, Niobium and Tantalum. Rare Earths were separated by solvent extraction and selective precipitation/dissolution. This facility, in the Urals, has annual capacity for 13,000 tons of Loparite from which it produces:

- niobium oxide – up to 855 tons
- tantalum oxide – up to 60 tons

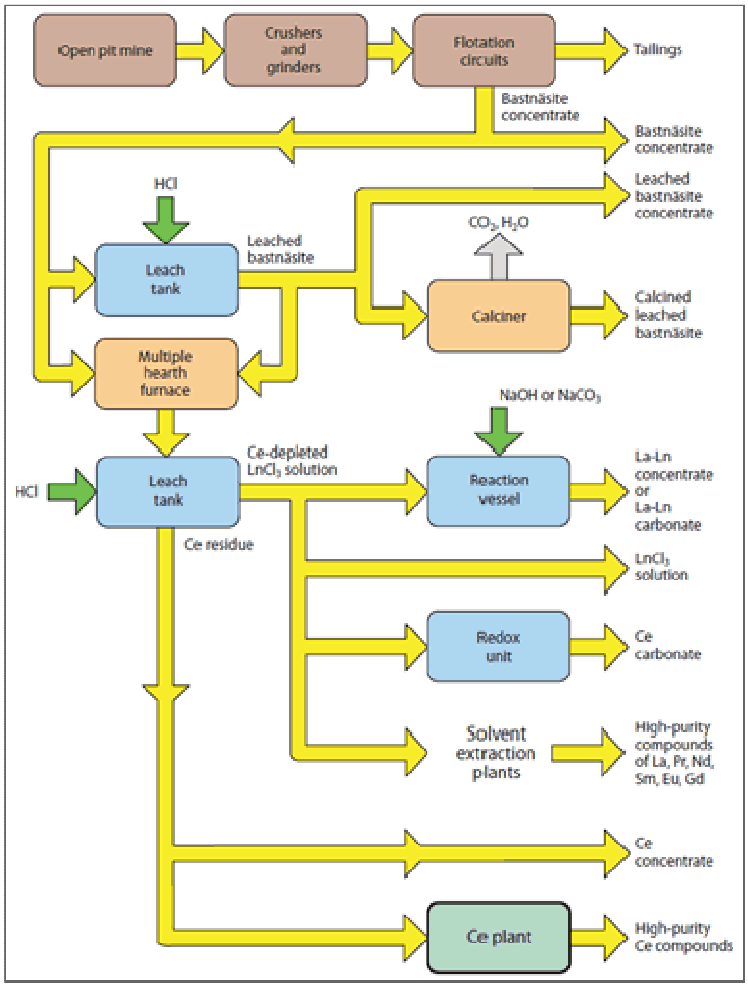
- carbonates and oxides of mixed rare earths – up to 3,600 tons TREO contained
- titanium sponge – up to 2'500 tons, or titanium chemicals – up to 4,350 tons TiO_2 contained

The concentrate is then processed at plants in Russia, Estonia (i.e. Silmet) and Kazakhstan.

In addition to the loparite source, the Silmet plant was sourcing Niobium from the Pitinga mine in Brazil (that country being the dominant source of the world's supply of that metal).

According to USGS numbers, the output of REOs from the Silmet plant has been around 1,100 tonnes per annum prior to Molycorp's appearance on the scene (well below the plant's rated capacity of 3,000 tonnes).

Process



The Silmet facility utilizes nitric acid-based solvent extraction to produce high purity cerium, lanthanum, neodymium, and praseodymium chemical products and "didymium", a mixture of the latter two metals.

The first part of the process begins away from Silmet where the loparite is converted to concentrate. The process is hydrometallurgical ore concentrate processing which consists in grinding the concentrate in order to obtain a grain size of at least 0.075 mm, breaking down the loparite concentrate by nitric acid at atmospheric pressure and a temperature higher than 100 °C, thereby producing a hydrated cake of refractory metals and a nitrate solution of rare-earth elements, filtrating said hydrated cake and subsequent processing of the obtained products. The breaking down is carried out at an initial concentration of nitric acid in a pulp ranging from 300 to 500 g/l, a temperature of 105-110 °C and in the presence of catalysing additives of fluorine.

The mineral is then sent to Silmet's separation plant where each element is separated using an acid or

solvent extraction process. These solvent-extraction processes involve re-immersing processed ore into different chemical solutions in order to separate individual elements. The REEs, however, are so close to each other in terms of atomic weight that each of these processes involve multiple stages to complete the separation process. It is also a fact that one cannot cherry-pick the REE out of the mix so the separation must be sequential and take the good (the expensive and scarce REE) with the bad (the well-nigh mass-market Cerium). Hence the almost mythic "complication" of processing Rare Earths. In some cases it requires hundreds of tanks of different solutions to separate one of the rare earth elements. This sizable undertaking supposedly makes their extraction cost prohibitive for most private mining interests.

