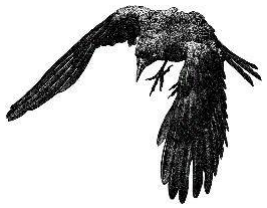
INDUSTRY REPORT
//Rare Earths



STORMCROW

INITIATING SECTOR COVERAGE
The Rare Earths Market Keeps Changing

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Magnets will Show Us the Way

- "Cheap and Cheerful" not Enough: In some of our past work, while rare earth prices were high and financial investors were interested, we conjectured the first success stories in the REE space would be relatively inexpensive and economically viable projects, regardless of their mine life. That is unlikely, given the capital market's lack of interest in resources. If strategic investors are going to become interested, they need projects to meet certain criteria, and those criteria are much more stringent than being inexpensive.

- Magnets and more Magnets: The main driver for any level of interest will be, we believe, magnet materials. Specifically, unless a project will produce meaningful levels of neodymium/praseodymium and/or dysprosium, it will probably not matter.

- Passing Muster: Our criteria for selection of these "strategic grade" projects doesn't leave too many projects standing, but we truly don't need many, anyway. This list includes Molycorp (MCP-US) and Lynas (LYC-ASX), two current producing projects, along with Arafura (ARU-ASX), Rare Element Resources (RES-US) and Quest Rare Metals (QRM-TSX). There are perhaps a few names that deserve honorable mentions, in that they are only eliminated from discussion on the grounds of more subjective criteria, but the above serves as a reasonable starting point.

- Supplies and Prices: With the above five names providing supply into the rest-of-world market for rare earths, we anticipate that by 2020 prices will allow for a reasonable profit to be made by all the names. And even more importantly, we have developed a "pessimistic" or "worst-case" price deck, against which all of the companies listed above would at least survive. Against this supply backdrop, we have produced our "base-case" REO price deck, through 2025.

See the end of report for important disclosures

The Recent History of REEs

The rare earth industry outside of China is nothing if not changeable. Both Molycorp (MCP-NYSE) and Lynas (LYC-ASX) have been unable to generate profits, and both have been hamstrung in doing so by a combination of ongoing technical issues that have affected their plant operations and production ramp, along with a market that is struggling to recover from the price shocks imposed on it by the sudden imposition of stringent Chinese export quotas in mid-2010. While Molycorp management has been adamant that the market for physical rare earths is becoming stronger, that the company is "selling every molecule" it makes, the movement of market capitalizations for companies in the space have suggested that institutional financial investors have abandoned the rare earth space. But in order to encourage the recovery of demand outside of China, it will be necessary to provide sufficient material to end users. This will only happen if additional financing to build new mines is available, because the output from Lynas and Molycorp alone is likely insufficient and is insufficient, in our view, to guarantee the necessary engineered products for end-users, particularly for users of high-strength magnets.

At the same time, however, end users of rare earths have not changed their opinions regarding rare earths. Indeed, across the board, whether the commodity under discussion is graphite, rare earths or any other Chinese-dominated commodity, the opinion of end-users is that they must diversify away from Chinese supply. This opinion is driven by two main factors. One is the willingness of the Chinese ministries to restrict supply of materials through direct action, such as imposing export quotas on rare earths or tungsten. The other is the increasing concern in China with respect to environmental damage, and the lax environmental controls in place at existing suppliers in China, exemplified by a major rare earth supplier such as Inner Mongolia Baotou Steel Rare-Earth Hi-Tech Co. (600111-Shanghai) suffering a delayed export approval due to environmental lapses some time ago and the temporary closure of various suppliers of natural flake graphite and related products to improve environmental practices in Heilongjiang province this year. End-users require reliable supply of critical materials, and policies that restrict such access, or that risk suppliers being shut down without warning, cannot be tolerated.

In the case of rare earths, there are specific issues that pertain. There are few automotive engineers that would debate this, outside of perhaps the engineers at Tesla Motors (TSLA-NASDAQ), but in both hybrid and fully electric automobiles it is a permanent magnet synchronous motor (PMSM) using rare earth-based permanent magnets that provides the most efficient and most cost-effective solution within a drive train. We will not reopen this debate, if the reader is

curious there are a number of publications from SAE International (previously known as the Society of Automotive Engineers) that outline the reasons why PMSMs incorporating neodymium iron boron (NdFeB) magnets support lower operating and capital costs in vehicles. There is no good alternative option to direct-drive generators incorporating NdFeB magnets in very large off-shore wind turbines, due to the enhanced reliability and increased efficiency of a direct-drive generator incorporating very large permanent magnets over a conventional generator with a mechanical transmission. It is impossible for motors using induction designs or ferrite magnets to be as small and light as a motor using rare earth magnets in aerospace applications. It is clear that there is an ongoing need for rare earths in the automotive, wind power and aerospace industries.

