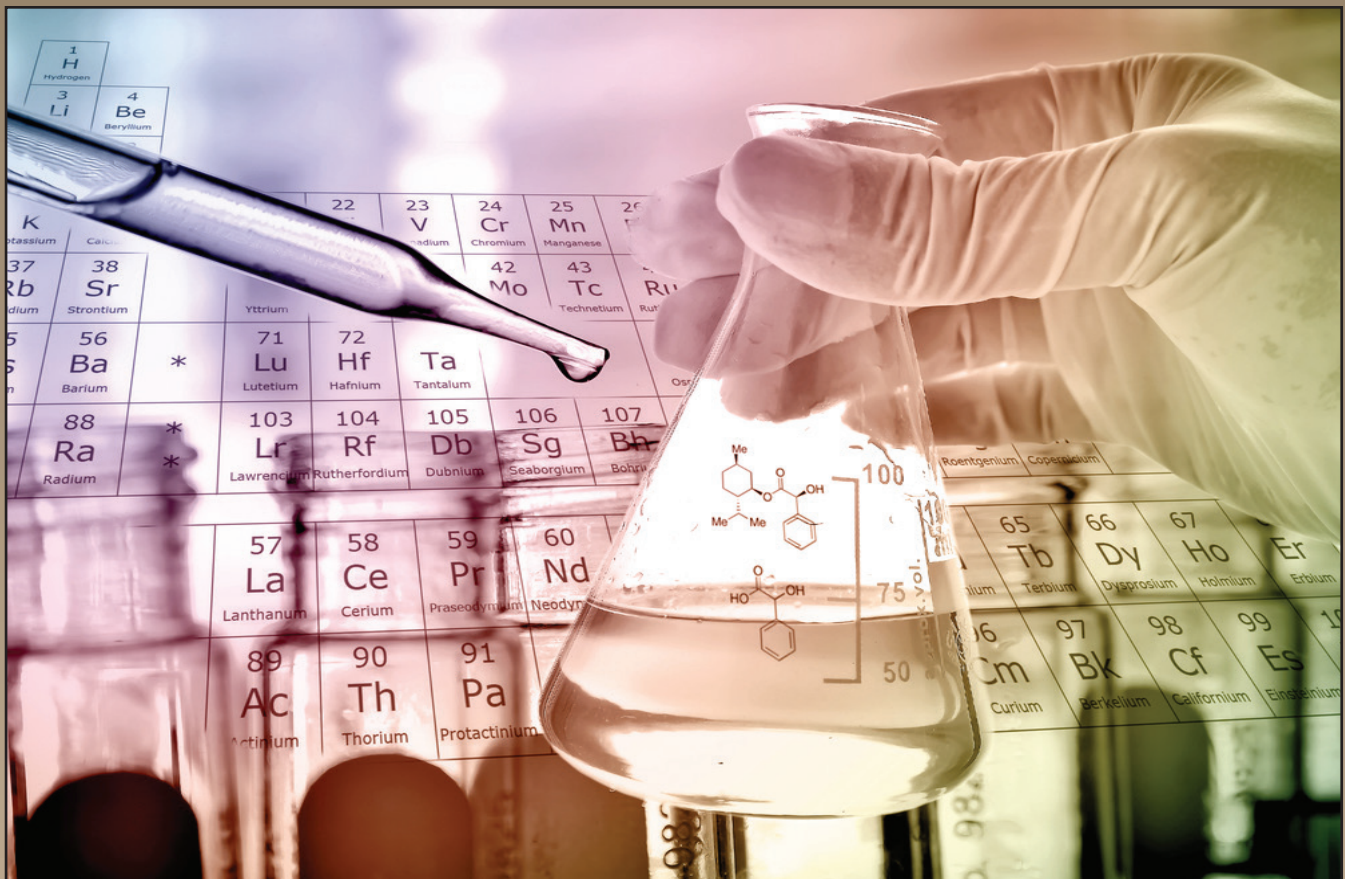


A Fundamental Economic Factor in the Rare Earth Space: **ACID**

By Stephan Bogner (Dipl. Kfm., FH)



Article #1 "The Knock-Out Criteria for Rare Earth Element Deposits: Cutting the Wheat from the Chaff" and article #2 "Knocking Out Misleading Statements in the Rare Earth Space" can be downloaded [here](#).

Article #3 "Rare Earth Deposits: A Simple Means of Comparative Evaluation" can be downloaded [here](#).

Article #4 "Ashram - The Next Battle in the REE Space between China & ROW?" can be downloaded [here](#).