Cerium oxide and lanthanum oxide separation is achieved by nearly 300 sequential separation cells (*camaras*). The neodymium and praseodymium products are produced by a similar nitric acid-based solvent extraction process. In this case there are 200 sequential cameras required to achieve the final products.

As the loparite ore experienced reduced availability and the plant was switched to take more bastnaesite ore from Mountain Pass (or elsewhere) then the processes needed to be changed.

It is useful to maybe highlight some of the other methods for REE separation that are, or have been, used. The original process for separating monazite to extract the REE concentrate of its Thorium (which Mountain Pass's output is "rich" in) and lanthanide content was called Acid Opening and involved heating the monazite with sulphuric acid to temperatures between 120 and 150° C. Various versions of the process were used. One caused the thorium to precipitate out as a phosphate, leaving a solution of lanthanide sulfates from which the lanthanides could be removed.

A slightly improved version for separating monazite is called Alkaline Opening. This process uses a hot sodium hydroxide solution at about 140 °C. Alkaline opening allows the thorium phosphate to be recovered as crystalline trisodium phosphate. The remaining lanthanide/thorium hydroxide mixture is treated with hydrochloric acid which creates a liquid solution of lanthanide chlorides, and a sludge made up of thorium hydroxide.

Other processes for separating rare earths include: ion exchange; separation of Scandium, Yttrium and Lanthanum with high-performance centrifugal partition chromatography and S-octyl phenyloxy acetic acid and separation through chloride salt solutions and heptafluorodimethyloctanedione.

The thought that strikes us from the fact that the Silmet REE plant largely runs on technology from the 1980s, if not the 1970s, is the replicability of this plant.

Strategy with Silmet

Molycorp almost immediately began shipping feed stocks from Mountain Pass to be processed into finished products at Silmet. The current status of the loparite mines is unclear as Russia has finally woken up that the initial period of post-USSR development did the country quite a lot of disservice in

loosening its grip on its own REE destiny. Reports indicate that the loparite mines were in the process of abandonment (with the larger of the two mines there being flooded in 2009) which would have left Silmet without an import source had not the Molycorp deal been cut.

Molycorp claimed that the purchase would greatly increase its ability to supply products into the global REE market. It also provided a base from which to supply European customers. Unspoken in all this was the fact that REE processing can be a messy business with high environmental risk and buying an operating facility was probably the easiest way for Molycorp to secure a European presence rather than struggling with permitting in a location that might be more logistically attractive in Western Europe. Neo has now inherited that strategic position.

At Silmet, Neo currently transforms REEs into the whole gamut of Rare Earth products was well as manufacturing Niobium and Tantalum products. As of September 30, 2017, Silmet had nameplate capacity to produce up to 2,500 tonnes of Rare Earth products per year and 459 tonnes of rare metals per year. The main equipment utilized for production at Silmet include electron beam furnaces, shaft furnaces for aluminothermy reduction, rotary tube furnaces, rare metals solvent extraction lines, and various precipitation tanks. NPM Silmet OU, the entity that operates the Silmet facility, is an indirect wholly-owned subsidiary of Neo.

The Accident

On June 9, 2015, Neo's Silmet facility suffered a fire that completely destroyed Building 51 and its operational and production capabilities. Building 51 contained the equipment used to leach the raw materials for tantalum and niobium production. As a result of the fire, Silmet was forced to drastically curtail production of rare metals products for the remainder of 2015, although there was no impact upon Silmet's rare earth production.

In the fourth quarter of 2015, Neo installed equipment that restored approximately 30% of the lost leach capacity, and in 2016 it was able to further increase its leach capacity to approximately 50% of its pre-fire capacity. In September of 2017, Neo completed the installation of additional equipment that is expected to bring its rare metals production capacity back to approximately its full pre-fire capacity by the end of 2017.

Neo is pursuing an insurance claim for the loss of property, the cost of demolition, cleanup, and decontamination, and business interruption losses relating to the 2015 fire at the Sillamäe location. Coverage issues, issues relating to the policies, and the amount of the claim that the Insurers will pay became a subject of discussions. Neo (and its predecessors in interest) were paid two advances of €2,000,000 each, for a total of €4,000,000 after being credited with a deductible of €938,000.

