Appia adds another rare earths project to their portfolio, this time in Brazil

written by InvestorNews | July 5, 2023

Appia has now grown to own (including the 70% agreement to acquire the PCH Project) four significant rare earths/uranium projects globally. The very high grade Alces Lakes continues to be the flagship but now the new Brazil Project adds further to their portfolio. It also gives Appia a chance to significantly accelerate towards being a global rare earths producer at some point in the future.

A Tale of Two Critical Mineral (Rare Earths) Markets, the Subsidized and the Unsubsidized

written by Jack Lifton | July 5, 2023

The twenty-first century began with an unprecedented (outside of war) mammoth growth of demand for the ores of the structural metals (a/k/a base metals, such as iron, aluminum, copper and the alloying elements for steels). Brazilian, Australian, and Indian iron ore miners whose American, Japanese, and European markets had matured were thrilled. Chile, Jamaica, Africa, and

Polynesia prospered. China, the source of the new demand, just grew and grew into the world's newest manufacturing center.

The ironically named "progressives" of the West are those who think that progress is attainable only under a benevolent central government run by elites dedicated to prosperity for all. Of course, this definition makes the logical error of self-reference, progress is whatever the progressives say it is. The simple fact that progress, defined as an uplifting of all, is only possible through wealth creation and its wide distribution and that, by far, the best system for doing this, so far created, has been free market capitalism, has been rejected by the self-serving "elites" who today hold elective office and control the permanent civil services of the West.

The fact that today's Western elites consider only themselves, their narrow clique, worthy of defining, being the beneficiaries of, and promoting progress has not escaped the attention of the 90% of the world that does not live in the United States or Europe.

In the nineteenth and twentieth centuries, the use of military power by European states was after the World Wars followed by the economic domination of the United States to continue to guarantee the flow of cheap mineral resources to the self-serving progressive fantasists of the West. That era is closing. The revolt against their exclusion, first by the Germans and the Japanese, was to mimic the imperial style of Britain and France. This failed in both instances as did the similar Russian (Soviet) attempt, but they bought the United States a century of world domination. This era is now closing as the progressive fantasists have destroyed its ability to create and fairly distribute wealth.

For the last generation the financializers who replaced the

engineers as CEOs of American and European OEMs have moved the majority of manufacturing off-shore and witlessly (not unwittingly) caused the metals processing and fabricating industries to relocate closer to their raw material sourcing and new end-users. This second move, of the minerals and metals processing industry, perhaps even more than the move of the OEMs, was an unintended gift to a China that no one foresaw as a global industrial powerhouse aborning.

The perspective of necessary time must be examined to understand the deleterious effect of Western financialization on commodity production and pricing. There is an excellent example of this in the attempt to “reshore” a total rare earth permanent magnet supply chain.

The massive Chinese dominance in the total supply chain to produce rare earth permanent magnets did not occur overnight, and it will not and cannot be rectified (in the sense of being made irrelevant) in any short period of time. By which I mean years. In fact, China controls the market for rare earth permanent magnets, because it first built or acquired control over the overwhelming majority of rare earth minerals on this planet. This occurred simultaneously with the West giving over to China the technology to separate the mixed rare earths extracted from the ore into individual rare earth compounds. This was followed by the technology to make rare earth metals, alloys, and permanent magnets. This overall agenda, supported by the building, in China, of a strong and focused educational system to support a world-class technologically advanced nation, has established in China a, long-term, holistic approach to acquiring, developing, supporting the mass production of, and deploying state-of-the-art technology to its people for the last 25 years. What does this mean for the West?

An example of the approach taken by America, the former leader,

in technology and its deployment is illustrative: There are two separate domestic (North) American markets for rare earth permanent magnet (REPM) enabled devices; the military and the civilian. Dishonest attempts at promoting and marketing rare earth projects to investors have confused not only the low information “journalists” who cover this story but also the self-designated rare earth experts, in particular the ones who refer to their work as “intelligence.”

The military “need’ for REPMs can be defined very simply. The lighter the weight of the components of a weapons system the larger can be the weight of the explosives in the weapons. Rare earth permanent magnet motors (REPMMs), are also, by weight, the most efficient converters of electricity to mechanical motion of all types of electric motors. Thus a warship whose propeller shaft is the rotor of a large electric motor is easier to maintain than one that is the end of a gear train from an immense diesel engine. Better to use the diesel engine to generate the electricity for the drive motor and have (lithium-ion) batteries for backup during diesel engine service or in case of breakdowns. And what about those electromagnetic catapults on an aircraft carrier? REPMMs are a lot easier to maintain than AC motors and a battery backup can save an expensive aircraft and its pilot’s life in an emergency where the electricity supply from the reactor/generator is interrupted. And the fin actuators on a “smart” bomb… The actual demand for REPMMs by the U.S. military is classified, but in 2013 it wasn’t, and the number bandied about then was 1000 mt/year. The coming into service of new stealth fighters and direct electric propulsion ships and electromagnetic catapults since then has surely increased the demand for REPMMs by the military. Let’s say then that it must be 3000 tpa by now. Oh, and I forgot to mention all of these active military uses for REPMMs in extreme conditions mean that they run hot. This means

they must be of the type that uses the very rare rare earths, dysprosium and terbium, as well as the even rarer metal, gallium, in their construction. As of this writing 100 percent of the world's supply of Dy and Tb is processed in China.

Now let's look at the North American civilian market for REPMMs. An internal combustion, fossil fueled vehicle produced in North America today has between 25 and 50 micromotors. All of which are REPMMs. The total demand for REPMs to construct these motors is 0.5kg/vehicle. Even so, in a typical model year, the domestic American OEM automotive industry uses 8,500 mt of REPMs. But now, a major change is in the wind. A drive motor for a battery powered electric vehicle, if it is of the REPMM type, uses 2.5 kg of REPM! Thus each BEV that uses a REPMM for traction (drive) requires 5-10x the amount of REPM that an entire ICE powered vehicle requires!!

