



# Rockstone Research

December 17, 2015

## Research #13

Rare Earth Elements (REEs)



## Shedding Light onto the Rare Earth Playing Field

Due to its inherent complexity, the rare earth element (REE) space is difficult to understand. Unfortunately, investors doing their due diligence have not necessarily had an easy time finding the sought-after clarity due to the many different voices commenting on the space. For example, a recent [article](#) by Jon Hykawy on illegal Chinese REE production was arguably inaccurate on some basic fundamentals. However, when taking a look at the recently published article [“Levelling the Rare Earth Playing Field”](#) from Alastair Neill, one can only roll their eyes in disbelief. With 13 articles published over the last 2 years, Rockstone has attempted to shed much needed light onto this space and I feel the need to chime in here again.

### Company Details

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Shares Issued & Outstanding: 216,462,364



↗ Chart Canada (TSX.V)

Canadian Symbol (TSX.V): CCE

Current Price: \$0.08 CAD (Dec. 16, 2015)

Market Capitalization: \$17 million CAD



↗ Chart Germany (Tradegate)

German Symbol / WKN: D7H / A0J2Q3

Current Price: €0.05 EUR (Dec. 16, 2015)

Market Capitalization: €11 million EUR

Technical Analysis:

Since 2001: <http://schrts.co/wR62L5>

Since 11/2013: <http://schrts.co/kAtslu>



Find very little to agree with in Mr. Neill’s very simplistic ranking system, apart from him noting that the focus should be on the magnet feed REEs (Nd, Pr, Tb, Dy) and not exclusively on the heavy REEs.

A rare earth project will sink or swim on their ability to economically produce those key magnet feed elements in the proper relative proportion, and product form.

Neill’s article attempts to address revenue potential; however, the most fundamental of all economic factors is missing; that being OPERATIONAL EXPENDITURES (OPEX). **Revenue (i.e. gross income) is irrelevant in an evaluation if not coupled with the other side of the equation (i.e. cost of production). That is, if your cost of production is higher than your revenue, then the project is a bust no matter how you look at it!**