Article #5 "Putting in Last Pieces Brings Fortunate Surprises?" can be downloaded [here](#).

Article #6 "What Does the REE Market Urgently Need? (Besides Economic Sense)" can be downloaded [here](#).

Article #7 "The Rare Earth Mine-to-Market Strategy & the Underlying Motives" can be downloaded [here](#).

A Fundamental Economic Factor in the Rare Earth Space: ACID

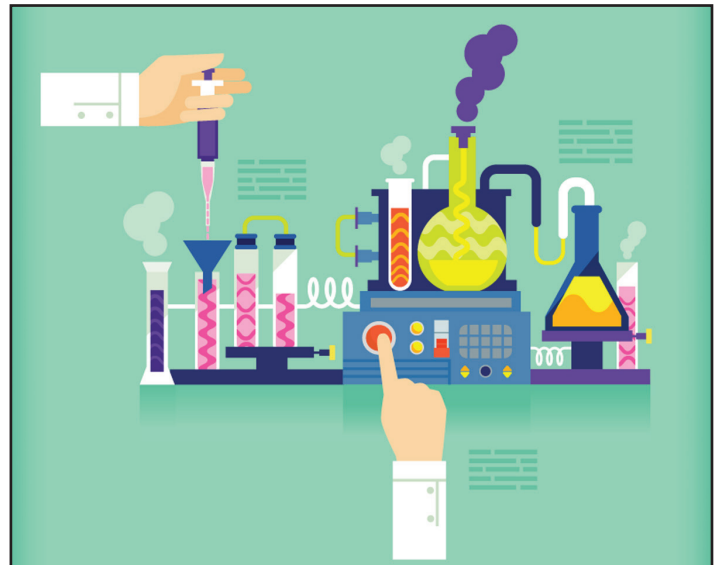
In our [prior article](#) we discussed the contrasting business strategies in the rare earth element (REE) space in an effort to better understand the motives behind them. I concluded that the production of an intermediate mixed REE product was the preferred strategy, as opposed to a goal of producing separated oxides, and further, that a simple and low-cost flowsheet allows for this strategy to be practical. I then left our readers with a simple graphic illustration of various project’s material tonnages/volumes entering the extraction stage, following ore mineral processing and upgrading, where acid attack is required; leaving our readers to ponder the downstream flowsheet implications. I would like to further discuss these “implications” herein, and moreover, how a project’s viability is intimately associated with the consumption of acid.

Acid is a commonly overlooked aspect in the evaluation of an REE deposit, although it is often **the largest operational cost of the project**. Acids are expensive chemicals that are required for various processing techniques and **are a major component of any REE flowsheet, regardless of host rock or mineralogy**. Acids are used in a variety of manners within a flowsheet with the largest consumption required in the extraction stage for solubilizing the REEs in the solid feed, i.e. placing them into solution. The extraction stage is also where the largest overall project operational cost (\$/tonne) will typically be incurred, and therefore, where the largest single impact on operating margins will be incurred.

Therefore, **to truly understand the nature of an REE flowsheet, one must understand the mass (i.e. tonnage) of feed (often misnomered as “volume”) entering the extraction stage compared to the ore mined, as well as the amount of acid required to react with this feed.**

The remainder of this article will endeavour to discuss the roles of acid in REE flowsheets, the impacts of acids in relation to the viability of an REE flowsheet, and further outline why this is important to understand with respect to a project’s economic viability.

In addition, at the end of this article I have included some basic background on acids and bases for our readers and so will move directly to a discussion on their use in REE processing.



Acid Use in REE Processing

In order to understand how and why acids are used in REE processing, an understanding of the three main processing stages is needed; **mineral processing, extraction and bulk recovery, and separation.**

Mineral processing includes comminution (i.e. grinding) and subsequent methods of rare earth mineral recovery and upgrading (beneficiation) to a mineral concentrate. This is done by exploiting the minerals’ physical characteristics with the help of gravity, magnetics, electrostatics, flotation, etc. Chemical upgrading may also be performed to remove gangue minerals by selectively attacking them using acids or bases.

The next stage is **extraction and bulk recovery**, whereby the product of mineral processing (mineral concentrate or mined ore if not amenable to upgrade) is chemically attacked to form soluble REE compounds, followed by leaching to bring the REEs into solution. After partial impurity removal, the result is a crude rare earth precipitate at a targeted purity (e.g. mixed rare earth carbonate).

The third stage is **separation**, where the crude precipitate is further processed into separated rare earth oxides (REOs) to fit customer specifications. A **refining** stage may also follow **separation**, whereby specific separated REOs are refined to high-purity end-use products with very tight specifications (e.g. autocatalysts, polishing agents, phosphors).

