# Lifton with Engdahl of Star Minerals on mine to market manganese batteries

February 5, 2015 – Jack Lifton, the host of **InvestorIntel's *One-on-One*** speaks to Jim Engdahl, Director, President and CEO, of Star Minerals Group Ltd. (CSE: SUV) about the metamorphosis into a mine to market manganese company. Jack and Jim have a long history, and in this ***One-on-One***, they discuss issues relating to manganese as a critical material and how battery companies such as Panasonic lean towards manganese batteries.

**Jack Lifton:** I'm speaking today with Jim Engdahl who is the CEO of Star Minerals. He's in his office in Saskatoon where he's going to tell us what Star Minerals is about and what it wants to accomplish and when that might be. Over to you Jim.

**Jim Engdahl:** Thanks Jack. Well, Star Minerals is a junior company that's been around a long time and it's metamorphosed into different businesses, but when I became the management of the company, the CEO, and Gary Billingsley came on my board it was done with the specific intention of using the public vehicle that Star, as it was called at the time, Star Uranium, to create a public company in which we could in turn develop strategic metals. The start of that– the first was to joint venture to Great West Minerals' project, Hoidas Lake, into that.

**Jack Lifton:** Yes.

**Jim Engdahl:** That's our original plan.

**Jack Lifton:** Okay. What has happened? As we know from battle plans, the minute the battle starts the plan changes. What's

happened since then?

**Jim Engdahl:** Well, market conditions always dictate a lot of those changes, as you know Jack. I think what happened with us is we initially as it turns out commenced a preliminary economic assessment report with Barr Engineering out of Minneapolis, who are very familiar with the Hoidas Lake project. That is in the process right now. Also, as we started moving forward the general markets were terrible in terms of raising capital to really do a whole lot of things and so we were looking towards other ways of thinking out of the box to create some things. Also, we did develop a strategic plan to work towards developing other strategic metals, particularly as it related to the battery world.

The first opportunity that came to us was an opportunity via our engineering group out of Minneapolis and a manganese project in Minnesota and a very exceptional deposit of manganese that the company that owned it before was not their history to be in the mining industry. They spent a lot of money trying to develop it, specifically for some technology purpose. As things developed one of the things that did happen was that they got approached by a company that had developed a new battery technology. That company was OTI out of Vancouver. That particular battery was manganese based. As such, our mine to market model that we've used in the past came into play. That's where Gary and myself decided that this would make a lot of sense to now work towards building a strategic company with strategic metals focused in the battery world and with Hoidas Lake also being clearly one of our prime projects as well for the rare earth sector.

**Jack Lifton:** I've always— As you know, I've always been a supporter of the mine to market concept. In fact, Gary was the first person I knew who ever enunciated that theme, mine to market, and it stuck in my mind for these many years. I think that basically mine to market is a strategy looking for a solution. I'm glad to see that this has expanded beyond the

rare earth space…to access the rest of the interview, click here

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# The Rising Star in the Manganese Battery Space

It seems appropriate having just written on Great Western's recent travails to take a look at the executives that first brought GWG to its initially success before decamping to their new vehicle Star Minerals (CSE: SUV). Nowadays the company is a Saskatoon-based, diversified exploration-stage company, with a primary focus on strategic technology metals. Star Minerals was known as Star Uranium up until October 2013.

In 2013 Star entered into a joint venture on Great Western's rare earth project in Saskatchewan, Hoidas Lake. This we shall discuss briefly a bit further along. Star also holds a gold exploration property in the Seabee gold mining district, diamond properties in the Fort a la Corne region as well as base metal and uranium properties. However the company's direction is now starting to crystallise with a recent deal signaling that Electrolytic Manganese, in a mine to market format, is the mineral the company has decided to pursue.

**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) are shortly going to be cast adrift when the South32 demerger operation is effected.

**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.

More relevance to Star's move is the application 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 Mangansese Dioxide (EMD)

has been predicted to be fastest growing segment of manganese production.

**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.

Despite this the metal does have relevance to the North American economy with the USA being the largest consumer of EMD globally at 41%. Currently there is no production of electrolytic manganese in North America. For a long while American Manganese was the great white hope for this mineral in North America but never seemed to get escape velocity.

**The Recent MOU**

In early December 2014, Star Minerals announced the signing of a Memorandum of Understanding with Cooperative Mineral Resources (CMR) of Brainerd, Minnesota and Octopus Technologies (of Vancouver, BC) to cooperate on developing a mine-to-market manganese-based battery technology. This was a key strategic shift designed to take Star into the business of finding, exploring and developing strategic metal deposits for the battery industry. By implication, as with many others in the REE space, it might be seen as a distancing from that over-crowded sector.