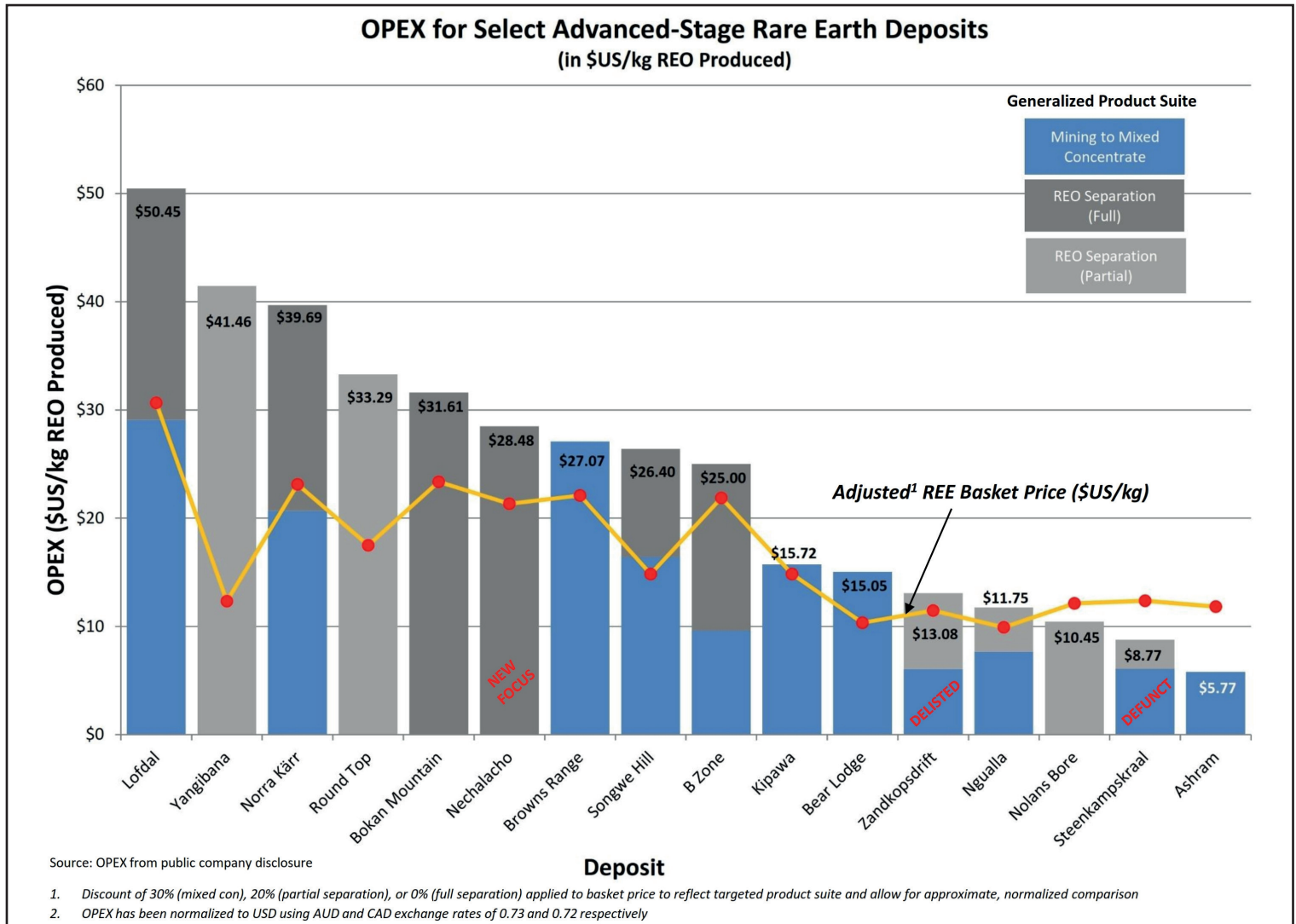
Therefore, for any relevant comparison to be done, the proper questions to ask are, what are the operating costs for these projects- relative to the products they will produce – and do they actually have a projected positive net margin? In other words, do they actually have a reasonable potential to generate a profit?

It’s not about which project can produce the highest value REE product in the greatest volume per mined tonne of ore; it’s about what REE project can produce the proper product(s) (i.e. stable, long-term market demand and price), at the lowest cost possible, to have a positive net income (i.e. profit) throughout a commodity cycle. In this regard, based on all the projects I follow in the REE space, Commerce’s Ashram Project is at the top of the list and far above Lynas, who are barely, just barely, cash positive (if you believe their actual released numbers, as accounting practices

can easily cloud reality, if necessary).

In March 2015, Rockstone published the article [“The REE basket Price Deception and the Clarity of OPEX”](#), providing a chart comparing the OPEX and adjusted basket price for various advanced stage REE deposits. The endeavour was to normalize a project’s REE basket price (i.e. adjusted basket price) to reflect the product suite targeted (generalized to three categories; mixed concentrate, partial separation, or full separation), and to normalize OPEX to the USD as many projects report in AUD or CAD. The idea was to compare projected production costs across projects while also reflecting the differences in end-product(s) targeted, which will have a direct impact on the cost of production and revenue generated.

I have taken the liberty of updating this chart for added clarity in this discussion.



