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Initiation of Coverage

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Manganese X Energy Corp (TSX-V: MN)
Strategy: Long

Key Metrics		
Price (CAD)	\$	0.185
12-Month Target Price (CAD)	\$	0.36
Upside to Target		95%
12 mth high-low		\$0.16-\$0.22
Market Cap (CAD mn)	\$	5.1
Shares Outstanding (millions)		27.5
	Fully Diluted	37.7

Manganese X Energy Corp

Rising Metal in the Battery Space

- + Company has secured the Houlton Woodstock project in New Brunswick that is one of the largest Manganese showings in the North East of the US/Canada on the Maine/New Brunswick border
- + Target market is the Manganese battery space, which is perceived by many as the solution to looming Lithium and Cobalt shortages
- + Manganese usage in batteries is steadily rising and new applications in Lithiated Manganese Dioxide batteries (LMDs) heralds even stronger demand
- + Manganese prices have soared over the last twelve months reaching levels not seen since 2010
- + Electrolytic Manganese (EMM) production outside China is minimal providing an opportunity for Manganese X to become one of the few Western players in EMM
- × Project is early stage therefore priority will be establishing a resource and potential for production
- × Chinese dominate the EMM space and can move the price up (or down) at will

Battle of the Batteries

The shortcomings of Lithium Ion batteries are becoming more and more evident by the day. As if the travails of the Samsung Galaxy Note 7 were not enough there is a rising tide of frustration with the chargeability (or lack thereof) with the most common example of LIBs, namely in mobile phones. With rising usage (in terms of minutes and hours spent online) and ravenous apps continuing to operate even when a phone is not being actively used, the batteries are lasting ever shorter amounts of time and necessitating that users carry back-up power packs or spend their lives in search of “somewhere to plug in”. If this is the future it looks very fraught and grim.

The die has already been cast though with regards to the type of battery that will go into the next few generations of EV and HEVs. It would be too expensive and disruptive for Western car makers to execute a *volte face* away from LiBs. However as applications proliferate so do technologies. Prominent amongst these are batteries utilizing Manganese as a key component.

The main focus in equities markets in the past has been on bulk DSO Manganese and that has mainly been a focus of the Australian and South African markets. Manganese X Energy is, instead, looking to develop the higher-value tech-oriented possibilities of Electrolytic Manganese.

In this note we shall review the developments and strategy at Manganese X and look at the dynamics of the Electrolytic Manganese market and the battery technologies that utilize it.

The Focus Change

In August of 2016, the former Sunset Cove Mining (a graphite play largely dormant since 2013) resolved to switch its focus to work on the recently acquired manganese property and adopted a resolution to authorize a name change to Manganese X Energy Corp. so as to better reflect the new exploration focus it will be undertaking in 2017.

The asset the company intends to pursue is the Houlton Woodstock manganese prospect in New Brunswick. It optioned this property in late June from the project generator, Globex Mining (GMX.to). Manganese X may acquire 100% interest in the property subject to a 3% Gross Metal Royalty by, over a two-year period, making \$200,000 in cash payments (\$100,000 already paid), issuing 4,000,000 post-consolidation shares (2,000,000 obligatory), undertaking an aggregate of at least \$1mn in exploration expenditures and delivering a Preliminary Economic Assessment to Globex on or before the fourth anniversary of the option agreement.

The New Brunswick Department of Natural Resources has awarded a \$40,000 matching grant for an initial exploration program (which is currently underway).

Manganese

Manganese is a chemical element with symbol Mn and atomic number 25. It is not found as a free element in nature; it is often found in combination with iron, and in many minerals. Manganese is a metal with important industrial metal alloy uses, particularly in stainless steels.

Manganese is the world's twelfth most prevalent mineral and is mined in South Africa, Australia, China, Brazil, Gabon, Ukraine, India and Ghana and Kazakhstan. It is the fourth most traded metal with annual production (in 2011) amounting to an estimated 14 million tonnes. As a direct shipping ore (DSO) it has become in recent years almost the exclusive preserve of mega-producers, and smaller players have disappeared. One of the largest players has been BHP-Billiton (with mines in Australia and South Africa) while the largest player in North America is probably Grupo Autlan in Mexico. The BHP Manganese assets (amongst others) were cast adrift in early 2015 when the South32 demerger operation was effected.