What began as a financial system to maximize profits has now created a dual market in critical minerals, the Chinese and the Rest of the World, (C+ROW). The financializers, their work done and rolling in the profits of their selfish misdeeds have now returned the problem of the security of supply chains back to the engineers. The dual commodity markets though will sharply reduce profits and the West's capital is in the hands of those whose only interest is in the accumulation of money not the creation of wealth.

The military can pretend that increased prices for the support of domestic self-sufficiency don't matter by subsidizing the military-industrial complex with "cost-plus" awards. The consumer economy does not have that luxury.

The latest existential crisis (the first such crisis was the ancient fear of God's wrath by floods), "climate change," has now pitched this dual commodity pricing problem to the

forefront.

There is not enough of the critical metals for EV batteries and drive motors, not already under the control of China, to convert the global fleet of ICE vehicles to battery electric operation. Nor can there ever be.

China, alone, is and will remain self-sufficient in the critical metals necessary to convert its domestic ICE fleet to BEV operation and to produce enough stationary storage to be able to convert a large part of its domestic energy production by intermittent sources, wind and solar, to reliable maintenance of the grid.

The ROW (rest of the world), if it adopts the mandates of the Green Revolution, will have to choose winners and losers. There can be enough lithium, neodymium, praseodymium, dysprosium, and terbium produced outside of the control of China for some countries to achieve a significant fraction of their electricity by non-fossil fuel methods and the conversion of some of their transportation to electric operation. But those countries will have to together or individually create markets for the production and processing of those metals independent of Chinese control and pricing. This means permanent subsidies to miners, refiners, fabricators, and consumer and military product manufacturers. This means a lowering of living standards to pay for the subsidies.

Perhaps it’s time to rethink the Green New Deal. Are the consequences worth the decline of the West? Is climate variation really an existential crisis? And, how much longer can we ignore 90% of the world’s population that has most of the critical minerals we need within their control??

Jack Lifton on Appia Rare Earths' Brazilian Acquisition and the Critical Minerals Institute Summit

written by InvestorNews | July 5, 2023

In this InvestorIntel interview, Tracy Weslosky talks with Critical Minerals Institute's (CMI) Co-Chairman Jack Lifton about why Appia Rare Earths & Uranium Corp.'s (CSE: API | OTCQX: APAAF) acquisition of a Brazilian rare earths ionic clay project, if finalized, will be an "intelligent vertical integration by Appia."

Speaking about Appia's Alces Lake Project as a "premier deposit of neodymium-rich monazite in North America," Jack explains how the new Brazilian project will be synergistic with the Alces Lake Project. Jack discusses how the new Brazilian project can be a low radiation source of critical heavy rare earths such as dysprosium and terbium.

Speaking about the upcoming Critical Minerals Institute Summit II (CMI Summit II) to be held in Toronto on June 14-15, 2023, Jack discusses that he intends to address if the North American industry can become self-sufficient in critical minerals. He goes on to discuss how the shortage of experienced competent mining engineers, in some ways, is a bigger problem for the Western world than the supply of critical minerals.

To access the full episode, click here.

Subscribe to the InvestorIntel YouTube channel by clicking here.

About The Critical Minerals Institute

The **Critical Minerals Institute** or **CMI** is an international organization for critical mineral companies and professionals focused on battery and technology materials, defense metals, and ESG technologies in the EV market. Offering a wide range of B2B service solutions, the **Critical Minerals Institute** hosts both online and in-person events designed for education, collaboration, and service solutions that address critical mineral challenges for a decarbonized economy.

To learn more about The Critical Minerals Institute, click here.

Can the Global Automotive Industry Source Enough Critical Minerals to Meet EV Production by 2030?

written by Jack Lifton | July 5, 2023

American President, Joe Biden, has decreed, and the U.S. Congress has mandated, that, by 2030, 50% of new domestic American OEM automotive production must be of electric vehicles (EVs). Further, the U.S. government now requires by law that, by 2028, for a new EV purchaser to receive a tax credit of up to $12,500, then 80% of the vehicle's components must have been made in the United States from raw materials produced and

processed in the United States.

American OEM automakers are losing money hand-over-fist on making and selling EVs. Ironically, it is their profits from internal combustion engine (ICE) vehicles that are keeping them afloat. Without subsidies, also known as “tax credits,” no one could continue to make and sell EVs. And, quite frankly, without ICEs, Tesla could not afford to be in the EV business. The supply chains for universal automotive components used both by ICEs and EVs could not exist without the scale and sales of the ICE industry.

Sourcing Critical Minerals for EV production

I think that the idealogues, both elected and unelected, in North America and Europe need to answer some questions. Today I am asking, “How does the global non-Chinese OEM automotive industry plan to source enough critical minerals and metals, annually, to meet government-mandated, not market-driven goals for the production of EVs by 2030?

In the following discussion, I’m going to limit myself to the critical minerals and materials needed for the production of EVs just in the United States. Keep in mind that American domestic OEM automotive production is just 10% of the global annual total production.

The domestic American OEM automotive assembly industry most of which is owned and operated by foreign-owned manufacturers is building today, in North America, at least nine new factories to construct lithium-ion batteries for EVs. In addition, a half dozen EV drive train factories and a dozen assembly plants will be built or converted to pure EV production by the end of this decade.

Calculating the amount of Critical Minerals needed

The figures below are averages used in a variety of lithium-ion types. The only constants are for lithium and graphite, which are calculated for a 100 kWh Tesla battery no matter what the cathode chemistry.

The figures for material usage for rare earth permanent magnets are for one drive motor. American cars typically use two.

For the battery:

Material/Metal	Usage per BEV	For 7,500,000 EVs
Lithium (no matter which chemistry)	6-8 kg (measured as metal)	45-60,000 metric tonnes
Nickel	40 kg	300,000 metric tonnes
Cobalt	12.5 kg	93,750 metric tonnes
Manganese	24.5 kg	183,750 metric tonnes
Copper	53 kg	397,500 metric tonnes
Graphite	66 kg	495,000 metric tonnes

For the drive motor and the 25 accessory micro-motors:

Neodymium / praseodymium (75:25)	1.5 kg	56,250 metric tonnes
Dysprosium	0.05 kg	562 metric tonnes
Terbium	0.01 kg	112 metric tonnes
Gallium	tbd	

Note that the amounts above are annual needs for 50% of projected American domestic production using a production number baseline of 15,000,000 vehicles per year, which is more than 2022 production and sales but far less than the 21st-century

average.