OPEX and Adjusted REE Basket Price (adjusted based on produce suite) of Select Advanced Stage REE Deposits



In terms of projected OPEX, from lowest to highest, the projects are:

1. Ashram: Commerce Resources Corp.
2. Steenkampskraal: Great Western Minerals Group Ltd. (NA - done in by company debt and poor management)
3. Nolans Bore: Arafura Resources Ltd.
4. Ngualla: Peak Resources Ltd.
5. Zandkopsdrift: Frontier Rare Earths Ltd. (since delisted)
6. Bear Lodge: Rare Element Resources Ltd.
7. Kipawa: Matamec Explorations Inc.
8. B Zone: Quest Rare Minerals Ltd.
9. Songwe Hill: Mkango Resources Ltd.
10. Browns Range: Northern Minerals Ltd.
11. Nechalacho: Avalon Rare Metals Inc. (since changed focus to tin-indium)
12. Bokan Mountain: Ucore Rare Metals Inc.
13. Round Top: Texas Rare Earth Resources Corp.
14. Norra Kärr: Tasman Metals Ltd.
16. Yangibana: Hastings Technology Metals Ltd.
15. Lofdal: Namibia Rare Earths Inc.

In a pricing environment such as now, where REEs are trading potentially at the bottom of the cycle, it is the projects with the lower production costs that will have the greatest chance to survive. The above chart strongly indicates that the Ashram Deposit is best positioned in such an environment with the lowest approximated production cost of its peers at \$5.77 per kg REO produced in USD, using the current CAD exchange rate.

Although an idealized metric, a project's basket price may be used as the basis for a general approximation of revenue potential (i.e. gross income) if it is adjusted to reflect the product suite that is targeted to be produced, as in the above noted chart. Therefore, when coupled with the OPEX (normalized to the USD), the difference approximates the projected operating

margin of the project (i.e. "net income" or "profit").

The following chart plots the approximated operating margin (i.e. adjusted REE basket price minus normalized OPEX) using the same criteria as described for the above noted chart. It is clear in today's pricing environment that most projects are projected as being highly unprofitable; however, the Ashram Deposit, given its industry low projected OPEX, has an approximated profit margin of \$6.05 per kg REO produced.

By comparison, one of Mr. Neill's top picks, Northern Minerals' Browns Range Project, has a normalized OPEX of \$27.07 per kg REO produced for a projected operating margin of negative \$4.97. As both Ashram and Browns Range are targeting the exact same end-product in their respective studies (mixed rare earth carbonate), this side by side comparison is even more directly applicable.

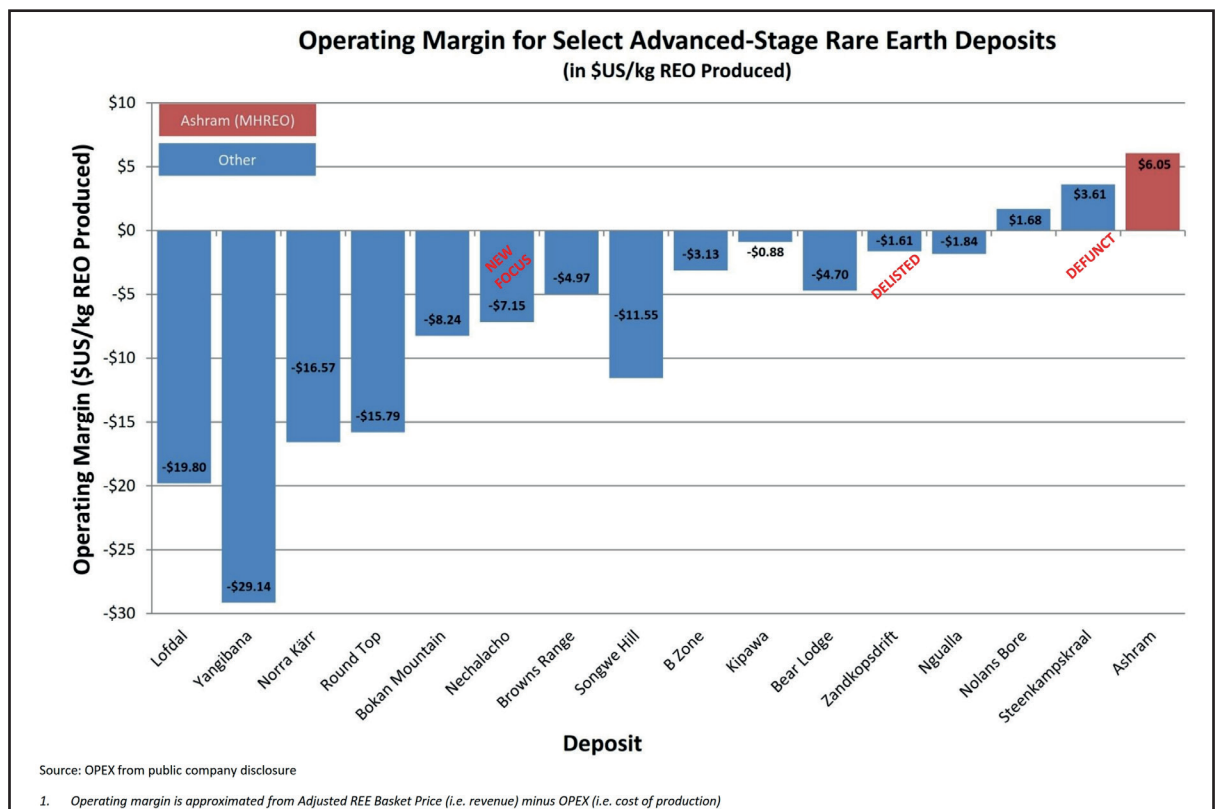
For further discussion and analysis of Northern Minerals' Browns Range Project, I suggest our readers review another [article](#) by Ben Kramer-Miller,