At the same time, however, neither of the current ex-China producers of rare earths, Molycorp nor Lynas, is able to produce a substantial quantity of dysprosium (Dy). The Achilles' heel of NdFeB magnets is that while they are capable of producing intense magnetic fields, enabling very small and very high power motors, those same magnets are susceptible to de-magnetization if their temperature rises too high in those same high power applications. Dysprosium acts to counter this effect, allowing a much higher operating temperature before de-magnetization can occur, or even have an appreciable impact during operation. While there are various physical processes that can produce NdFeB magnets that are more resistant to de-magnetization without using dysprosium, none of them have the history or the industry acceptance of using dysprosium. We have previously described (in publications issued while we were at Byron Capital Markets, as well as in less formal conference presentations and Internet postings) why we believe that, as dysprosium use declines as a percentage component of NdFeB magnets and helps to bring down the cost of NdFeB magnets, volume growth in the magnets will climb higher. In order to ensure reliable supply of these magnets, users outside of China will need to be able to buy from new suppliers of magnet materials.

By our argument, above, automotive companies such as Ford (F-NYSE), Nissan (7201-Tokyo), General Motors (GM-NYSE) and their various motor or magnet suppliers would be supportive of the construction of new rare earth mines outside of China. So, too, should wind turbine suppliers such as Gamesa (GAM-Madrid), Siemens (SIE-XE) and General Electric (GE-NYSE). Even aerospace companies such as Boeing (BA-NYSE) and Lockheed Martin (LMT-NYSE) and their motor suppliers such as Thales (HO-FP) or Eaton (ETN-NYSE) should be concerned about reliable and cost-effective supplies of rare earths outside of Chinese ministry control.

Thus, to our way of thinking, the argument as to what types of rare earth projects may come to market has shifted. In 2010 and 2011, our argument went that financial investors would likely support the "cheap and cheerful" rare earth project. This was our description for a project that required no more than a few hundred million dollars in capital expenditure, and that could be brought to market relatively quickly, in no more than four years. However, the rapid avoidance of high-priced rare earths by industry (both outside AND inside China, to be fair) led to rapidly declining prices and a complete loss of interest on the part of investors. And that means that the only immediate support for rare earth projects will be motivated by strategy, most especially from end-users.

If true, then the requirements of strategic users should dominate the discussion of what projects will garner support and survive. These requirements form the backbone of project selection by groups like the German Rohstoffallianz, the collection of German companies seeking security of supply for selected critical materials. This list, we believe, includes such factors as the ability of a project to supply for a very long period of time, a requisite high level of geopolitical stability of the nation in which the project is located, and economic viability of the project, among a number of other factors. When major corporations are allocating support for a project, whether that project costs $300 million or $600 million to build is less a concern than whether the operating costs provide for a potential 5% or 50% margin.

Future Pricing of REOs

Our previous "pessimistic" rare earth price deck, which was discussed in various forums including the blog InvestorIntel, was designed to answer a simple question asked of us by institutional investors. That is, how bad can rare earth prices get? By and large, institutional investors do not have the time to devote to deep inspection of commodities with small markets. These fund managers can be forgiven for thinking that, given the precipitous fall in rare earth prices since late 2011, rare earth prices might be headed to zero. Our "pessimistic" price deck looked to a rather unlikely combination of circumstances, that sufficient financial backing was available to build enough new production capacity to satiate demand in almost all rare earth markets. This resulted in rather low prices, especially in the interim period from 2015-2019, through to 2025. In spite of this, however, more than a few projects continued to generate positive cash flows and would survive. However, if additional major suppliers entered the market, we showed that prices would be depressed to the point that some suppliers would be forced to exit the market. This is truly "as bad as it can get".