CMR is owned 100% by Crow Wing Power, which is a member-owned electric utility, with the cooperative distributing electricity to 37,000 customers in Cass, Crow Wing and Morrison counties in rural Minnesota.

**The Emily Deposit**

In 2009, CMR began work to advance the development of the Emily Manganese/Iron Ore Project located near Emily, Minnesota on the Cuyuna Iron Range.

Although manganese has been reported at various places in the Emily district, its distribution has not been studied in detail, partly because of the pervasive alteration, partly because of a relatively thick glacial cover, and also partly because the resource was considered to be an extension of that in the better-known North range.

The ultimate goal of the project is to supply electrolytic manganese metal to the steel industry and electrolytic manganese dioxide to the battery industry. CMR has undertaken extensive work including exploration core drilling, bulk sampling at Emily and mineralogical and metallurgical testing at recognized analytical laboratories, and has been successful in producing EMM and EMD from samples taken at Emily.

In May 2013, Barr Engineering of Minneapolis completed a report entitled “Mineral Resource Report on the Emily Manganese Project Minnesota” compiling historic and modern data from the CMR work to produce an historic estimate of manganese mineralization at the Emily deposit. The Barr estimate incorporates drilling results from three separate drilling programs; the first from October 1945 to June 1950, the second in September and October 2011, and the third in October and November 2012 for a total of 20 drill holes totaling 8,861 feet.

Based on the report, the deposit ranges from:

- 4 billion pounds of contained manganese grading at 16.48% Mn at a cut-off grade of 10% Mn
- to 2.2 billion pounds of contained manganese grading at

9.2% Mn at a cut-off grade of 1% Mn

Star and CMR intend to enter into an agreement forming a joint venture to develop the Emily deposit dependent upon proof of the project’s technical and economic viability.

**The Offtakers**

OTI is an energy storage company which has developed a smaller, lighter battery that significantly reduces the cost of energy storage and is suited for backup/standby power applications and smart grid management systems. OTI is in a strategic partnership with Kemetco Research in building the prototype battery for testing and certification. Kemetco also specializes in extractive metallurgy and chemical processing and has done extensive work for CMR on manganese metallurgy.

The initial focus will be to produce EMD to be sold to OTI in an offtake agreement between OTI and the CMR/Star JV (though terms are yet to be established. OTI has in turn completed and signed a sales distribution agreement, for their storage battery, with a significant global player in this market. The time frame of all this is quite short as CMR and Star intend to complete and sign the JV agreement by the end of February 2015 with OTI and the JV having signed their offtake agreement by the same date. OTI will have provided details of the sales agreement between themselves and the significant distributor by the end of February 2015. Of ourse with so many parties there is always the potential for slip-up in coordinating the sequence of final deals. Amongst the potential pitfalls are that Kemetco and OTI must come to an agreement on completing the test facility for their battery plant and final terms need to be agreed between Kemetco and the JV to build the test facility to produce EMD.

**A Few Words of Hoidas Lake**

The Hoidas Lake project in northern Saskatchewan is made up of 14 mineral claims, totaling about 12,490 hectares. The deposit

has, according to Star, one of the highest proportions of neodymium (Nd) present in any known rare earth deposit and this element is of particular strategic importance to the permanent magnet industry. The Measured and Indicated resource for Hoidas Lake amounts to around 50,000 tonnes of contained TREE grading at 2.027% by weight.

Back in October 2013 Great Western Minerals signed an option and joint venture agreement with Star for the Hoidas Lake project, executing on a preliminary deal inked back in June 2013.

Under the terms of the deal, Star was given the option to acquire a 51% stake in the property, separated into two tranches. The first option would give Star a 25% interest, and is contingent on the company completing an NI 43-101 compliant preliminary economic assessment at the project within two years. In March 2014 Star engaged Barr Engineering to complete the required PEA report however this has yet to be released.

The additional option, for the remaining 26%, is dependent on Star finishing a feasibility study during a four year period after exercising the first option.

**Conclusion**

The management team at Star are undertaking the increasingly common task these days of “turning the supertanker” with a morphing from a Rare Earths company into a manganese (and technology metals) company. At least the Hoidas Lake REE asset is not one that is too advanced or that has had too much effort expended upon it. It can sit in the freezer a bit longer without too much harm being done.

With American Manganese preserved in aspic there was a space for a North American producer of Manganese (particularly Electrolytic Manganese) and Star have clear decided to move into the space elbowing AMY to the side. Management at Star must also be breathing a sigh of relief at moving into a metal

where the metallurgy is an order of magnitude simpler than the REE space they have left behind.