Electrolytic Manganese

Manganese scarcely gets a mention in the Canadian markets for several reasons. The main one is that the trade is so dominated by the bulk metal trade that juniors are just not players (or have not been in recent memory) while a secondary factor is that Canada and the US and peculiarly poorly resourced in this metal so if juniors or majors have dabbled it has tended to be those in Australia that have done so.

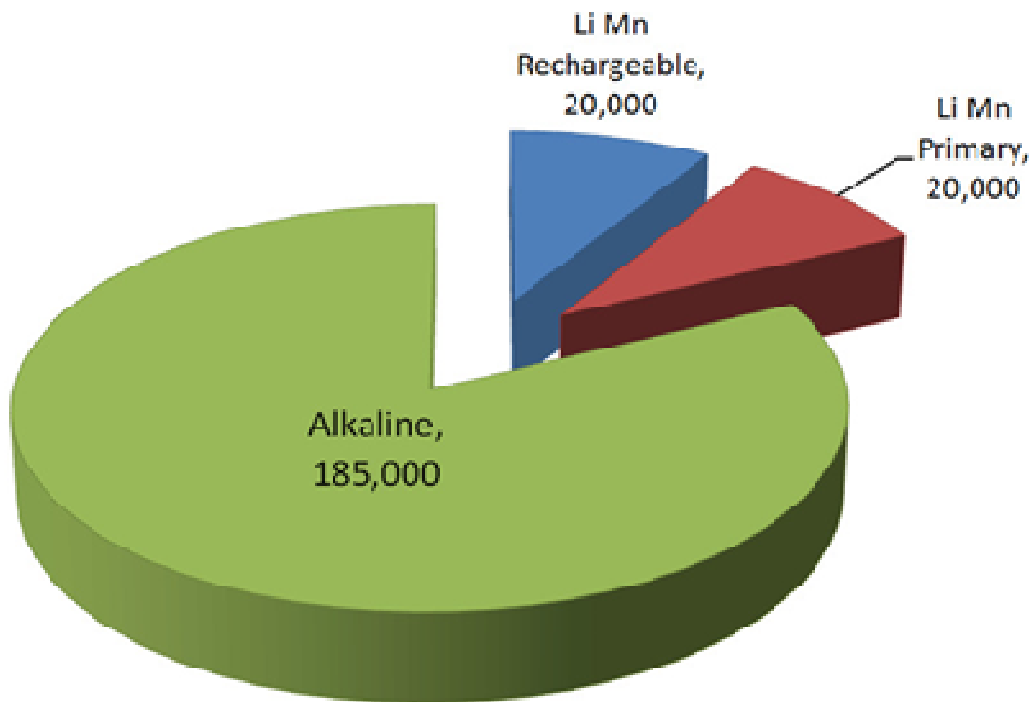
The main application for EMM is in batteries. Another application for EMD is in electrodes for water treatment plants as it separates out the waste from the water. Growing water treatment industry, particularly in Asia Pacific, is anticipated to drive demand over the foreseeable future.

Market specification for EMM is relatively standard across the industry and published pricing data for EMM is based on a typical specification for electrolytic flakes containing greater than 99.7% total manganese.