The latest accounts show that the company received around USD$11.4mn in insurance payments during FY18 for this event.

The Supply Chain

It is illustrative of Neo's dependence upon Chinese sourced REE inputs to look at the supply chain of Magnaquench. Its Tianjin facility sources its praseodymium raw material primarily from Chinese rare earth separators, while its Korat, Thailand operation sources material from Silmet and other third parties. The main material sourced from Silmet is neodymium oxide. This oxide must be converted into metal form before it can be utilized by Magnequench. The conversion process is outsourced to a related third party pursuant to a toll processing agreement with GQD Special Material (Thailand) Co. Ltd., a Thai joint venture in which Neo owns a 20% interest, which operates a production facility in Rayong, Thailand. At the Tianjin facility, much of the raw material that goes into the production of Magnequench Powders is stored at its facilities on a consignment basis and purchased as consumed

The Luxfer Deal – A Brief Flirtation

To understand the relative swoon in the company's price in 2019 one has to look back to the debacle of the Luxfer offer.

On the 18th of December 2018 Luxfer Holdings PLC (NYSE: LXFR) announced the signing of a definitive agreement under which Luxfer would acquire Neo Performance Materials for US$612 million in cash and stock. Upon completion of the transaction, shareholders of Neo Performance Materials will receive US$5.98 in cash and 0.395 Luxfer shares for each common share of Neo Performance Materials. Post-transaction, current Luxfer shareholders will own approximately 63% of the combined company on a pro-forma basis. The largest of the Neo Performance shareholders is Oaktree Capital and it will end up with 24% of Luxfer ordinary shares outstanding.

Luxfer is a UK based company despite its NYSE listing and it's businesses are Luxfer Gas Cylinders, Luxfer Graphic Arts, Luxfer Magtech, Luxfer MEL Technologies and Luxfer Superform, have pioneered the use of aluminum, magnesium, zirconium and carbon for over 100 years. Luxfer is a leading producer of highly engineered advanced materials. The high-pressure gas containment devices are used in defense and emergency response, healthcare, transportation, and general industrial settings.

The price for this deal looked pretty low (at around ten time times EBITDA). It would seem that the company was almost being gifted to Luxfer with no premium. The company had nearly US$70mn in cash at the end of September.

With the price at the time around $16.70 the offer was worth around $11 in Luxfer shares. Despite the fact that Luxfer shareholders were ending up with a majority of the merged entity, it was actually Neo that had the higher market cap. Curiously Luxfer had a P/E of 98 times but it also had a dividend yield of 2.5%. However the company had a tough 2017 and the P/E on the trailing twelve months was only 12.5 times. On the 10th of March 2019, the two companies announced their mutual agreement to terminate the proposed merger.

We understand Oaktree did not pay a break fee to Luxfer, but that Luxfer ended up paying Neo's costs.

Neo Performance Materials

USD $mns	FY19e	1Q19	FY18	4Q18	3Q18	2Q18	1Q18	FY17
Revenue	434.000	108.530	454.195	120.331	114.216	110.433	120.185	434.169
Production Costs	309.000	78.389	324.361	81.700	82.607	76.368	83.686	296.648
Depreciation and amortization	9.800	2.410	9.741	2.352	2.404	2.475	2.510	10.101
Gross profit	115.200	27.731	120.093	36.279	29.205	31.590	33.989	127.42
Selling, general and administrative	43.700	7.296	49.948	13.898	10.991	11.913	13.146	63.222
Share-based compensation	3.100	-0.390	3.436	-0.222	1.478	1.090	1.090	6.241
Depreciation and amortization	7.400	1.985	6.978	1.716	1.658	1.722	1.882	7.418
Research and development	11.300	2.601	16.843	3.693	4.188	4.596	4.366	15.714
Operating income	49.700	16.239	42.888	17.194	10.890	12.269	13.505	34.825
Other income/expense	0.657	-0.126	-1.109	0.723	1.859	-3.647	-0.034	1.803
Insurance claim			11.769			11.769		
Finance costs, net	1.100	-1.382	0.649	-0.945	0.128	1.703	-0.237	0.152
Foreign exchange gain (loss)	-0.600	0.093	-0.565	-0.382	-0.249	0.237	-0.171	-0.466
Pre-tax Income	50.857	14.824	53.632	5.620	12.628	22.321	13.063	36.314
Income tax expense	10.171	2.835	12.465	1.948	3.975	3.351	3.191	11.893
Post-tax Income	40.686	11.989	41.139	3.672	8.683	18.97	9.872	25.393
EPS	1.017	0.31	1.02	0.09	0.22	0.48	0.22	0.62
Shares on issue	40.00	39.65	39.921	39.921	39.866	39.866	39.921	39.630

The Latest Results

As can be noted from the earnings table on the previous page, Neo Performance has been bringing in strong earnings results despite the much talked-of malaise in the Rare Earths space. Indeed the company is in quite rude good health. Earnings of $25mn in FY17, were followed in FY18 by $41mn (of which over $11mn was due to the insurance claims) with our expectation for around $40mn in FY19 (unaided by claims).