The material usage per vehicle comes from the most recent estimates of the International Energy Association (“IEA”).

Finally, note that the amount of lithium required, up to 60,000 tonnes, measured as metal, is equal to 360,000 tonnes, measured as lithium carbonate equivalent (LCE), which is more than half of the global production of LCE in 2022!

Assuming that 50% of global OEM automotive production in 2030 will be EVs, you need to multiply the above demand numbers each by a factor of between 5 and 10 just to assume that the total global production of vehicles remains the same in 2030 as today, about 100,000,000 vehicles per year.

The amount of lithium necessary for enough stationary storage to manage a world totally converted away from fossil fuels is estimated to be 3.5 times as much as is necessary for the conversion of the global automotive fleet, so you need to add that demand to the above totals. I do not know how much of the world’s energy production in 2030 will be from non-fossil fuels, but even if it is just 20% of the total the above demand numbers would double.

The question we need to ask…

The core questions are:

1. Can the world’s economies divert enough of their total capital and natural resources to effect the above transformation(s)?
2. Even, if so, are there sufficient resources of the critical minerals and processing capacity for transforming them into end user products to carry out even this percentage of the transformation in just 7 years?, and

3. Would even the attempt to transform the global energy production economy from fossil-fuels to alternate energy destroy wealth creation and its wide distribution bringing about the decline of the Western standard of living and the destruction of any hope that the developing world has of achieving that standard?

It's time to decide if it's all worth it.

Rare Earths Juniors Search Minerals and Geomega Resources are "Winners" in Canada's Critical Minerals Strategy

written by Matt Bohlsen | July 5, 2023

As announced last week at the Prospectors & Developers Association of Canada ("PDAC") mining conference in Toronto, the Canadian government released news regarding their Critical Minerals Strategy. In particular, Canada's Resources Minister Wilkinson stated there will be "over $344 million for Canadian critical minerals development." The Minister also said that equity stakes could come through the soon-to-be-launched Canada Growth Fund and loans could be arranged through the Canada Infrastructure Bank. This is good news for Canadian critical minerals projects. The Canada Growth Fund was announced last year and is to be backed by $15 billion in Federal funds. This compares with Australia's (clean energy finance corporation –

A$10 billion) and Japan's (Green Energy Fund – JPY2 trillion) initiatives but still falls well behind USA's US$369 billion Inflation Reduction Act.

The Canadian Critical Minerals Strategy is part of Canada's climate plan, which outlines Canada's goals of reducing greenhouse gas emissions by 40-45% below 2005 levels by 2030 and reaching net-zero emissions by 2050.

The Government of Canada has invested in the critical minerals industry recently through various projects including the mining of rare earths in the Northwest Territories and electric vehicle battery assembly in Quebec.

With this latest announcement, two companies that have already been chosen to receive funds are Search Minerals Inc. (TSXV: SMY | OTCQB: SHCMF), receiving C$5 million, and Geomega Resources Inc. (TSXV: GMA | OTCQB: GOMRF), receiving C$3 million.

Search Minerals Inc.

Search Minerals is a rare earths explorer and developer in Labrador, Canada. Search's flagship project is the Port Hope Simpson ("PHS") Property which includes the Foxtrot resource, Deep Fox resource, Silver Fox, Awesome Fox, and Fox Meadow deposits. The properties are prospective for Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy), Terbium (Tb), Zirconium (Zr), and Hafnium (Hf).

Search plans for mining and primary production of the Deep Fox and Foxtrot deposits in Labrador and further refining of concentrate into REE mixed oxides and carbonates on the Island of Newfoundland thereafter.

The 2022 PEA (based only on the Foxtrot and Deep Fox Resource) resulted in a post-tax NPV8% of C$1.31B and a post-tax IRR of

41.5%. Initial CapEx was estimated at C$422 million (including a C$61 million contingency) with a mine life of 26 years. The PEA is based on an annual production of approximately 1,437 t of magnet rare earths oxides (Nd+Pr: 1,291 t, Dy: 125 t, and Tb: 21 t).

Search said on March 7 that they plan to use the C$5 million government funding towards a demonstration plant. Search stated:

> *"The Government of Canada has contributed $5 million in non-dilutive support to Search Minerals via a Contribution Agreement which will be used to fund the construction and operation of a demonstration plant for rare earth extraction and recovery. The total project cost is estimated at approximately $9.3 million with a further $1 million of funding under application from other sources. Search Minerals' contribution to the construction costs is expected to be approximately $3.3 million. The demonstration plant will process ~20 tonnes of rare earth concentrate prepared from 72 tonnes of Deep Fox and Foxtrot mineralization……."*

The demonstration plan will support a Feasibility Study expected to be completed in 2024.

Search Minerals currently trades at C$0.07 and on a market cap of C$29 million.

Geomega Resources Inc.

Geomega Resources is focused on rare earths recycling but also owns the largest rare earth bastnaesite 43-101 resource estimate in North America at their Montviel REE Project in Quebec, Canada.

Geomega is fully funded to develop the first rare earth magnet

recycling facility outside of Asia, to be located in Saint-Bruno, Quebec, Canada. The Project is undergoing detailed engineering in preparation for procurement and construction.