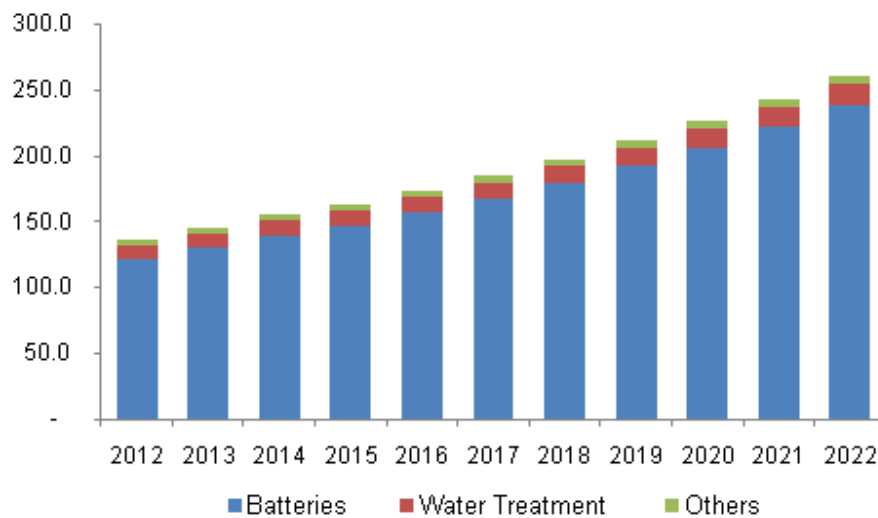
Battery Usage – Covering the Gamut

We should start by noting that manganese is currently employed in that most prosaic of battery formats, the alkaline battery (think AA or AAA). There is nothing new in that but it does provide a constant demand for manganese and has done for over half a century. It is also one in which little effort goes into the recycling of the manganese metal.

The more cutting edge application though is known as the Lithiated Manganese Dioxide (LMD) Battery. The standard mix of LMD used in batteries contains 4% Lithium, 61% manganese and 35% oxygen by atomic weight. The attractions of this format are that LMD has high power output, thermal stability and enhanced safety when compared to other lithium ion battery types. For these reasons LMD batteries are currently being used in the Chevy Volt and Nissan Leaf. Research at the University of Illinois has achieved an advanced prototype battery, using Lithiated Manganese that can be recharged in as little as two minutes (equivalent to filling a gas tank).



Battery consumption of Electrolytic Manganese Dioxide (EMD) has been predicted to be fastest growing segment of manganese production with a CAGR of 5.1% from 2015 to 2022.



Source: Grand View Research

Production of EMD from Manganese Ore

The first step in a conventional production flow sheet for converting manganese oxide ore to alkaline grade electrolytic manganese dioxide (EMD), which is a high purity product that possesses the ‘recipe specific’ electrical characteristics desired by battery makers, is a high temperature pyrometallurgical roast process, wherein the manganese ore is heated to between 800°C and 900°C to reduce it so that it can then be dissolved in hot sulfuric acid.

Production & Consumption

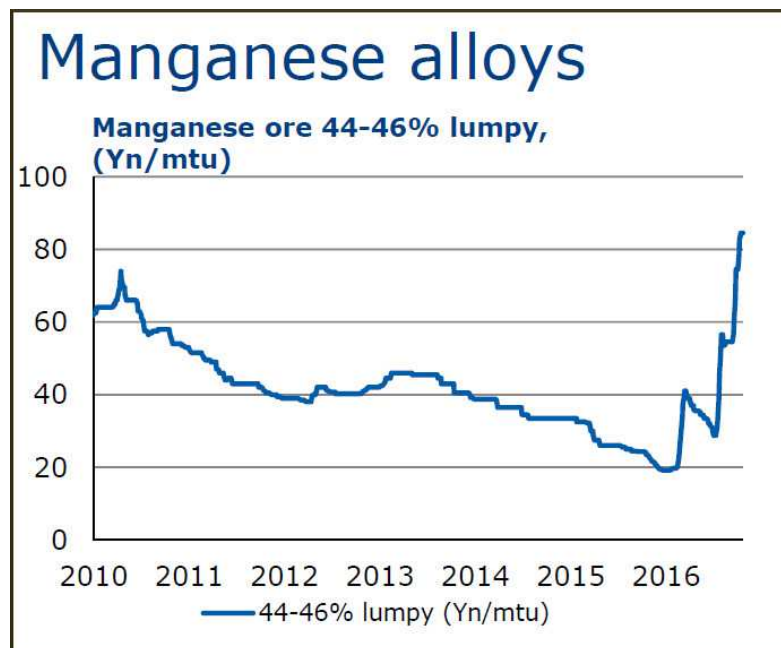
Currently, 100% of the EMM that is consumed in North America and Europe is imported from other countries, most notably from China who controls around 95% of the global supply of EMM (producing around three billion lbs per annum), and from South Africa the only other producer outside of China.