Acids are used throughout the REE flowsheet, predominantly in the extraction and separation stages, in a variety of manners and steps to dissolve or precipitate target minerals or elements respectively. However, **common to all REE flowsheets, the largest quantities of acid are typically consumed in the extraction circuit (hydrometallurgy) where acid is required to react with the feed material and allow dissolution of the REE.** Depending on the type of acid used and its market price, grade of mineral concentrate (if not ore), and gangue minerals present, the overall consumed acid cost could range over \$200 per tonne of ore milled in some flowsheets. This makes minimizing acid consumption in an REE flowsheet a high priority.

The objective of the acid addition at the start of the extraction stage, typically at high temperature (200-300°C), is to convert the REEs to a soluble form. This chemical reaction releases the REEs from the solid mineral state, and allows them to be brought into aqueous solution from which they may then be isolated from other impurities, and precipitated. The acid reaction process typically produces a solid 'cake' that contains readily water-soluble REEs, and often one may see a "water leach" after the acid bake noted in disclosure. This water leach is what actually places the elements (REE and impurities) into solution. **All REE projects must go through a variation of this stage, including the South China Clays** where H₂SO₄ or ammonium sulphate (NH₄)₂SO₄ is used to elute (i.e. "leach") the ion-adsorbed REEs into solution. This makes acid consumption in the extraction stage a good metric for relative comparison among most REE projects.

The mineralogy (REE and gangue) and nature of the feed (mined ore vs mineral concentrate) determine the method of dissolution. High-grade monazite or xenotime concentrates may be 'cracked' using the strong alkaline (base) chemical sodium hydroxide (caustic soda), as is common with mineral beach sand deposits. Although this alkaline method can be very effective, it is not common as very few deposit types and mineralogies are amenable to production of a high-grade (>50% TREO), clean monazite/xenotime mineral concentrate. However, the Ashram Deposit of Commerce Resources Corp. is one such project that may be able to evaluate caustic soda as an option in the extraction stage as its mineral concentrates continue to improve in grade.

Alternatively, bastnaesite concentrates from China are commonly attacked using sulphuric acid, creating REE sulphate compounds that are readily water-soluble.

In another method, hydrochloric acid was used at the Mountain Pass Mine (USA) following a high temperature roast of a 60% REO bastnaesite mineral concentrate. For REE projects in development, **sulphuric acid is the most commonly used acid for material dissolution following the mineral processing stage as it attacks effectively a variety of minerals.**

Sulphuric acid has a strong corrosive character that makes it ideal for dissolving a range of feed types in the extraction stage by creating soluble sulphate compounds. **It is also relatively cheap, available in large quantities, may be handled and transported safely, and is effective at breaking down highly refractory minerals when heated to high temperatures.** Another key advantage is that sulfate forms a solid product for disposal (as opposed to the liquid wastes created by the use of chloride and nitrate reagents).

A listing of common acids and bases used in a typical REE flowsheet is noted in the table on the next page.

Acids and bases are commercially available in a narrow range of standard concentrations; with hydrochloric acid (37%) and sulphuric acid (98%) being good examples, although different concentrations may be achieved through dilution in water. Upper concentrations are limited by a variety of factors. HCl, for example, will leave the aqueous state and enter the gaseous state above ~37% concentration, hence its common commercial availability in concentrations of 32-37%.

Further to HCl, to make matters more confusing, hydrometallurgists will typically express its consumption in a flowsheet on a "100% HCl basis". This is about 2.7 times the concentration it is commercially available in, meaning if the consumption is 100 kg/t (100% HCl basis), the volume required as a 37% aqueous solution is ~2.7 times higher. The good news is that the "100% basis" for HCl is pretty standard disclosure in the space.

A common misconception is that a company will have to ship the acid in aqueous form for use, which is not always the case. For example, the need for HCl in a circuit does not mean a company must ship truckloads of aqueous HCl across the land/sea to its hydrometallurgical plant, as it can also be readily generated from solid forms more amenable to cheaper transport and storage (e.g. calcium chloride). There are also several methods of recycling HCl in the circuit so net HCl consumption may be reduced.