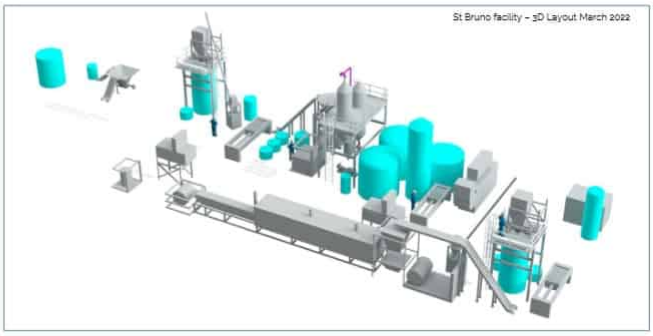
Geomega Resources REE recycling demonstration plant summary

GEOMEGA Rare Earths · Refining · Recycling

REE Recycling Demo Plant

- Facility in Saint-Bruno, Quebec
- 1st of its kind recycling plant in North America
- Conservative economics based on bottom prices
- Nd, Pr, Tb, Dy prices – 3x increase since 2019

Demo Plant Economics	
Demo plant feed throughput	1.5 tpd / 8hr day
Average grade of feed stock	30% TREO (Nd, Pr, Dy, Tb)
Capital costs (inc. WC)	$4.8 M
Direct operating costs	$3 / kg of TREO
Targeted Sales (2019 prices)	$10 M
Target Profit Margin	20%
Conversion to Commercial Plant	**Up to 4.5 tpd / 24hr operation** Additional costs $1M-$2M Targeted Sales $30 M



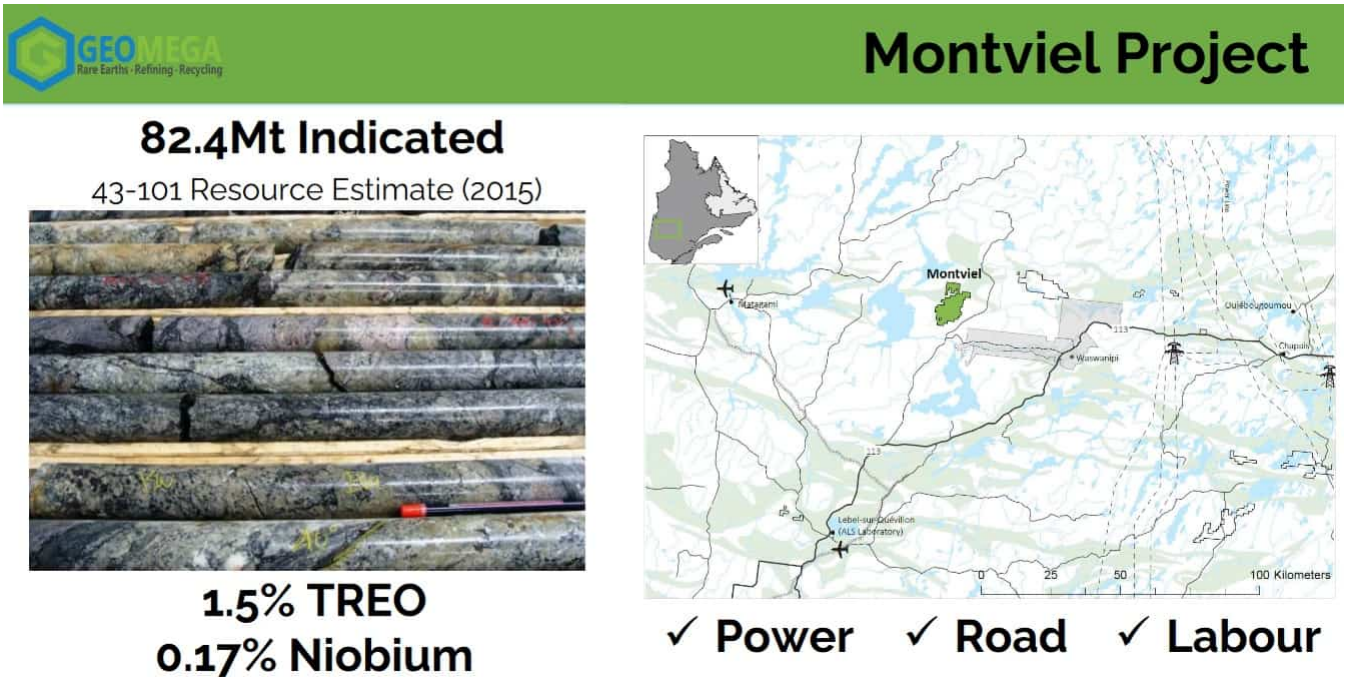
- Detailed Engineering ongoing
  - PFD, PCD – completed
  - P&ID – 50% and ongoing
- Procurement – ready to start
- Pre-construction – finalizing service provider

Rare Earths Recycling & Clean Processing of CSM

Source: Company presentation

The Montviel REE Project Indicated Resource is 82.4 Mt @ 1.5% TREO & 0.17% Nb2O5 plus 184Mt Inferred Resource. The Project has road access nearby and access to power and labor.

The Montviel REE Project in Quebec, Canada



Source: [Company presentation]

Geomega Resources Inc. currently trades at C$0.215 and on a market cap of [C$30 million].

Closing remarks

It appears that the time has finally come for the Canadian junior critical minerals miners to get some real government support. A lot more will be needed to bring projects into production in a timely manner, but it is at least a good start.

Dysprosium – The Most Critical Magnet Metal Could Threaten

the EV Industry

written by Jack Lifton | July 5, 2023
Dysprosium, it's more critical than ever and just as scarce as ever.

On October 18, 2011, *eleven years ago*, I wrote the following email reply to an inquiry about the future of the non-Chinese OEM automotive industry's then new dependence on critical materials for EVs:

> *"I am at the moment in Shanghai where I have given an invited presentation to the Society of Automotive Engineers' (SAE) 2nd Hybrid and Electric Vehicle Conference. My topic was Critical and Strategic Metals for Electric Propulsion. I will be speaking and moderating a panel at the SAE World Congress in Detroit on April 25, 2012, on "Strategic and Critical Metals and Materials for a 21st Century Global OEM Automotive Industry." In each case the most critical metal of all is the rare earth element dysprosium, without which the modern automotive powertrain would lack the ability to have reliable stable electric motors and generators "under the hood" where dysprosium-modified neodymium-boron-magnets provide high coercivity (magnetic field strength) maintenance through repeat cycles of heating and cooling, and, also, the miniaturization of the automobiles power options, power steering, and a variety of motor management sensors."*

Dysprosium – one of the most critical of all metals

The OEM automotive industry today uses most of the approximately 1000 metric tonnes of dysprosium produced yearly today and produced exclusively in China. The growth of the OEM automotive

industry in sheer numbers of vehicles produced plus the anticipated introduction of more and more electric vehicles with large electric traction motors of the rare earth permanent magnet type, already in use across the board in the Toyota Prius and all of its competitors of all types, Plug-in hybrid electric vehicles (“PHEVs”) as well as electric vehicles (“EVs”), has, in my opinion, already created a dysprosium shortfall that has alarmed the automakers.