The only potential problems are a rise in Rare Earth input prices being a weight on margins or in a more extreme scenario a clampdown on Chinese exports reducing the companies field to manoeuvre, thus impacting sales.

This is the prime reason why we would like to see the company ensure its REE inputs through making a strategic investment in the likes of publicly quoted Rainbow (AIM:RBW) or Northern Minerals (ASX:NTU) or another private player like Biolantanidos (in Chile). There is also some logic in doing a deal with Serra Verde in Brazil. Securing the upstream must be a new mantra for the company considering the sizeable cash balance it holds and its strong earnings in recent times.

The EV Revolution and Rare Earths

From 2013 through 2017 Adamas Intelligence estimated that electric mobility and industrial applications were the greatest demand drivers of Dysprosium oxide (via use of Dy-containing NdFeB), followed by wind power, and vehicle accessory motors.

Global REOs Demand by Application

(in tonnes, unless otherwise noted)

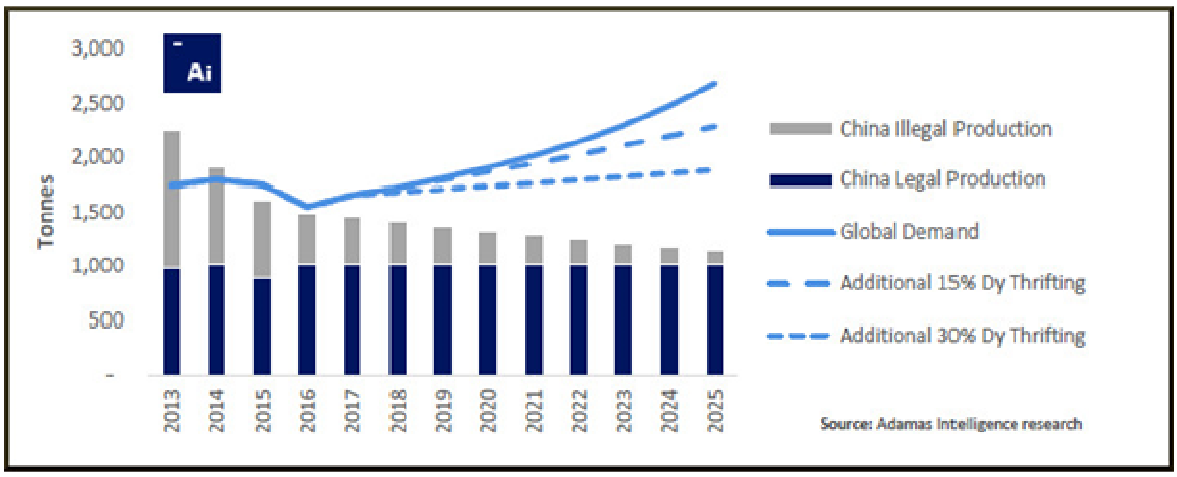
Application	Main REEs	2016	2021	CAGR
Permanent Magnets	**Nd, Pr, Dy, Tb**	**28,400**	**46,000**	**10.1%**
Catalysts	**La, Ce, Pr, Nd**	**29,000**	**37,200**	**5.1%**
Polishing	Ce, La, Pr, Nd, Gd, Er, Ho	14,700	16,400	2.2%
Batteries	La, Ce	10,000	12,300	4.2%
Glass Additives	Ce, La, Pr, Nd, Gd, Er, Ho	9,200	11,300	4.2%
Metallurgy	La, Ce, Pr, Nd, Y	9,700	10,400	1.4%
Ceramics	La, Ce, Pr, Nd, Y, Eu, Gd, Lu, Dy	7,500	9,400	4.6%
Phosphors	Eu, Y, Tb, Nd, Er, Gd (Ce, Pr)	2,800	2,200	(4.7%)
Other	Nd, Pr, Dy, Tb, Eu, Y, La, Lu, Sc, Sm, Gd, Ce, Er	11,900	17,400	7.9%
Total		**123,200**	**162,600**	**5.7%**

Source: Roskill, ibid.