In 2013, Chinese domestic apparent consumption of EMM was reported as 830,000 tonnes per annum and exports of EMM were reported as 210,000 tonnes per annum. If South Africa’s 30,000 t annual production capacity is assumed to have been sold outside of China, the rest-of-world (RoW) demand for EMM in 2013 was estimated at approximately 240,000 tonnes and the global demand as approximately 1.07 mn tonnes.

The USA is the largest consumer of EMD globally at 41%. Currently there is no production of Electrolytic Manganese in North America so the US is entirely dependent upon imported Manganese. For a long while American Manganese (AMY.v) was the great white hope for this mineral in North America but never seemed to get escape velocity and its risibly low grade was ultimately a deal-killer. Interestingly in line with the *zeitgeist*, Manganese X intends to have its value-added production sites in the USA.

The biggest corporate news in the space of late was when Ningxia Tianyuan Manganese in Ningxia Hui Autonomous Region confirmed it had completed construction of a new facility to produce 300,000 tons of EMM per annum. This is slated to increase Tinyuan's total annual production capacity to 800,000 tons, and the monthly production capacity goes up to 60,000 tons from the existing 35,000 tons.

As the company's production volume comprises 1/3 - 1/2 of China's domestic production volume, the impact to the market from this increase in the production capacity is potentially big.



As the chart above shows the Manganese market in DSO ore has soared in 2016 and rather stunningly stands at levels that are the best in at least seven years. This exceeds the years in which iron ore was still a hotly sought asset. Prices for Australian-sourced Mn ore into China are up 314% since January of this year according to Argus Metals. The rationale behind these strong prices is that ore and production cuts are supporting prices. Amongst these developments are:

- South32 idling furnaces at its Metalloys operation
- ARM idled some furnaces
- OFZ Slovakia closed one of its two furnaces
- Delays in new Chinese production, notably in the aforementioned Ningxia Tnyuan facility and also with the 100,000 tpa Chongqing Tycoon expansion and the 40,000 tpa Guizhou Wuling Manganese addition.

Beyond this there remains the potential for further South African price rises driven by electricity price hikes from Eskom. These have been held down by slackness in many other metals where production has been reduced. However with other competing electricity users (e.g. ferrochrome) ramping up again pressure on supplies (and hence energy) should rebound.

Houlton Woodstock

The property covers a significant portion of the known historic manganese-bearing horizon(s) in an area approximately 6.3km northwest of the town of Woodstock, southwestern New Brunswick.

The southern-most portion of the claims is located approximately 5 km west-northwest of town of Woodstock. The USA-Canada border is approximately 12 kilometres west of licence 5816. Route 95, a twinned highway running from Woodstock to connect to the US interstate I-95 highway, is located approximately 3 km south of the claims.