The US Dept of Energy agrees that dysprosium is one of the most critical of all metals for the continued health and competitive advantage of the non-Chinese car industry, I have repeatedly said that if no non-Chinese sources of dysprosium come into production by 2015 then the non-Chinese OEM automotive industry will cease to be competitive with that of China in internal combustion powertrain performance and will certainly lose out in the EV market.”

Now, eleven years later, I am going to discuss this same topic, “Is there a dysprosium supply crisis?,” at a June 8 meeting of the Detroit section of the Society of Automotive Engineers. Whoever first said that changes in the OEM automotive industry take a long time was right.

Critical Minerals Institute Summit

The broader theme of Critical Materials for EVs will be a focus of the Critical Minerals Institute Summit in Toronto on June 14 and 15.

This problem, the supply of critical minerals for the transformation and use of non-fossil fuel energy production and storage is existential.

Ucore’s rare earths processing technology facility offers Louisiana a blue ribbon opportunity for the critical minerals supply chain

written by InvestorNews | July 5, 2023

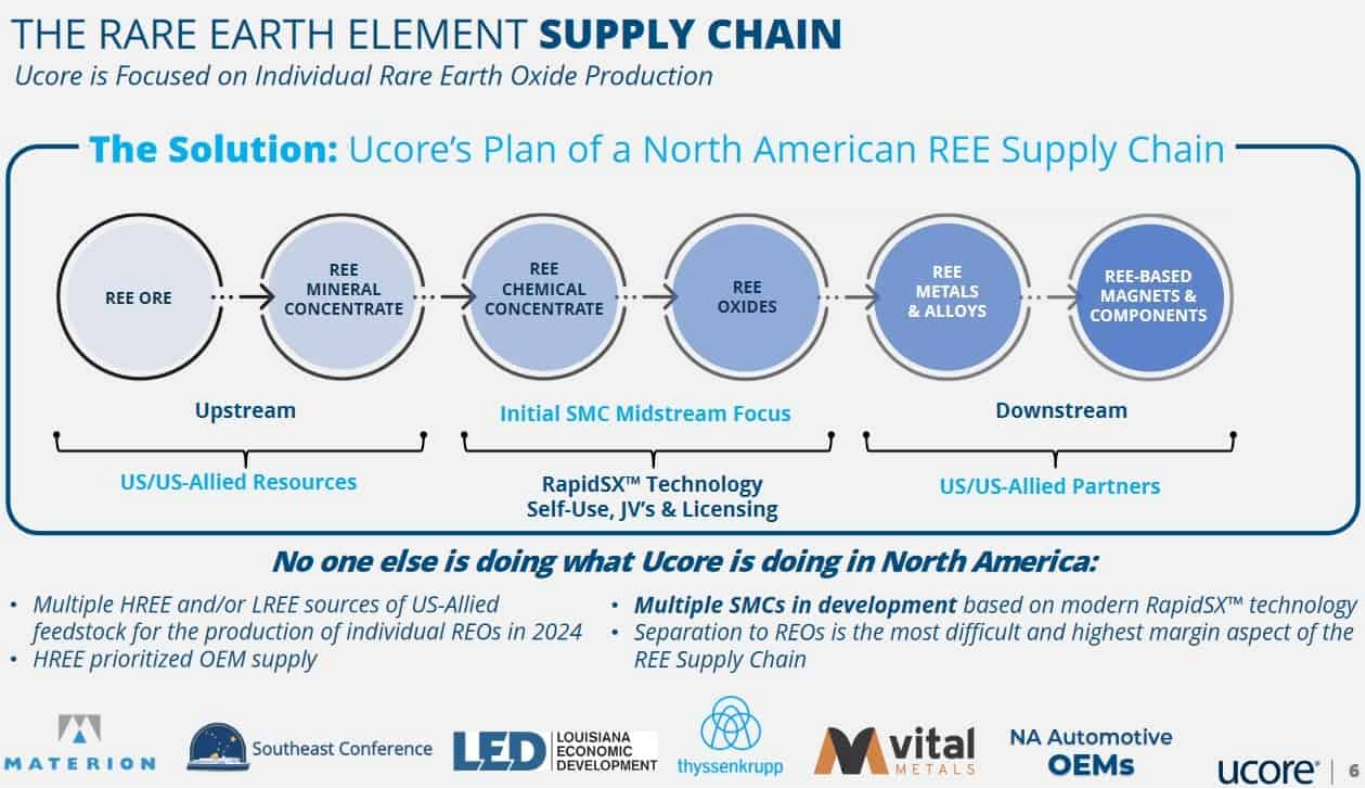
As most readers of InvestorIntel know by now, demand for the magnet rare earths is set to surge this decade as the EV and renewable energy booms takes off. Electric vehicles require the magnet rare earths in their electric motors as do many of the most powerful wind turbines.

The problem right now is that there are no rare earths separation facilities of scale in the USA, meaning the market is reliant on China.

Today’s company is one of very few western companies that is making big moves to change that. Notably to develop rare earths separation facilities in North America.

Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) (“Ucore”) 100% own the Bokan-Dotson Ridge REE Project (contains Dysprosium (Dy), Terbium (Tb) & Yttrium (Y)) in Alaska and has plans to build a rare earth separation facility in Louisiana, USA.