Table 1: Acids and Bases Common to REE Project Flowsheets

Chemical Name	Formula	Acid / Base	Typical Concentration	~ \$/tonne (FOB, China)	Main Flowsheet Use	Typical Magnitude of Consumption, 100% basis (kg of chemical relative to tonnes of mined ore)
Sulphuric	H ₂ SO ₄	Acid (strong)	98%	\$150-300	Solubilize REEs for extraction circuit	~250 to >1,000 kg/t
Hydrochloric (Muriatic)	HCl	Acid (strong)	37%	\$150-300	Solubilize REEs for extraction circuit, Leach carbonate and/or mid-flowsheet crude products, pH modification	<100 to >1,000 kg/t
Nitric Acid	HNO ₃	Acid (strong)	68%	\$350-500	Solubilize REEs for extraction circuit, dissolving crude rare earth products for further purification	20 to >1,000 kg/t
Oxalic Acid	H ₂ C ₂ O ₄	Acid (weak-strong)	100%	\$600-1,000	Precipitate REEs as oxalates	15 to 150 kg/t (~1.5 - 4 kg / kg REO Produced)
Hydrofluoric Acid	HF	Acid (weak)	48-55%	\$1,000-1,500	Potential by-product in some flowsheets due to presence of fluorine	n/a
Acetic Acid	CH ₃ COOH	Acid (weak)	100%	\$500-800	Elution of REE from <i>Solid Phase Extraction</i> (SPE) process	15 to 150 kg/t (nominally regenerated)
Fluorosilicic Acid	H ₂ SiF ₆	Acid (fairly strong)	23-40%	\$500-800	pH modification and pyrochlore activator in flotation	<<1 kg/t
Sodium Hydroxide Solution (Caustic Soda)	NaOH	Base (strong)	50%	\$350-500	Caustic crack of high-grade, high purity monazite/xenotime concentrates	<50 kg/t (due to high-grade concentrate required)
Sodium Hydroxide Solid (Caustic Soda)	NaOH	Base (strong)	99%	\$300-500	Caustic crack of high-grade, high purity monazite/xenotime concentrates	<50 kg/t (due to high-grade concentrate required)
Calcium Carbonate (Limestone)	CaCO ₃	Base (weak)	>95%	\$10-20	Liquor neutralization agent	Highly Variable
Ammonium Hydroxide	NH ₄ OH	Base (weak)	25-28%	\$200-400	Liquor neutralization agent	Highly Variable
Calcium Oxide (Lime, Quicklime)	CaO	Base (strong)	>90%	\$100-150	Liquor neutralization agent	Highly Variable
Sodium Carbonate (Soda Ash)	Na ₂ CO ₃	Base (moderate)	>99%	\$150-250	Liquor neutralization agent	Highly Variable
Sodium Bicarbonate	NaHCO ₃	Base (weak)	>99%	\$150-250	Liquor neutralization agent	Highly Variable

A similar option exists for sulphur whereby elemental sulphur (S) may be shipped to site at roughly 1/3 the tonnage/volume of the liquid sulphuric acid. A plant may be built on-site to convert this elemental sulphur to acid and may also provide some net energy to the overall project as an added bonus. The negative is a larger upfront capital expenditure (CAPEX) to build the plant, although the benefit is typically a lower operating expenditure (OPEX).

Each acid/base is chemically unique, with an equally unique ability to attack materials to different degrees and manners. For example, nitric and sulphuric acids are both strong acids; however, they do not attack materials with equal efficiency, nor do they chemically interact in the same ways. Although, each acid/base is unique, with principles like ‘normality’ and ‘molarity’ applied for more accurate assessment, these principles are not required for the evaluation herein **as all that really matters in a rare earth flowsheet, apart from the acid/base being effective, is the tonnage consumed and the associated cost (purchase, shipping, storage, handling).**



Project Comparison

In order to further understand why the consumption of acid in a typical REE flowsheet is important to a project’s economic viability, I would like to relate back to the OPEX of the project.

As you may have found, it is a difficult task to properly compare the overall project OPEX of rare earth projects.

It is not as simple as directly comparing among projects the \$ per tonne mined or \$ per kilogram REO produced. This is because projects end at different processing stages, yielding products that vary widely in form, cost of production, purity, and value at sale (e.g. the two contrasting business strategies; individually separated REO vs a mixed REO concentrate). This is something that must be understood for any comparative evaluation. Simply put, **the OPEX of a project must be related back to the final phase of metallurgy completed**; however, this is not always clear in company disclosure. For example, the separated oxide business strategy will typically have an OPEX as much as 200-300% higher than those producing a readily marketable intermediate mixed REO product.