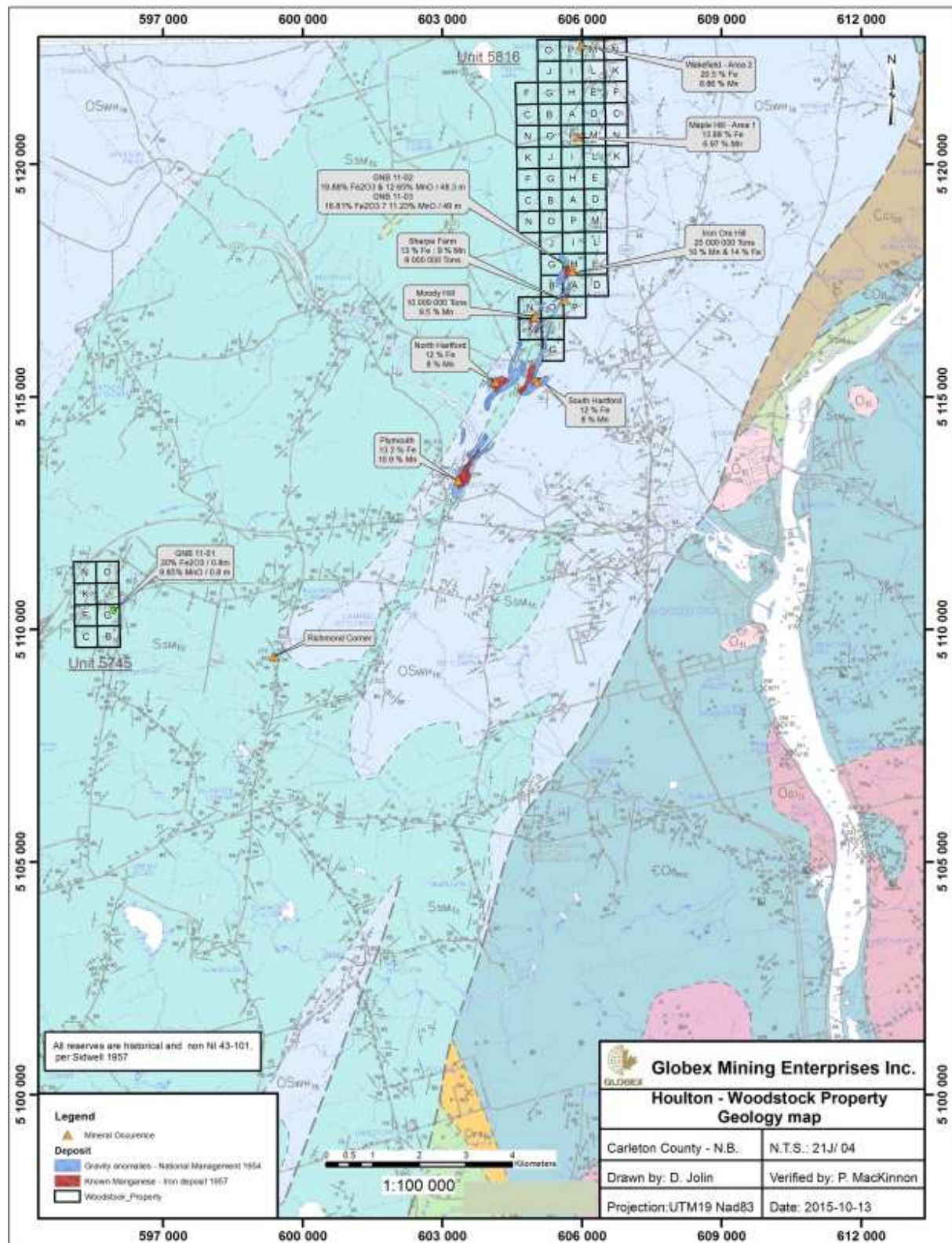
In 2010 Globex Mining Enterprises acquired 100% interest in the 28 claim (880 ha) Houlton Woodstock property by staking. The property currently comprises 63 claims and is held 100% by Globex.

Geology

Iron and manganese are considered to have been deposited from seawater in an oxidizing environment and host strata have subsequently been structurally thickened through folding and faulting related to the Acadian Orogeny (middle to early Late Devonian in age). Some subsequent remobilization of manganese has occurred and resulted in re-deposition of manganese carbonate and oxides in fracture zones.

The regional geology is dominated by the Smyrna Hills Formation of the Perham Group, which consists of shales, silty shales and associated ferro-manganiferous siltstone, calcareous shale and sandstone, limestone and conglomerate. The mineralization occurs in banded iron formation consisting of an interlayered sequence of manganese oxide, manganese-carbonate-silicate oxide shales and silty shales. The manganese-iron mineralization occurs in tightly folded, northeast striking, steeply northwest dipping and plunging lenses that are occasionally overturned. Evidence of the structure is visible at the historic workings at Iron Ore Hill, where some of the rare outcrops occur.

The Woodstock manganiferous banded iron formations (BIFs) are known to be one of the largest Mn resources in North America and were mined as a source of iron from 1848 to 1884. Six major ferromanganiferous bodies were identified by gravimetric surveys (circa 1954). The strike of these BIF's extends from Jacksontown to Plymouth, western New Brunswick, and similar deposits are known to occur nearby in Maine.