The move on the Emily property ticks the boxes on the torturous path to reestablishing domestic US sources of production in a swathe of strategic metals that have fallen into a state of neglect due to expediency. At least the Star crew will not have to surf the mosh-pit of wannabes that crowded them out of the Rare Earth space. EMD is a much sparser populated space. The coming month should see some of the technical accords and JVs of the various parties involve start to slot into place and then the Spring should see work on Emily kick up to verify its potential for mining.

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# Good ZEN and high DVR performance not enough to drive graphite sector in October

**Graphite Market Review – Zenyatta Ventures** ('Zenyatta', TSXV: ZEN | OTCQX: ZENYF) was one of the few graphite companies to experience some 'ZEN' in October, gaining 16.58% in Toronto and 15.18% at the OTCQX. Zenyatta can boast a graphite deposit that is entirely different than the vast majority of its competitors, which have flake graphite. Its geological formation, through igneous hydrothermal processes, accounts for a superior purity and crystallinity. The Albany project, located in northern Ontario, is the largest & only, "high purity' hydrothermal graphite deposit being developed in the

world. The important and simple fact that investors should consider is that the Albany deposit has been proven to present a very high carbon graphitic content, which means the graphite is pure enough to compete with synthetic varieties. Zenyatta's target customers are precisely the ones, who, until recently, had no alternative to synthetic graphite. There are incentives to switch from oil based synthetic graphite to naturally occurring graphite of Zenyatta's caliber. The processing has delivered a nice high-grade, pure product with minimal cost and minimal detrimental environmental effects. The synthetic graphite market accounts for a potential USD$ 13 billion-dollar market.

Zenyatta's strong performance contrasts sharply with that of the other graphite companies tracked by InvestorIntel. Market performance was decidedly down, registering an average drop of 9.08% versus InvestorIntel graphite members that were barely down 2.43%. Tracy requested I mention this as she insists an online media presence makes a difference, and allow us to welcome **Northern Graphite Corp.** whose OTCBB: NGPHF – one of the few graphite companies to move upward +2.69% last week.

Speaking of new members, allow me to welcome **Deveron Resources Ltd.** (TSXV: DVR) who became an InvestorIntel member in the last 2 weeks. DVR gained an impressive 54.55%, staring the month at CAD$ 0.11 and ending at CAD$ 0.17, after announcing that they had officially entered the graphite and zinc market with a targeted acquisition with a high grade deposit.

The Graphite space features in most respects companies that are operating in politically stable locations with access to acceptable to excellent infrastructure. Most of the graphite companies covered by InvestorIntel, moreover, have shown wise management, while just about every deposit seems able to quench the need for a stable and high quality graphite supply, capable of being used in technology ranging from Li-Ion battery anodes to graphene.

The biggest winners for the month ending on October 31, 2014 were, apart from Zenyatta and Deveron, Strategic Energy Resources Ltd. (ASX: SER) which gained 6.45%, Lomiko Metals (TSX: LMR | OTCQX: LMRMF) which gained 19% in OTCQX trading and **Discovery Africa** (ASX: DAF) gained 9.52%.

This said, there were several companies that saw equally impressive negative numbers (see below chart). Whereas the graphite sector's market performance in the previous months and weeks might best be characterized as 'mixed', October was decidedly less optimistic. Yet many of the companies announced positive developments. For instance, **Alabama Graphite** announced that it has completed ground geophysical surveys at its prior producing Bama Mine Graphite Project, starting exploration in additional zones at the Coosa Project in Alabama. The two projects encompass over 43,000 acres and are located in an area with significant historical production of crystalline flake graphite. The Company has the largest NI 43-101 indicated flake graphite resource in the United States based on drilling 0.18 square miles (0.3% of the total acreage). The Alabama deposits are unique in that a significant portion of the graphite-bearing material is oxidized and has been broken down into an extremely soft rock, which suggests that operation al costs from mining to grinding should be lower than average.

In addition to the good news Christopher Ecclestone initiated coverage on Alabama Graphite and then selected it as one-of-five most likely to prosper. Undoubtedly the exercise of warrants is responsible for the downward pressure on the stock in October, however – TSXV: ALP was up +5.26% and OTCQB: ABGPF was up +4.17% last week.

On October 21st, **Triton Minerals Limited** (ASX: TON), which also suffered from downward pressure – presented its maiden JORC compliant resource estimate for the Nicanda Hill graphite deposit at the Balama North project in Mozambique. The total Mineral Resource estimate comprises 1,457 million tons at an

average grade of 10.7% Total Graphitic Carbon “TGC” and 0.27% vanadium classified as either Inferred Mineral Resources or Indicated Mineral Resources. 328 Mt were classified at 11.0% TGC and 0.26% vanadium and 1,129 Mt were classified at 10.6% TGC and 0.27% vanadium. Triton claims it now has the single largest known graphite deposit in the world as well as one of the largest vanadium deposits. Click here to access the interview on how Triton’s Nicanda Hill is the largest graphite and vanadium deposit in the world.