Ucore is focused on Rare Earth Oxide separation (production) in North America for both heavy (HREE) and light (LREE) rare earth elements



Source: Ucore company presentation

As announced on November 22, 2022, Ucore is in the process of selecting a site for their Louisiana facility and is choosing between three existing brownfield facilities in Southwest and Central Louisiana. Ucore states that they intend "to select a location in Q1-2023 to maintain the development schedule required by prospective OEM partners." Ucore indicated that they hope to have the facility in operation by end-2024 (Phase 1 – 2,000 tpa TREO) and Phase 2 (5,000 tpa TREO) by 2026 (see chart on page 11).

Ucore states that the Louisiana separation facility (known as the Louisiana Strategic Metals Complex ("**LSMC**")) is being designed to:

- "process 2,000 tonnes of TREO from mixed rare earth concentrates on a per annum basis ("**tpa**") in the first and second year of operation, after that, expanding to 5,000 tpa:

- from multiple US-friendly sources, including heavy REE ("**HREE**") and light REE ("**LREE**") feedstocks.

- initially be capable of processing all RapidSX™ splits required to produce individual praseodymium, neodymium, terbium, and dysprosium from each applicable feedstock source. The product line will expand to other individual rare earth elements as the Western REE market develops."

The four primary rare earth oxides used to produce NdFeB permanent magnet motors are neodymium, praseodymium, dysprosium, and terbium.

Rapid SX™ technology and demonstration plant commissioning

The LSMC will use Ucore's 100%-owned Innovation Metals Inc. Rapid SX™ technology which has already been successfully piloted. Ucore states that "RapidSX™ is a transformative REE Separation Technology" that is faster and has a lower CapEx and OpEx than conventional separation technologies. It is also very scalable.

The longer term Ucore plan is to develop several Strategic Metals Complex Facilities (separation facilities) across North America.

The demonstration plant work is a focus for early 2023. Last month Ucore announced that:

"Commissioning will take place over the next several months. A program designed to demonstrate the significant advantages of utilizing its RapidSX™ technology platform for separating light and heavy rare earth elements into high-purity individual elements/compounds……..The Demo Plant is designed to process tens of tonnes of HREE and LREE feedstock annually. Once the

commissioning trials are completed, the Company is planning two additional 10-ton processing campaigns for the commercial demonstration and products qualification program."

Usually, once potential off-take partners have qualified the material, it can lead to off-take agreements. This then typically lends support for potential project funding.

Ucore's next steps and master plan

Source: Ucore company presentation

Project funding – U.S desperately needs to develop rare earths separation facilities

According to Ucore, there is currently no rare earths separation facilities of scale in North America. This would suggest that Ucore may receive some assistance from the U.S. government to get their Louisiana facility funded. Alastair Neill recently pointed out in an InvestorIntel article: "MP received US$35 million and Lynas US$120 million. This begs the question of whether or not the DoD will support Ucore with this plan of action." Syrah Resources Limited (ASX: SYR), Talon Metals Corp. (TSX: TLO) and Piedmont Lithium Inc. (Nasdaq: PLL | ASX: PLL)

are others that have recently received U.S. grants for their spherical graphite processing, nickel processing, and lithium chemical processing plans respectively. There is also the U.S. loans program office that is looking to support critical metals projects in the USA.

The Louisiana Economic Development ("LED") organization has already stepped up to support Ucore with a non-binding Letter of Intent ("LOI") for a 10-year US$9.6 million plus tax incentives package (over the first ten years of operation) in consideration for Ucore's projected investment of US$55 million for the Louisiana facility. There is also an expedited process for all required state permits.

Closing remarks

Ucore still has several hurdles ahead to achieve their goals, but management appears to be laser focused on the task. With some support already from LED and hopefully from the U.S Federal government the future for Ucore is starting to shape up nicely.

Ucore Rare Metals Inc. trades on a market cap of C$53 million and is cashed up after a recent ~C$4.59 million raise in December, 2022. Stay tuned.

The top billionaires are now chasing the critical magnet

rare earths – Part 2 of 2

written by Matt Bohlsen | July 5, 2023

In part 1 we looked at a growing trend where billionaires have started investing or taken a strong interest in rare earths companies, mines, and/or projects around the world. In particular, the story focused on **James Litinski's** rise to fame at MP Materials Corp. (NYSE: MP), as well as the recent billionaire moves of KoBold Metals (**Jeff Bezos, Michael Bloomberg, Bill Gates**) chasing rare earths in Greenland and **Gina Rinehart** buying into Arafura Rare Earths Limited (ASX: ARU).

Here in Part 2 of this series will take a look at more billionaires chasing rare earths such as **Andrew 'Twiggy" Forrest, Chris Ellison, and Elon Musk**.

Andrew Forrest's Wyloo Metals and Hastings Technology Metals Ltd.

As announced on August 26, 2022, Australian billionaire Andrew Forrest's private company Wyloo Metals has agreed to an A$150 million cornerstone investment in Hastings Technology Metals Ltd. (ASX: HAS), through the issuance of secured, redeemable, exchangeable notes. Even more interesting was that Hastings intends to use the A$150 million proceeds to acquire a 22.1% strategic shareholding in Canada's Neo Performance Materials Inc. (TSX: NEO). Neo uses rare earths to make magnetic powders and magnets, which can later be used in the permanent magnet electric motors used in most quality EVs and wind turbines.

Hastings controls two rare earth projects in Western Australia, the Yangibana Project (more advanced) and the Brockman Project. At the Yangibana Project, Hastings plans to build a mine and beneficiation plant and a hydrometallurgical plant nearby in Onslow, to produce 8,500 tpa TREO production and 3,400tpa NdPr.

It was also revealed in November 2022 that Andrew Forrest's Fortescue Metals Group Ltd. (ASX: FMG) has signaled the company hopes to open up a business mining and refining rare earths.