As alluded to above, the largest OPEX portion of any REE project flowsheet is almost always the reagent consumption (i.e. acid) in the extraction stage. Therefore, understanding the tonnages consumed, and why they are required, helps in the evaluation of a project’s metallurgy, and thus, ultimately, the economics of the project itself. **Understanding reagent consumption and cost may be viewed as an effective manner of gaining early insight into a project’s economic viability, as well as serving as a general metric of comparison among projects.**

Unfortunately, it is a difficult task to compare acid consumptions directly between REE projects. The disclosure is simply foggy at best, and acid consumptions are commonly not even disclosed, or are not disclosed properly to allow for a comparison (e.g. is consumption relative to mined ore or to mineral concentrate?). So a quantitative comparison is just not practical. However, we are still able to indirectly evaluate this aspect of a flowsheet based on other deposit characteristics, including mineralogy and metallurgy, specifically, the mineral processing phase where the largest impact on downstream acid consumption is determined. Such additional metrics of evaluation will aid in identifying ‘red flags’ or other pertinent indicators of a project’s potential economic viability.

In terms of disclosure, there are some exceptions to the norm. Certain companies, Commerce Resources for example, are very transparent on their acid consumptions. As this information is critical to a project’s viability, it could be assumed that the lack of such transparency in disclosure is a ‘red flag’.

The primary means of reducing acid consumption in a flowsheet is to reduce the mass requiring acid attack (i.e. upgrade to a mineral concentrate). Silicate (i.e. granitoid) dominated deposits typically have complex

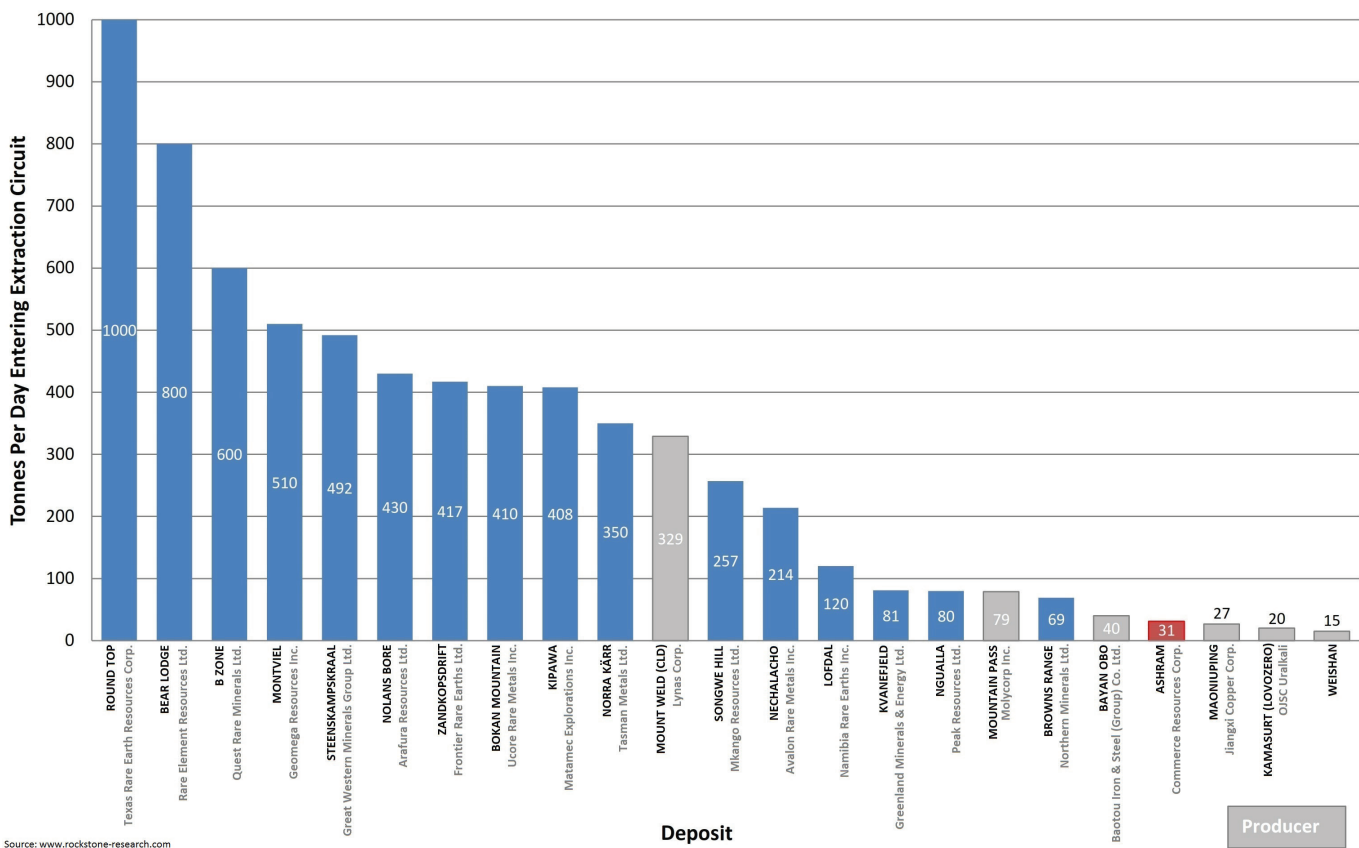
and unusual REE mineralogy that has never been commercially processed (e.g. eudialyte, kainosite, allanite, zircon); therefore, they are typically not amenable to upgrade to a high-grade mineral concentrate. Carbonate dominated deposits, on the other hand, typically have simple and well-understood mineralogy (e.g. monazite, bastnaesite) amenable to physical upgrade to a high-grade mineral concentrate (>30% TREO). This ability to upgrade to a >30% TREO mineral concentrate **removes the majority of the acid consuming minerals, typically resulting in a significantly lower total acid consumption (i.e. lower kg/t ore or kg/REE produced, as well as total volume consumed) compared to other deposits.** Although silicate deposits have gangue mineral suites that consume less acid compared to carbonates, their inability to concentrate those REE minerals into a high-grade mineral concentrate negates the advantage.