Exhibit 1 – "Pessimistic" Rare Earth Price Deck

Year	2009	2010	2011	2012	2013	2014e	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f	2025f
Lanthanum Oxide (99%min, US$/t)	4,604	23,820	98,757	25,547	7,866	6,451	6,301	5,952	4,915	4,692	4,480	4,081	4,124	4,169	4,217	4,266	4,318
Cerium Oxide (99%min, US$/t)	3,437	23,102	98,217	24,684	7,863	6,575	5,443	4,219	3,385	2,516	2,367	2,164	2,172	2,181	2,190	2,199	2,208
Praseodymium Oxide (99%min, US$/t	14,381	49,338	204,067	116,162	91,385	107,262	111,320	105,961	87,798	68,871	70,178	67,874	70,755	73,978	77,575	81,631	86,238
Neodymium Oxide (99%min, US$/t)	15,208	50,635	250,574	122,364	71,833	68,243	64,716	61,063	47,241	36,977	41,403	43,274	46,852	51,195	56,529	63,264	72,036
Samarium Oxide (99%min, US$/t)	3,429	16,000	104,816	58,032	13,296	7,219	6,847	6,065	4,629	3,791	3,055	2,259	2,374	2,492	2,612	2,735	2,860
Europium Oxide (99%min, US$/kg)	478	553	2,923	2,596	1,095	855	692	509	416	364	357	304	306	308	310	313	315
Gadolinium Oxide (99%min, US$/t)	n/a	10,707	62,724	24,167	24,033	15,001	11,723	6,974	3,549	3,244	2,563	2,286	2,382	2,490	2,613	2,752	2,913
Terbium Oxide (99.9%min, US$/kg)	360	557	2,344	2,026	920	788	758	697	497	463	382	360	363	366	369	372	375
Dysprosium Oxide (99%min, US$/kg)	109	235	1,508	1,190	555	450	443	412	326	325	248	232	235	239	242	246	249
Holmium Oxide (99.5%min, US$/kg)	n/a	41	303	107	66	61	57	39	17	16	14	13	13	14	14	14	14
Erbium Oxide (99%min, US$/kg)	n/a	90	236	150	68	67	60	52	42	44	30	31	32	33	35	37	39
Ytterbium Oxide (99.99%min, US$/kg	n/a	27	91	113	53	53	55	44	17	17	11	11	11	11	12	12	12
Lutetium Oxide (99.9%min, US$/kg)	n/a	274	827	1,385	1,201	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258
Yttrium Oxide (99.999%min, US$/kg)	n/a	60	143	111	26	22	21	20	19	19	12	12	12	12	12	12	12

Source: Stormcrow

However, the actual situation today is very different from the one we assumed in formulating this pessimistic scenario. It is unlikely that any rare earth project will be funded by pure financial investors. Instead, it seems logical to us that a small number of rare earth projects will be supported by strategic investors, most especially end-users. These same projects will in turn be supported by lenders and perhaps a few financial investors who have taken the time to understand the rare earth market. This is likely to result in a much smaller volume of new supply entering the market through the study period.

To try and better understand what projects fit the criteria of strategic supporters, we began with a database that included 38 later-stage rare earth projects. We then applied cuts to the data that included the following:

- Project is capable of commencing DFS and permitting by end of 2015 (20 projects remaining)
- Project is located in a nation with essentially zero geopolitical risk (14 projects remaining)
- Project has a resource and planned output that supports at least 20 years of production (11 projects remaining)
- Project must produce at least 2,000 tpa of NdPr oxide OR 250 tpa of Dy oxide (9 projects remaining)
- Project must be cash flow positive using our "pessimistic" price deck (7 projects remaining)

- Project must have minimal technical and/or social acceptance risks remaining; production should be from previously processed minerals in minimally populated mining regions

The output of this model consists of only five projects, and two of those are already in production. The group includes both the Mt. Weld CLD and Duncan deposits belonging to Lynas, and Molycorp's Mountain Pass. In addition to these producing projects, Arafura Resources (ARU-ASX) of Australia and Rare Element Resources (RES-TSX, REE-US) of the United States are predominantly LREO developers that make the cut. On the HREO production side, Quest Rare Metals (QRM-TSX) of Canada is the only project that satisfies all our criteria.