Three of the main historic manganese occurrences plus at least two additional showings are located on claims of licence 5816. Starting from the south, the Moody Hill occurrence was reported in 1957 by Sidwell (the area manager of Stratmat, that held the project at that time) to contain an estimated 9,072,000 tonnes, the Sharpe Farm occurrence an estimated 7,257,000 tonnes and the Iron Ore Hill occurrence 22,680,000 tonnes, all of an estimated average grade of 13% iron and 9% manganese. These estimates are obviously not NI43-101 compliant.

North of the Iron Ore Hill occurrence approximately 2 kilometres, the Maple Hill showing is reported to have grades of 13.9% iron and 6.97% manganese. Located a further 1.5 kilometres north of the Maple Hill showing, at the far northern end of licence 5816, the Wakefield Showing is reported to have tested 20.9% iron and 8.86% manganese.

Additionally, the North and South Hartford occurrences, which are located near south end of licence 5816, may be a continuation of the Moody Hill occurrence; however there is little exploration in this area. There appears to have been little or no exploration done in this area with the exception of the 1950s gravity survey.

History

The iron-manganese occurrences in the Woodstock area were first brought to light by Dr. C.T. Jackson in 1836. Two small blast furnaces operated between then and the early 1860's when most activity ceased until the Stratmat began exploration in the early 1950's. To this point, the mining activity was primarily in the Iron Ore Hill area, whereas afterward, the main focus has been around the Plymouth deposit. Exploration was mainly driven by larger gravity anomalies obtained at Plymouth as compared to the rest of the surveyed area. Gravity anomalies were found to extend northwards toward and beyond the Iron Ore Hill occurrence.

Between 1953 and 1957 Stratmat Limited completed 10,370m of drilling (5,300m of which was on the Plymouth occurrence, located several kilometres southwest of Globex's claims). Unfortunately most of the logs of the drilling were not saved, but the aforementioned 1957 report by Sidwell, describes the results of the program.

Most drilling is believed to be located south of the Moody Hill area with several drill holes indicated at Moody Hill and at least two each on the Sharpe Farm and Iron Ore Hill occurrences. From the results of the sparsely laid out gravity survey and the limited drilling, Sidwell calculated approximate tonnage and grades of all of the occurrences previously mentioned.

In 1986 Mineral Resource Research Limited (MRR) did limited drilling, some bulk sampling and a magnetometer survey on the Plymouth Deposit, located south of the Houlton Woodstock Property.

Recent Exploration

In 2010, Globex took seven samples from the old workings at the Iron Ore Hill site and 59 chip samples were taken from outcrop in a ditch running along the road which cuts across the south side of the occurrence. The rock types ranged from a massive, dense, black, semi-metallic rock to a brick red, highly fractured, lighter, slaty material. Manganese values in the chip samples ranged from 0.72% to 26% MnO and iron ranged from 7.74% to 33.4% Fe₂O₃.

In 2011 two diamond drill holes were collared in the area of Iron Ore Hill to test at depth near the historic workings. Sampling from wide intervals of this mineralization returned assays greater than 11% MnO and 16% Fe₂O₃. Manganese is understood to be primarily contained in the mineral rhodochrosite, a carbonate, along with several other minor manganese minerals.



As a result of the considerable widths of iron and manganese-bearing material encountered Globex ordered a magnetometer survey of the claims later in 2011. The geophysical results led to expansion of the Globex property to its current 63 claim configuration. The magnetic survey determined there is a large anomalous region centered roughly on the Iron Ore Hill area and a region of slightly more scattered magnetic anomalies trending to the south-southwest from Iron Ore Hill toward the North Hartford area as well as smaller, weaker anomalies trending to the north-northeast of the Iron Ore Hill area towards the Jacksontown area.