The three magnet metals that will harvest this whirlwind will be Neodymium, Praseodymium and Dysprosium. It is not a guaranteed that these will be available in the quantities required because Mother China is not an inexhaustible supply of these metals. Moreover, just as it is corralling all the Lithium and Cobalt it can get its hands on then why would it continue to be as wasteful as it has been hitherto of its Rare Earth advantage?

Source: Adamas Intelligence

The preceding chart shows a quite alarming decline in REE inventories which has occurred at a time when production is unchanged. Essentially China is selling down inventories to maintain sales. We sense that China's long dominance in the space is showing the signs of the massive overexploitation over the last 30 years and the ONLY remedy is to cut back exports and start stockpiling material before the country becomes as vulnerable to outside forces in REEs as it is in Cobalt. This potentially sets the scene for a supply crunch outside China and no amount of WTO whining and appeals will stop the Chinese halting exports if it is deemed to be in the national interest.



Source: Adamas Intelligence

Prices

The current market cap of the reincarnated company is around half the level it was when the original deal was done. We added the company to the Model Mining Portfolio in the second half of last year. As the chart below shows it had a rocky time from November through to the end of 2018. Then it gapped up in a very curious way.

Risks

The potential risks are:

- That REE prices return to the doldrums
- The company being taken out by a predator before it gets a chance to maximize its value
- Lack of a guaranteed non-Chinese supply source for Neo's operation outside China
- Possible country specific (i.e. US) bans on Neo exports from its Chinese operations
- The West continues to ignore the threat posed by one-country dominance and thus does nothing to foster non-Chinese production

REE prices are still captive to Chinese whims. There seems to be a perception that at least in the more strategic REEs (i.e. not Lanthanum and Cerium) that the Chinese would prefer to see higher prices but they do not want to trigger a rush of wannabes into the space that would threaten their dominance. The REE space has shrunk to a sufficiently small number of players that the Chinese can permit some price increases without triggering a rush of new entrants. Prices could rocket on a trade war induced ban on REE exports from China. This would be good, in helping financing some of the more advanced projects. It would be bad in reactivating some of the "sleeping dogs" of the REE space.

It might be a case of once bitten twice shy on the merger front… or is it twice bitten? We'd rather see the company as predator rather than prey.

As a buyer of Rare Earths from China, Neo could end up caught between the conflicting parties and find its inputs of raw materials challenged, if not halted altogether.

Conclusion

In the chess game of non-Chinese Rare Earths, the Silmet "piece" is at least the King and maybe even the Queen. That Neo holds one of these, plus a swathe of other pieces of lesser power in the game reinforces that the company has strengthened its hold on the space since the first rare Earth boom rather than lost its grip. Molycorp was a challenger and is gone, the La Rochelle plant of Solvay is an important piece but largely sidelined. Neo controls the centre of the board.

Then there is the issue of the Rare Earth space itself. The glacial pace of additions of Western capacity offers no threat of oversupply while the brutal overexploitation of the in-country resources that the Chinese possess promises a declining output and ever thinner grades. In a nutshell, Bayan Obo is not forever. Other areas, such as the ionic clays have been ravaged and it is difficult to see how Chinese production can be sustained, in many cases, with loss-leading exports to the West. With China's mass adoption of the EV it has failed to be noticed that the only difficult-to-source input that China actually has a global dominance in is Rare Earths (for magnets in the motors). Will China continue to fritter away its REE advantage by selling to the West at knockdown prices? We suspect a crunch moment is nearing.

The gaming piece that Neo lacks (and that Neo pre-Molycorp lacked) is a source of supply independent of the Chinese mothership. We can see reasons for standing back from the feeding frenzy of 2009-11, but the logic of not re-entering the fray, now that the REE space is a bargain basement, escapes us. There will be a gaping supply hole if the Chinese decide to pull the plug on "charity" sales of REEs to Western users. The trade war adds extra piquancy, and it happens to coincide with a period that we are calling "Post-Peak Chinese Rare Earths". The Chinese need to conserve their supplies and accumulate offshore sources of REEs for their own contracting supply. Neo needs to guarantee their supplies and this cannot be achieves via cuddling closer to the panda.

With Rare Earths on the cusp of returning to investors focus (even if not investor-frenzy) the most obvious Big Beasts of the space are Neo Performance and Lynas. Lynas is not cheap by any measure while Neo clearly is. How it manages its China-risk is now a key consideration. We added a Long position in Neo Performance to the Model Mining Portfolio in late 2018 and despite the tumble after the failed merger, we reiterate our 12-month target price for the holding is CAD$24.

Important disclosures

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