Yes, we fully agree that there are many other rare earth projects under examination, albeit far fewer are in active development than was true in 2010 and 2011. However, many of these projects are in geopolitical regions that render them of minimal interest to strategic supporters, or they have social acceptance or technical risks attached to them. While some would argue the degree of that risk in supporting their own personal favorites, we would argue that there is no shortage of good projects available for development and if there is no good reason to take on ANY such risk then we do not believe that a strategic investor such as a corporate end-user will do so.

We maintain the same latent demand models (that is, demand for a commodity or product at reasonable and economic price points) as we have previously used for our "pessimistic" rare earth price deck. There is, of course, a potential level of demand, and a maximum price beyond which substitution pressures take hold, for each use of rare earth in a variety of different industries. For specific rare earths, there may be multiple industrial segments that can use them, each with a different substitution price. For example, to take an extreme case, the latent demand for lutetium (Lu), used in medical scanners, is effectively infinite compared to present or even future production and we would expect to see prices remaining roughly at these historically high levels. However, the price of substitution of neodymium (Nd) and praseodymium (Pr) for magnets used in direct drive wind power generators is likely less than $200 per kg, even though latent demand below this price may grow to be very large. To fully realize such latent demand for REOs, prices must remain below the price point encouraging substitution and supply reliability must be sufficiently strong.

Exhibit 2 – REO Latent Demand (RoW) by Element and Year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Global GDP	-2.0%	4.0%	2.6%	2.3%	2%	3.1%	3.3%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
GDP (China)	8.5%	10.4%	9.3%	7.8%	7.7%	7.4%	7.2%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
GDP Less China	-3.0%	2.8%	1.5%	1.4%	1.5%	2.2%	2.5%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Latent Demands (RoW, in tonnes)																	
La Oxide	14,883	15,299	12,426	7,560	7,674	9,416	11,578	11,832	12,091	12,356	12,627	12,904	13,186	13,476	13,772	14,073	14,382
Ce Oxide	21,715	21,715	13,029	7,817	7,936	8,114	8,314	8,496	8,682	8,873	9,067	9,266	9,469	9,677	9,889	10,106	10,327
Pr Oxide	3,465	3,589	2,938	3,003	3,380	3,861	4,342	4,871	5,221	5,597	5,999	6,431	6,572	6,716	6,864	7,014	7,168
Nd Oxide	10,223	10,591	8,670	8,861	9,066	10,356	11,647	13,067	14,660	16,447	18,452	20,701	21,155	21,620	22,094	22,578	23,073
Sm Oxide	1,738	1,429	1,451	1,428	1,421	1,453	1,503	1,536	1,570	1,604	1,639	1,675	1,712	1,749	1,788	1,827	1,867
Eu Oxide	234	240	244	248	126	128	132	135	137	140	144	147	150	153	157	160	164
Gd Oxide	1,042	1,081	1,109	1,135	1,164	1,202	1,243	1,283	1,324	1,366	1,410	1,455	1,501	1,549	1,599	1,650	1,702
Tb Oxide	167	172	175	174	121	122	124	126	127	129	131	133	135	138	140	142	145
Dy Oxide	717	737	748	743	740	749	760	769	794	819	833	847	861	876	891	906	921
Ho Oxide	88	91	92	93	95	97	99	102	104	106	108	111	113	116	118	121	123
Er Oxide	508	530	546	562	579	600	624	647	671	696	721	748	776	804	834	865	897
Tm Oxide	101	104	105	107	108	111	114	116	119	121	124	127	129	132	135	138	141
Yb Oxide	353	363	369	374	379	388	398	406	415	424	434	443	453	463	473	483	494
Lu Oxide	88	92	94	96	99	102	105	109	112	116	119	123	127	131	135	140	144
Y Oxide	4,926	5,064	3,085	2,502	2,032	2,493	2,810	2,872	2,935	2,999	3,065	3,132	3,201	3,271	3,343	3,416	3,491
Totals	60,248	61,097	45,079	34,703	34,919	39,192	43,794	46,366	48,962	51,793	54,873	58,242	59,540	60,873	62,231	63,619	65,039
Totals Less CHN Pirates	40,248	41,097	25,079	19,703	19,919	24,192	28,794	31,366	33,962	36,793	39,873	43,242	44,540	45,873	47,231	48,619	50,039
RoW Production	3,600	3,600	5,000	7,000	8,000	18,500	27,000	41,250	64,550	89,550	89,550	100,550	100,550	100,550	100,550	100,550	100,550