The significant advantage of amenable physical upgrade to a mineral concentrate that carbonatite deposits have is further reflected in world production, past and present, which is dominated by this rock type. **As mineral processing requires only small amounts of**

acid (e.g. pH control in flotation), it is the lowest cost of the three stages to complete, yet will determine the feed tonnages entering downstream processing, thereby having the largest impact on overall flow-sheet economics. This means less mined material requires attack with acid in the extraction stage, which then equates to less tonnage of acid required per year, and further to a **reduced OPEX and CAPEX.**

The following graph, also presented in our prior article, illustrates this simple idea. For direct comparison, a mining operation of 1,000 tonnes of ore per day is assumed to show the resulting daily feed tonnages that would enter the extraction facility for each project, based on their ability to physical upgrade to a mineral concentrate. **The projects with the least amount of tonnage entering the extraction facility are most likely to be processed downstream at the lowest cost,** as they have successfully removed the most gangue material during the prior mineral processing stage. Based on this method, Commerce Resources Corp.'s Ashram Deposit is the clear leader with less than half the input as the closest peer project in development.

Estimated Daily Treated Material Tonnages Entering Extraction Plant
(Assuming 1,000 t/d Operation)



Projects that are able to successfully upgrade to a high-grade mineral concentrate will have a strong advantage in terms of an economic metallurgical OPEX and CAPEX. This is clearly illustrated by the major current and past operating REE mines that, apart from the South China Clays, all operate at >30% TREO mineral concentrates (Bayan Obo, Mountain Pass, Maoniuping, Weishan, Kamasurt). The main impetus driving the need for high-grade mineral concentrates with these producers is simply the resultant decrease in consumables and corresponding OPEX; i.e. acid consumption! The graph clearly illustrates that the current producers, moreover the long established producers, effectively process less than 5% of their original mass downstream.

Reducing the mass in mineral processing will also have a large impact on the size of the front-end extraction circuit where the feed is processed, which, will in turn have a significant impact on the CAPEX of the project, as a larger circuit means more space and equipment is required. So, in addition to lower acid consumption being a positive simply due to less material requiring dissolution, upgrading to a mineral concentrate also **results in smaller downstream chemical circuits that require less equipment (reduced CAPEX), smaller storage requirements (reduced CAPEX), as well as reduced material handling and shipping requirements (reduced OPEX).**

Another important factor to note is that carbonatite deposits typically have to mine less material to achieve the same production quantity as other types of deposits, because of their characteristically higher grades. Coupled often with comparatively complex mineralogy leading to difficult mineral processing, **the acid consumption of a typical silicate dominated REE deposit, for example, is much more difficult to reduce than a typical carbonatite deposit.** This brings things back to the material handling issues facing large acid consuming projects. **Looking past the simple metric of kg of acid consumed per kg of ore, the sheer magnitude of tonnage/volume to store, ship, and handle may simply not be practical.**

The presence of carbonates in carbonatite deposits also has one other significant advantage over all other types of REE deposits, as it may allow for capacity to neutralize acidic waste streams (tailings) generated by hydromet processing. Non-carbonate deposits do not have this potential and therefore must rely on the purchase and shipment of calcium oxide (or another base). This is another reason why upgrading to a mineral concentrate is key to a project's flowsheet; the reduced tonnage of feed mate-

rial also reduces the amount of liquor (waste stream) to be neutralized. **This is a major issue for remote non-carbonate dominated deposits and one that is often poorly understood, and poorly disclosed.**