Chris Ellison and rare earths junior VHM Limited

Mineral Resources Limited (ASX: MIN) CEO Chris Ellison has been an early leader in the lithium boom, yet now he has also turned his attention to rare earths. Ellison has backed rare earths junior VHM Limited which is set to IPO on the ASX in January 2023. VHM Limited state they have "one of the world's largest, highest-grade rare earth deposits" at their Goschen Rare Earths and Mineral Sands Project in Victoria, aiming to begin production by H1, 2025. The rare earths in the Goschen Project include neodymium, praseodymium, dysprosium and terbium.

Elon Musk's insatiable demand for rare earths to feed Tesla's vehicles

In 2018 it was reported by Reuters that "Tesla's shift to a magnetic motor using neodymium in its Model 3 Long Range car adds to pressure on already strained supplies of a rare earth metal……" Musk and Tesla (NASDAQ: TSLA) had come to learn that by using the most powerful and lightweight permanent magnet electric motors they were able to save weight and improve efficiency, which improves both performance and range as well as cost (a smaller battery is needed to achieve the same range). Permanent magnet motors are currently the smallest and lightest electric motors you can buy. The only catch is they require the magnet rare earths. So this is now Tesla's current problem. How to source the magnet rare earths in the volumes they need now and in future years as they scale to 20 million electric cars per year by 2030. Tesla's chair Robyn Denholm gave investors a huge clue during a speech in Canberra to mining industry leaders in 2021, when she predicted that Tesla could soon consume more

than $1 billion a year in Australian produced lithium, nickel, **rare earths**, and other battery metals. Then again in October 2022, Denholm strongly advocated that Australia can do so much more to support the EV supply chain. Tesla chairman suggested Australia is capable to do mining, refining, battery cells production, and even make electric vehicles. She said Australia has the raw materials, including lithium, cobalt, copper, and **rare earths**.

I would add that Canada also has this very same potential and is now focused to build up an EV supply chain, notably in Ontario and Quebec. The Canadian government has allocated C$3.8 billion of financial support for critical minerals in its 2022 budget.

Tesla's electric cars have shifted towards using more permanent magnet motors that use the magnet rare earths

Hong Kong – August 13, 2021 : People walk past the Tesla

official showroom in Queens Road East, Wan Chai, Hong Kong.

Source: iStock

Closing remarks

This "billionaires chasing the critical magnet rare earths" series has exposed a relatively new trend where several of the richest and most powerful billionaires in the world have turned their attention to the magnet rare earths, namely neodymium (Nd), praseodymium (Pr), and dysprosium (Dy). Billionaires now involved in rare earths include James Litinsky, Jeff Bezos, Michael Bloomberg, Bill Gates, Gina Rinehart, Andrew Forrest, Chris Ellison and indirectly Elon Musk via Tesla.

The reason for this unprecedented interest in the magnet rare earths sector is simple. The most powerful and efficient electric motors need the most powerful magnets, and these are made from the magnet rare earths Nd, Pr, and Dy. Also, they typically use Boron (B). Electric motors are replacing the internal combustion engine and are now central to most modern day technology especially green technology such as electrification of our transport network and renewable energy generation.

Reaching net zero carbon emissions means the next 2-3 decades will rely heavily on switching to electric motors and that will require a secure source of the critical rare earths.

Investors can also learn from these leading billionaires and invest in the magnet metal rare earths while we are still in the early stages of what looks likely to be a decade long boom.

For more information you can visit InvestorIntel's page "Critical Minerals & Rare Earths".

eResearch Report on Search Minerals offers investors a ‘staggering’ volume of information on the rare earths market

written by Tracy Weslosky | July 5, 2023

Over the years I have lost count of the times I have recommended that public companies secure a research report, simply because I personally love the benefit of third-party analysis and metrics. Toss in an analyst with more financial degrees than most CFOs such as eResearch’s Chris Thompson, and the analysis can prove beneficial to everyone reading the content, including the company and all of us interested in critical minerals. Having followed rare earths company Search Minerals Inc. (TSXV: SMY | OTCQB: SHCMF) (“Search”) for a decade now, the recent eResearch analyst report blind-sided me by the coverage in that it was a staggering 72-page overview, review and historical biography of not only Search Minerals, but a worthwhile read on the rare earths sector.

Now for my notes extracted from my review of the eResearch Report on Search, but again I urge you to access the eResearch analyst report directly to secure any answers you may be ‘searching’ for…

Search Minerals is developing their rare earths projects in Labrador, Canada. Their flagship project is the **Port Hope**

Simpson ("PHS") Property which includes the Foxtrot resource, Deep Fox resource, Silver Fox, Awesome Fox, and Fox Meadow deposits. The Property is prospective for rare earth elements ('REE') Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy), and Terbium (Tb), Zirconium (Zr) and Hafnium (Hf). Search Minerals plans mining and primary production of the Deep Fox and Foxtrot deposits all going well by 2025 in Labrador and further refining of concentrate into REE oxides and carbonates on the Island of Newfoundland thereafter.

The updated 2022 PEA resulted in a post-tax NPV8% of C$1.31 billion and a post-tax IRR of 41.5%. Initial CapEx was estimated at C$422 million (including a C$61 million contingency) with a mine life of 26 years.

Foxtrot and Deep Fox Resource estimate – 31 December 2021

Source: Search Minerals news April 11, 2022

Search Minerals development timeline plan

Source: eResearch report on Search Minerals p.15

Highlights of the eResearch report ("The report") on Search Minerals, which was initiated on September 14, 2022:

- **The Importance of Rare Earth Elements (REE)** – If you are new to rare earths, this report highlights the many uses of rare earths including their role in the EV sector. Of interest was the quote on page 4: "Neodymium (Nd) is the strongest known magnetic substance and Nd magnets are used in applications that require strong, compact permanent magnets, such as cellular phones, electric motors, hard

disk drives, televisions, and medical devices." Also an interesting point for your next trivial discussion with friends over a glass of wine, is that the smartphone (screen and electronics) contains at least 9 rare earth elements.