Source: Stormcrow

Our assumption is that only Molycorp, Lynas and three other potential suppliers will enter the market. Each commences production in the year suggested by the individual company, but we build in a two year production ramp to nameplate capacity for each project. This lower level of supply strongly suggests that we will see higher prices for rare earths in the mid-term than were indicated in the above "pessimistic" price deck. The relevant supply projections for the individual rare earths are shown below:

Exhibit 3 – REO Supply from RoW Sources by Element and Year

RoW Production	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
La Oxide	1,038	1,038	1,503	1,702	2,034	6,086	9,385	10,360	10,360	11,422	14,712	18,213	18,213	18,213	18,213	18,213	18,213
Ce Oxide	50,500	1,515	2,202	2,497	2,988	9,202	14,378	16,116	16,116	17,869	24,658	33,335	33,335	33,335	33,335	33,335	33,335
Pr Oxide	242	242	302	328	371	949	1,449	1,647	1,647	1,847	2,637	3,667	3,667	3,667	3,667	3,667	3,667
Nd Oxide	713	713	881	953	1,073	2,814	4,374	5,094	5,094	5,812	8,630	12,271	12,271	12,271	12,271	12,271	12,271
Sm Oxide	121	121	132	137	145	304	466	571	571	684	1,100	1,584	1,584	1,584	1,584	1,584	1,584
Eu Oxide	16	16	18	18	19	49	82	108	108	133	198	261	261	261	261	261	261
Gd Oxide	73	73	75	77	79	145	220	282	282	340	590	885	885	885	885	885	885
Tb Oxide	12	12	13	13	13	25	36	43	43	48	82	127	127	127	127	127	127
Dy Oxide	50	50	51	51	52	79	113	144	144	158	337	587	587	587	587	587	587
Ho Oxide	6	6	6	7	7	12	18	22	22	24	62	121	121	121	121	121	121
Er Oxide	35	35	36	36	36	45	56	65	65	68	174	330	330	330	330	330	330
Tm Oxide	7	7	7	7	8	10	13	14	14	14	28	49	49	49	49	49	49
Yb Oxide	25	25	25	25	25	30	36	40	40	42	145	301	301	301	301	301	301
Lu Oxide	6	6	6	6	6	8	9	9	9	10	24	44	44	44	44	44	44
Y Oxide	344	344	345	346	347	446	571	690	690	734	1,832	3,449	3,449	3,449	3,449	3,449	3,449

Source: Stormcrow

We utilize the same types of pricing models as previously used to derive our pessimistic price deck. These models are non-linear and of the form:

$$Price = \frac{A}{B + Supply\ Excess}$$

where A and B are constants, determined using a least squares methodology. In some cases, a constraint must be placed on the value of B (so that B is suitably larger than a negative value for Supply Excess, indicating an ongoing potential supply shortfall). Supply excess is the supply of a particular rare earth oxide (REO) in a given year as produced outside China, plus estimated pirate production from China, plus a fraction of Chinese supply, less latent demand. Our estimate of the level of Chinese REO pirate production is between 10,000 and 20,000 tonnes per year, declining with time and largely from south China, and the appropriate fraction of Chinese licensed production that will be relied on by ex-China buyers is fitted to historical demand data (2010-2013) using a statistical technique.

The one exception to the above methodology involves pricing for lutetium. Lu is primarily used in the manufacture of detector crystals for positron emission tomography-type medical scanners. There are other types of detector crystals that can be used, but lutetium orthosilicate crystals provide the highest sensitivity and resolution, meaning that scans can be completed faster and in greater detail. The faster speed means that PET scanners built using Lu-based crystals can generate more revenue for a hospital or clinic. We believe that the price point for Lu oxide above which substitution becomes a factor is roughly $1,250 per kg, so we maintain this price moving forward as demand is significantly greater than world levels of production.