There are always exceptions to the rule, with one being that a select few silicate deposits that are not easily upgradeable may be able to mitigate some of this resultant additional acid consumption if their REE mineralogy is amenable to selective leaching from the gangue. This may significantly reduce the acid consumption required to solubilize the REE from the feed material. Matamec's Kipawa Deposit is an example as eudialyte, its dominant REE mineral, may be selectively dissolved from its gangue at low temperatures and acid concentration. The Kipawa Deposit is an advanced stage Dy-Y project, but is constrained by a low total REO grade, low tonnage, and an REE mineralogy that has not been processed commercially, all of which may collectively play a role in the perception that their joint venture partner (Toyota Tsusho) have walked away from the project.

Of course, with this type of flowsheet, a trade-off exists by way of a larger front-end hydromet circuit, as well as treatment of the remaining gangue that contacted the acid which would result in some additional CAPEX and OPEX component. In terms of silicate deposits in development, very few have this potential ability to selectively leach the REE minerals from the gangue.



Conclusion

There are many factors that go into evaluating a rare earth project. Grade and tonnage are simply not enough on their own, which is in stark contrast to many other commodities (see our previous [article](#) entitled “Rare Earth Deposits: A Simple Means of Comparative Evaluation”). The REE space is not as simple as iron ore or gold, as there are many intricacies that make each REE deposit a unique blend of critical attributes.

I prefer to focus on companies that are putting their money towards aspects where the largest impact to the project’s viability will be determined. In the rare earth space this is, without question, metallurgy. It is not enough for a company to simply state they have a flowsheet that works. Yes, this is an achievement; however, this is not the one that matters. **The ultimate achievement is a low cost, and ultimately economic, process flowsheet.** It is all that really matters as a first pass and far too often this is forgotten. It is the number one showstopper in the REE space, and one not all exploration companies take seriously enough as evidenced by seemingly flawed business strategies and lack of focused work on the flowsheet.

A valuable tool for a typical investor to help distinguish this aspect among REE projects is the amount of inferred acid consumption that a flowsheet requires. As the feed dissolution in the extraction stage consumes the largest quantity of acid in a typical REE flowsheet, it is essential to concentrate the REE minerals into a smaller volume through generation of a mineral concentrate in the preceding mineral processing stage. **Removing acid consuming gangue minerals by physical mineral processing is the ideal way of reducing overall acid consumption, and will have the largest impact on CAPEX and OPEX of a flowsheet through the size of circuit and equipment required (CAPEX), as well as the tonnage/volume of consumables purchased coupled with their shipping/handling needs (OPEX).**

Poor disclosure of the acid consumption and related flowsheet parameters should be viewed as a “red flag” with respect to a deposit’s economic viability. Therefore, next time you read a Preliminary Economic Assessment, Prefeasibility Study, or Feasibility Study, I recommend to take note of:

1. If the ore is amenable to physical upgrading and, if so, **the grade of mineral concentrate produced,**

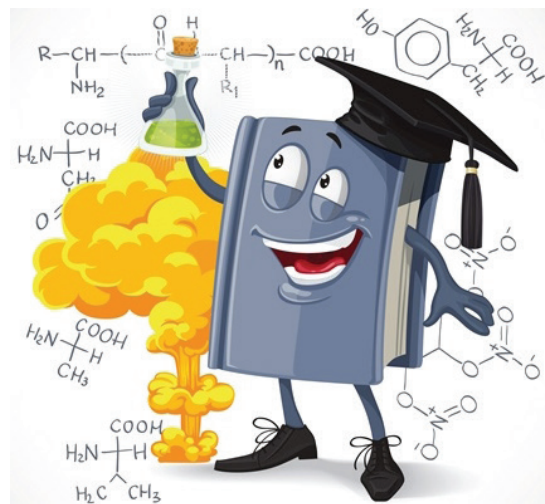
2. The **acid consumption** in the extraction stage (relative to per tonne of ore processed),

3. The **total tonnage/volume of acid required** in the extraction stage, and

4. The **total tonnage/volume of purchased calcium oxide** (or similar) required for neutralization.

Such disclosure, as noted above, will provide a good early indication of economic viability and flexibility of the project as a whole. Lack of such disclosure is to be taken as a negative indicator, I suggest.