Neighbouring Action

It is important to mention that Minco PLC (AIM:MIO) holds a 100% interest in the similarly named Woodstock EMM project located 5 km west of the town of Woodstock and the junction of the Trans Canada and US I95 Highways. Minco has completed a Preliminary Economic Assessment on the project for a 3,000 tonne per day open pit mining, hydrometallurgical and electrowinning operation, with projected average annual payable production of approximately 80,000 tonnes of electrolytic manganese metal. The capex though was rather eye-watering at over \$800mn.

Board & Management

The Interim CEO and a director is **Martin Kepman** who heads a management consulting firm. He has 34 years of consulting experience in industries ranging from software, softgoods, printing, food to mining.

Roger Dahn, VP of Exploration and a director, has over 30 years' experience in the mining and exploration industry including over 16 years with Noranda and Hemlo Gold Mines, Exploration Manager-Eastern Canada for Battle Mountain Gold and Vice President-Exploration with Olympus Pacific Minerals and most recently Tri-Star Resources plc. He has been involved with a number of base metal and gold discoveries which advanced to development stage and production. He is a registered professional geologist and a Qualified Person. Roger Dahn's brother is Professor Jeff Dahn, from Dalhousie University in Halifax, who is a key advisor under contract to Tesla on Lithium Ion battery development.

Mark Billings has been a director since February 2015. He is the CEO and Chairman of Canamex Resources (CSQ.v). He recently served as a Director and as Senior Vice-President, Corporate Development of Argex Titanium (RGX.to), a company he co-founded in 2007. Prior to founding Argex, he worked from 2004 to 2006 in the Corporate Finance division of Desjardins Securities. He has a BA in Political Science from Carleton University, an MBA from the Harvard Business School and is a CFA.

Steve Roebuck, a director since December 2010 and has over 16 years of mining and exploration experience. He is currently CEO and Director of Natan Resources (NRL.v). His times as a production engineer and production geologist at BHP Billiton's EKATI Diamond Mine provided him with true hands on experience in the design and implementation of exploration and delineation drill programs. He was formerly President of Scorpio Gold Corp from 2012 until 2016 and he was formerly Vice-President Exploration of Advanced Explorations Inc. from 2008 until 2012.

Risks

Amongst the risks at the current time are:

- Manganese price risk
- Chinese price manipulation to the high or low side
- Being superseded by new technologies
- Financing is still tenuous and dependent upon sentiments towards other metals, such as Lithium

and Cobalt

- New Brunswick is a tough jurisdiction with a past history of Greenie/NIMBY issues

With the price for Manganese ore for alloy purposes on a tear that is nearing ten year highs that must be the biggest risk at the current time. The secular growth in battery uses for Electrolytic Manganese seems assured for the foreseeable future and thus any breakthrough mass adoption of LMD battery styles would be an added boost.

The company currently has good relations with New Brunswick and local communities. It seems a sense of reality is finally arriving here as jobs become an over-arching issue.

The Chinese currently have a stranglehold on the EMM space so it will be interesting to see whether they try to earn more from their unique position or sink the price to ensure that interlopers are scared off (as per their actions in the Rare Earth space).

Conclusion

The battery space is a fast moving one these days. The obvious “new” technology is the “plain vanilla” Lithium Ion battery. It is gaining widespread adoption for automobiles but in less standardized applications requiring storage systems that are not necessarily mass produced a plethora of variants on the lithium battery formula are getting traction due to the all too evident shortcomings (particularly on the charging and endurance fronts) for which LiBs are becoming notorious.

Manganese is shrugging off its rather prosaic image as “just” another steel alloy metal and is now being seen in many quarters as one of the rising battery metals. Manganese X is one of the few to have recognized this trend and is seeking to create a source of EMM in the North America where hitherto dependence upon China has been the norm. Also in this mix are the pronouncements of the US president-elect on “making America great again” and one area that this could be achieved would be to achieve “metals” independence in those categories that China has hitherto dominated, with EMD being an obvious candidate for duties and/or punitive action.

This company has identified a niche that potentially steals the thunder of the hard-to-source Cobalt. Therefore we have classified Manganese X Energy as a **Long** call with a twelve-month target of \$0.36.

Tuesday, December 6, 2016



Important disclosures

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