released the same day as Alastair Neill, that highlighted Northern Minerals as an emphatic short sell target, including an in-depth analysis. Although I do not agree with everything Mr. Kramer-Miller notes, and am not advocating a short position in Northern Minerals, it does highlight an unusually strong divide for that specific project and serious pause for thought.

In general, to quote my prior article on the subject; ["The REE basket Price Deception and the Clarity of OPEX"](#):

*"It is evident that the higher operating margins are not from those deposits with the higher basket prices, but rather those that have the lower OPEX. This notion is bolstered by the six major hardrock producers that all have relatively low basket prices..."*

*It is clear those companies that have the lowest OPEX will have the greater flexibility during prolonged depression of prices. Some companies may appear profitable today; however, as an investor, I am most interested in those projects that will be profitable in a depressed market (i.e. the current market)."*



Approximated Operating Margin of Select Advanced Stage REE Deposits



The bottom-line is, the lower OPEX companies with good, balanced distributions anchored by the magnet feed REEs (most notably Nd and Pr) will have the greatest chance of success in this complicated space. **A higher basket price (i.e. higher projected revenue) may clearly be counterfeited by a high production cost (OPEX), negating the potential for any healthy operating margin.** This is absolutely essential to understand with Northern Mineral's Browns Range Project a good example of this.

Certainly, there are other factors to consider, such as capital expenditure (CAPEX), tonnage, and jurisdiction; however, it all starts with and stops with OPEX. I have reviewed essentially all players in the REE development space, and have continued to review them as their projects have progressed; however, I find that I am always arriving at the same conclusion. That is that the Ashram Deposit can produce what the market needs at some of the lowest costs projected, if not the lowest in the space. Their CAPEX is middle of the pack, but they have already demonstrated with their Preliminary Economic Assessment that their OPEX is a target to beat. This is where I am putting my money and I look very forward to the pending Pre-feasibility Study that will further delineate the project's potential economic viability in accordance with NI 43-101 requirements.

Turning back to Mr. Neill's article, unfortunately he has not only avoided including OPEX as a criteria of note, but he has also several fundamental points noted incorrectly or that are arguable to say the least. Specifically:

- How can Molycorp and Tantalus be given a real market cap? Both companies are in some form of receivership at this time.
- Not all market caps were correct at the time of publication.
- Commerce's Ashram total resource is being used as opposed to the MHREO Zone, which will be mined for most of the first 25 years. The MHREO zone has 24.6% combined Nd-Pr-Tb-Dy, or 3rd highest in

his listing, materially higher than is noted.