**Elcora Resources Corp**. (TSXV: ERA) reported that metallurgical tests are being conducted by SGS Canada Inc. to determine the preferred processing circuit for the graphite from the Company’s Sakura mine site in Sri Lanka. Elcora aims to produce premium graphite and graphene through a vertically integrated business strategy and announced a name change to focus on the Graphene revolution…and added Jack Lifton to the Advisory Board last week….

**Mason Graphite**, which had some positive share price movement earlier in October, reported the second batch of assay results from the 2013-2014 drilling program at its Lac Guéret project in northeastern Quebec. Mason said that the results confirmed the continuity of the mineralization within the GC zone while the graphite grades continue to be very high, confirming the high value potential of the Lac Guéret property.

Australian based **Valence Industries Ltd**., which saw its shares drop 8.89%, announced it has discovered a new and unique flake graphite deposit zone with intercepts exceeding 60% graphitic carbon. The discovery improves the economics of Valence’s Uley operation thanks to the presence of high quality arterial flake graphite, which is located close to the surface presenting grades exceeding 60%+ graphitic carbon (gC). **Lomiko Metals**, which as noted above had a mixed performance, gaining in OTC trading and losing in Toronto, announced that it has received the drilling permit for the its La Loutre Crystalline Flake Graphite Property. Lomiko has targeted La Loutre,

expecting to find high-grade, near-surface graphite mineralization suitable for conversion to battery-grade graphite. Mason Graphite, meanwhile, opened a pilot plant test for the Lac Guéret graphite project at COREM's research facility in Quebec City to test a bulk sample of approximately 60 tonnes of graphite mineralization obtained from the Lac Guéret property, featuring an average sample grade of 29.1% Cg. **Focus Graphite Inc.** (TSXV: FMS | OTCQX: FCSMF) announced that significant widths of graphitic mineralization ranging from 95 to 110 meters in thickness were intersected in a new zone at its wholly owned Lac Tétépisca Project southwest of the Manicouagan reservoir in Québec, comparing favourably with the mineral derived at the Lac Knife graphite deposit.

**Conclusion**

Overall, therefore, the graphite sector was very active in October as the graphite miners explored new areas, confirming or adding new sources of high grade materials suitable for the high end applications that have made graphite such a coveted material in the high technology sector. The market performance of many graphite companies, most of which are based in North America – with few exceptions in Madagascar, Mozambique or Australia, appears to fly in the face of the fact that the resumption of graphite mining in North America serves as a way for North America to rebuild internal supply lines for critical materials such as graphite.

***Note from the Publisher:*** Graphite interest continued to outperform other sectors last month, with 7 of our Top 15 most read articles in October being composed about graphite.

1. Liquid Metal Batteries – An Impending Deluge? – Christopher Ecclestone
2. Hostilities between China and Japan heat up in the American Courtroom over Patents – Jack Lifton
3. Hykawy's Focus on Focus: Through a Mining Lens – Jon Hykawy

4. Uranium Stocks Remain Near 52-Week Lows Despite Bounce in Spot Price – Peter Epstein
5. Graphite stocks down 3rd week in a row, fundamentals be damned – Peter Epstein
6. The Rare Earth Market Evolves – Jon Hykawy
7. Confidence of Lynas's financiers to signal a more profitable change for the rare earths sector? – Alessandro Bruno
8. Triton Minerals Beats All Expectations with Maiden JORC Resource – Peter Epstein
9. The Tesla Beauty Contest – Alessandro Bruno
10. Graphite Market Review: China's exports of graphite to decline markedly – Peter Epstein
11. Chinese authority launches new special campaign to fight illegal rare earths – Hongpo Shen
12. Graphite Market Review: Mixed performance despite a lot of good news – Peter Epstein
13. Seismic Shift in the Niobium Space – Christopher Ecclestone
14. Strong graphite market news flow sets the pace for a market turnaround – Peter Epstein
15. Potash is the new safe haven sector to hedge against market volatility – Alessandro Bruno

Graphite Market Review is a special weekly feature on InvestorIntel sponsored by Alabama Graphite Corp. (TSXV: ALP | OTCQX: ABGPF) and is written by US Analyst, Peter Epstein. – See more at: https://investorintel.com/graphite-graphene-intel/graphite-market-review-positive-week-stocks/#sthash.OF58rc2U.dpuf