As I continue to read company disclosure in the REE space, the most transparent company with respect to its flowsheet progress and strategy forward is Commerce Resources Corp. This company has not wavered from its business strategy since the projects inception, targeting a strategic joint venture partner to maximize shareholder value, in addition to demonstrating a low-cost flow-sheet allowing for versatility in project de-risking through robust economics and a marketable intermediate REO product. For these reasons, **I continue to hold Commerce Resources Corp. and its Ashram Rare Earth Deposit as my number one pick for success in the REE space.**



SUPPLEMENTARY INFORMATION Basic Background

We all have heard of the pH scale, a measure of acidity or basicity on a scale of 0 to <7 (“acidic”) through >7 to 14 (“basic” or “alkaline”) with water close to neutral (pH 7). However, the pH scale is more accurately described as a measure of the concentration of hydrogen ions (H⁺) in solution. Acids make the

pH lower as they dissociate in water, placing **hydrogen ions into solution** (e.g. $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$). Alternatively, bases make the pH higher as they dissociate in water, placing **hydroxide ions into solution** (e.g. $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$). Hydrogen ions and hydroxide ions may react with each other to form water ($\text{OH}^- + \text{H}^+ \rightarrow \text{H}_2\text{O}$). Acids and bases therefore may neutralize each other, giving a pH of 7, when the number of hydrogen ions (H^+) equal the number of hydroxide ions (OH^-).

The term “acid” or “base” is general in nature, encompassing a variety of unique and corrosive(acid)/caustic(base) chemicals, often in aqueous solutions. Acids and bases may be referred to as weak or strong based on their tendency to dissociate (ionize) in water; weak acids/bases partially dissociate, while strong acids/bases completely dissociate (e.g. $\text{HCl}(\text{acid}) \rightarrow \text{H}^+ + \text{Cl}^-$, $\text{NaOH}(\text{base}) \rightarrow \text{Na}^+ + \text{OH}^-$).

Some acids and bases are used in everyday life and are not dangerous to us. Vinegar, for example, is just a 5-8% solution of acetic acid and water with a pH of 2.4-3.4. Further, a dilute solution (10% concentration) of hydrochloric acid (HCl) is a common field tool for geologists to tell dolomite (minor to no fizz) from calcite (strong fizz) as HCl reacts with the mineral to release CO_2 . Baking soda (sodium bicarbonate) is a base that has common household uses as a cleaning agent and for odour control.

Other strong acids such as sulphuric and hydrofluoric, or strong bases such as sodium hydroxide, are commonly used in industry and requires extremely attentive handling as they may be highly corrosive to materials and/or people.

The use of both acids and bases in an REE flowsheet is ubiquitous, with both potentially having a large impact on a project’s capital and operating expenditures.

Technical Analysis

The new upward trend in share price on the TSX.V started in December 2013 thanks to Commerce Resources announcing a “metallurgical breakthrough”.

Since then, the upward-trend takes place within the (green) channel. After strong increases, the price tends to consolidate sideways beneath the (red) resistance. As soon as the (red) resistance is broken successfully, a strong buy-signal is generated, espe-

cially if the price happens to have completed consolidation to the lower (green) channel/trendlines. As the price just fell to the lowermost (green) support trendline, we expect a strong upward-trend to start again as soon as the (red) resistance is broken. In such an event, we anticipate the share price to increase to the uppermost (green) trendlines.



Disclaimer and Information on Forward Looking Statements:

All statements in this report, other than statements of historical fact should be considered forward-looking statements. Much of this report is comprised of statements of projection. Statements in this report that are forward looking include that rare earth element prices are expected to rebound; that Commerce Resources Corp. can and will start developing its projects into a mine; that exploration has or will discover a mineable deposit; that the Plan Nord will be executed; that someone is interested in partnering up, etc. These statements involve known and unknown risks, uncertainties and other factors that may cause actual results or events to differ materially from those anticipated in these forward-looking statements. Risks and uncertainties respecting mineral exploration companies are generally disclosed in the annual financial or other filing documents of Commerce Resources Corp. and similar companies as filed with the relevant securities commissions, and should be reviewed by any reader of this report. In addition, with respect to Commerce Resources Corp., a number of risks relate to any statement of projection or forward statements, including among other risks: the receipt of all necessary approvals; the ability to conclude a transaction to build the mine; uncertainty of future production, capital expenditures and other costs; financing and additional capital requirements for exploration, development and construction of a mine; the receipt in a timely fashion of further permitting for its projects; legislative, political, social or economic developments in the jurisdictions in which Commerce Resources Corp. carries on business; operating or technical difficulties in connection with mining or development activities; the ability to keep key employees and operations financed. There can be no assurance that such statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers should not place undue reliance on forward-looking information. Rockstone and the author of this report do not undertake any obligation to update any statements made in this report.

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