- To say that Quest has a "key investor" is somewhat of a misnomer. The company has been awarded (and has not necessarily received) funding from Sustainable Development Technology Canada (SDTC) to address their VERY complicated metallurgy under the guise of clean technology.

- Remoteness is a very relative term and a good project can overcome remoteness. There are examples of this in nearly every commodity.

- Rare Element Resources (I assume "RER" as noted in Mr. Neill's listing) is in a terrible location, being in the middle of a National Forest, with permitting a nightmare. The Fraser Institute may rank the jurisdiction well, but this can still be a bit of a misnomer if your project is within a protected area!

- Avalon's Nechalacho Project is no longer being advanced by the company in any meaningful way, and their focus has clearly switched to tin-indium in Nova Scotia.

In conclusion, the REEs are not an easy space and it is certainly not an easy task to evaluate and rank REE projects amongst themselves, and to this notion I give Mr. Neill some credit for his attempt. However, a proper evaluation must include simple fundamental factors, such as OPEX.

Back in April 2014, Rockstone published the article "[Rare Earth Deposits: A Simple Means of Comparative Evaluation](#)", in which 6 criteria of evaluation were taken into account for comparing REE projects in development. Perhaps it's time I update this ranking to reflect a changing REE market where critical REE (CREEs) and heavy REEs (HREEs) do not hold the stature they once did, and where the magnet feed REEs have now been established as the firm and long-term anchor to any REE project.

### Further Reading:

["Chris Grove of Commerce Resources Talks Rare Earth Processing and the Ashram Deposit"](#) (*Rare Earth Investing News* on November 16, 2015)

["The Next Resource Shortage?"](#) (*The New York Times* on November 20, 2015)

### Analyst Coverage:

[Research #12](#) "Key Milestone Achieved from Ashram's Pilot Plant Operations"

[Research #11](#) "Rumble in the REE Jungle: Molycorp vs. Commerce Resources – The Mountain Pass Bubble and the Ashram Advantage"

[Research #10](#) "Interview with Darren L. Smith and Chris Grove while the Graveyard of REE Projects Gets Crowded"

[Research #9](#) "The REE Basket Price Deception & the Clarity of OPEX"

[Research #8](#) "A Fundamental Economic Factor in the Rare Earth Space: ACID"

[Research #7](#) "The Rare Earth Mine-to-Market Strategy & the Underlying Motives"

[Research #6](#) "What Does the REE Market Urgently Need? (Besides Economic Sense)"

[Research #5](#) "Putting in Last Pieces Brings Fortunate Surprises"

[Research #4](#) "Ashram – The Next Battle in the REE Space between China & ROW?"

[Research #3](#) "Rare Earth Deposits: A Simple Means of Comparative Evaluation"

[Research #2](#) "Knocking Out Misleading Statements in the Rare Earth Space"

[Research #1](#) "The Knock-Out Criteria for Rare Earth Element Deposits: Cutting the Wheat from the Chaff"



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Stephan Bogner studied at the International School of Management (Dortmund, Germany), the European Business School (London, UK) and the University of Queensland (Brisbane, Australia). Under supervision of [Prof. Dr. Hans J. Bocker](#), Stephan completed his diploma thesis ("Gold In A Macroeconomic Context With Special Consideration Of The Price Formation Process") in 2002. A year later, he marketed and translated into German Ferdinand Lips' bestseller ("Gold Wars"). After working in Dubai for 5 years, he now lives in Switzerland and is the CEO of [Elementum International AG](#) specialized in duty-free storage of gold and silver bullion in a high-security vaulting facility within the St. Gotthard Mountain Massif in central Switzerland.

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