- **Search Minerals PEA (2022) Highlights (based on the Foxtrot and Deep Fox Resource)** – Mine production of 2,000 tpd (720,000 tpa) over a 26-year mine life, including both open pit and underground operations….Underground mining capital in Year 7 of C$54 million is funded from operations….Annual production of approximately 1,437 t of Magnet Rare Earths Oxides (Nd+Pr: 1,291 t, Dy: 125 t, and Tb: 21 t).
- **Key Projects Funded for C2022**: Funded for Deep Fox exploration, preparation of 70t bulk sample, and working towards the start of a Feasibility Study.
- **Strong Management Team** – Management has extensive experience, geological knowledge of the region, and are experts in REE processing. Since I know many of the members of this team, I urge you to review the geological team as many in this sector often refer to them as the best in the business, specifically Dr. David Dreisinger whom Jack Lifton and I have used in numerous interviews over the years to help the InvestorIntel.com audience understand the rare earths market.
- **Search Minerals Appears Inexpensive Using Different Valuation Metrics** – The Report looked at several different valuation methodologies for Search Minerals. eResearch initiates coverage on Search Minerals and reports a Speculative Buy Rating.

Again, the *e*Research report makes for compelling reading and I would encourage anyone serious about investing in rare earths investors to review the entire report.

Most certainly the potential 17x upside (p 5) if Search Minerals succeeds to production is something to consider, especially given the backdrop of forecast shortages of the key magnet rare earths this decade as the EV and wind energy sectors potentially boom. Investors should also consider the various risks that junior miners face as not all will succeed.

Search Minerals Inc. currently trades at C$0.10 with a market cap of C$41 million.

Disclosure: The valuations presented in this article are those of eResearch and not InvestorIntel. Search Minerals is a digital media advertiser on InvestorIntel.com and pays for both banner ads and interviews, however, neither eResearch nor Search Minerals have paid for this content.

Ucore Rare Metals is building its rare earths Field of Dreams with RapidSX

written by InvestorNews | July 5, 2023

To misquote the famous line in the 1989 movie '*Field of Dreams*', "if you build it, they will come" (the actual line from the movie is he will come – referring either to Kevin Costner's character's father or shoeless Joe Jackson or perhaps both). Making a giant leap from that to the world we find ourselves in today, where 80% of the worlds rare earth resources are controlled by China, if you build it, or at least can process

the raw materials into rare earth oxides (REOs), then arguably everyone will come. OK, maybe that was a bad segue but you're just going to have to live with it. The point is, there are billions of dollars being invested over the next couple of years on EV battery manufacturing facilities in North America and the U.S. has recently implemented legislation (the Inflation Reduction Act), which requires that 40% of battery components be sourced from factories in the U.S. or its free trade agreement partners, and that Chinese components and minerals be phased out beginning in 2024. On-shoring is the name of the game as we transition to a lower carbon future.

There are numerous rare earth explorers pursuing processing capabilities but perhaps no one is closer to commissioning than Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF). Ucore is focused on rare- and critical-metals resources, extraction, beneficiation, and separation technologies with the potential for production, growth, and scalability. Ucore has an effective 100% ownership stake in the Bokan-Dotson Ridge Rare Earth Element Project in Southeast Alaska. Ucore's vision includes disrupting the People's Republic of China's control of the U.S. rare earths supply chain through the near-term development of heavy and light rare-earth processing facilities – including the Alaska Strategic Metals Complex in Southeast Alaska. And to that end Innovation Metals Corp., a wholly owned Ucore subsidiary, has developed the RapidSX separation technology resulting in the production of commercial-grade, separated rare earth oxides at the pilot scale.

Sounds promising but what exactly is RapidSX? The process combines the time-proven chemistry of conventional solvent extraction (SX) with a new column-based platform, which significantly reduces time to completion and plant footprint, as well as potentially lowering capital and operating costs. SX is the international rare earth industry's standard commercial

separation technology and is currently used by 100% of all rare earth producers worldwide for bulk commercial separation of both heavy and light rare earths. Utilizing similar chemistry to conventional SX, RapidSX is not a new technology but represents a significant improvement on the well-established, well-understood, proven conventional SX separation technology preferred by rare earth producers. As an investor, I prefer disruption of existing technology versus reinventing the wheel as it is typically more capital efficient and quicker to market, unless of course, it's cold fusion type of disruption, in which case I'm all ears.

As for the progress of RapidSX, Ucore announced in mid-July that it had upscaled its rare earth Demonstration Plant capabilities and streamlined the RapidSX commercial deployment plan. In early 2022 Ucore received very positive results from the independent RapidSX technology evaluation, including the conclusion that a RapidSX production plant can potentially have a 2/3rds smaller footprint than a conventional SX facility with the same throughput. The team then received buy-in from all stakeholders to expand the design and construction of the Demo Plant. Ucore's enhanced Demo Plant will be able to process: tens of tonnes of mixed rare earth concentrate on a per annum basis; many feedstock sources, including planned light and heavy rare earth element feedstocks for the Strategic Metals Complexes; and all RapidSX splits required to produce individual praseodymium, neodymium, terbium, and dysprosium. Ucore has planned product qualification trials in Q4-2022 for prospective North American metal/alloy makers and original equipment manufacturers (OEMs).

All this is only one aspect of Ucore's business, they are also a rare earth explorer with the advanced Bokan-Dotson Ridge rare earth deposit. Highlights at Bokan include a NI 43-101 Preliminary Economic Assessment, with a resource estimate that remains open down-dip and on-strike with further drilling

planned. The project can be “near shovel ready” for construction in less than 30 months after receipt of the next stage of development funding. And the Company boasts that Bokan is the highest grade NI 43-101 HREE resource in the U.S. But we’ll save digging further into the details on Bokan for another day.

Bottom line, Ucore is very close to churning out rare earth oxide material at its Demonstration Plant which could lead to supply offtake agreements with EV manufacturers and/or other downstream customers. This could be huge for Ucore in light of the fact that on-shoring is going to be a high priority for the foreseeable future. With a market cap of C$34 million, there could be a bright future for Ucore if all the pieces fall into place.