Our Base-Case REO Price Deck to 2025

The results of fitting the above data for each relevant REO to historical annual pricing data obtained from *Asian Metal* for the period 2009 to 2013 (where available) is given below. Exhibit 4 represents what we feel is our best estimate today for the likely state of REO pricing through 2025:

(table follows on next page)

Exhibit 4 – "Base-Case" Rare Earth Price Deck

Year	2009	2010	2011	2012	2013	2014e	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f	2025f
Lanthanum Oxide (99%min, US$/t)	4,604	23,820	98,757	25,547	7,866	5,955	6,955	7,254	7,810	7,904	7,033	6,742	6,447	6,558	6,676	6,800	6,932
Cerium Oxide (99%min, US$/t)	3,437	23,102	98,217	24,684	7,863	8,847	6,411	5,902	5,959	5,516	4,197	3,211	3,229	3,248	3,267	3,287	3,308
Praseodymium Oxide (99%min, US$/t)	14,381	49,338	204,067	116,162	91,385	121,257	119,963	120,155	121,631	122,931	119,103	112,369	112,485	113,105	114,262	116,601	119,093
Neodymium Oxide (99%min, US$/t)	15,208	50,635	250,574	122,364	71,833	71,180	68,543	83,223	94,438	107,729	108,786	104,549	113,252	123,335	134,990	141,325	148,444
Samarium Oxide (99%min, US$/t)	3,429	16,000	104,816	58,032	13,296	7,601	7,253	7,026	7,131	6,884	5,631	4,285	4,401	4,519	4,639	4,762	4,887
Europium Oxide (99%min, US$/kg)	478	553	2,923	2,596	1,095	918	878	814	780	721	622	527	472	418	365	368	372
Gadolinium Oxide (99%min, US$/t)	n/a	10,707	62,724	24,167	24,033	25,485	26,046	26,447	28,055	28,473	23,916	19,700	19,700	19,982	20,603	21,907	23,437
Terbium Oxide (99.9%min, US$/kg)	360	557	2,344	2,026	920	788	807	881	892	868	692	544	550	556	563	570	577
Dysprosium Oxide (99%min, US$/kg)	109	235	1,508	1,190	555	456	450	445	451	454	415	361	364	367	371	374	378
Holmium Oxide (99.5%min, US$/kg)	n/a	41	303	107	66	63	55	51	49	46	38	20	20	20	21	21	22
Erbium Oxide (99%min, US$/kg)	n/a	90	236	150	68	71	62	52	150	155	140	120	124	128	132	137	143
Ytterbium Oxide (99.99%min, US$/kg)	n/a	27	91	113	53	51	56	62	69	76	60	43	44	45	46	47	48
Lutetium Oxide (99.9%min, US$/kg)	n/a	274	827	1,385	1,201	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258
Yttrium Oxide (99.999%min, US$/kg)	n/a	60	143	111	26	21	21	21	47	54	41	31	33	35	37	38	38

Source: Stormcrow

The above prices take into account the lack of general financial investor interest in the rare earth industry, following the disappointing financial results from Molycorp and Lynas, and the widespread downturn in all other junior company share prices. Our "base-case" price deck suggests that sufficient support for only three additional rare earth mines would result in prices that are reasonably high compared to historical norms, and that could provide very reasonable financial returns for all the companies involved.

Conclusion

The present lack of interest in the rare earth market by general financial investors is, unfortunately, warranted. Molycorp and Lynas have, to date, demonstrated no ability to generate profits, and, in fact, are both suffering from continuing technical and market challenges. However, there are groups of end users of rare earths that recognize the need for additional projects outside of China, especially those projects capable of producing large quantities of magnet materials such as neodymium, praseodymium and dysprosium.

We believe that the list of potential new rare earth mines only contains a few projects that meet a stringent set of criteria including long mine life, geopolitical stability, high annual production of critical rare earths, economic viability and low technical and social acceptability risk. In fact, apart from the mines and chemical operations presently belonging to Molycorp and Lynas, both of which we believe will be in production for many years regardless of who ultimately owns them, only three projects fully meet those requirements.

If we assume that the producing rare earth mines outside of China eventually belong to Molycorp, Lynas, Arafura, Rare Element and Quest, and that each project enters the market on the timetable set by the individual companies, then

we believe that prices will adjust according to our Exhibit 4, above. These prices allow for reasonable profits to be generated by all of the producers.

We believe that this price deck represents a reasonable base-case scenario for rare earth companies. For rare earth junior companies wishing to use a price deck to analyze their prospects, it is important to note that the entry of even a small producer into the market can skew subsequent pricing considerably. We would suggest using our "pessimistic" price deck to evaluate whether a prospective project is economically viable under a worst-case scenario. However, the above "base-case" analysis only pertains to the production volumes we have outlined, and any additional production that is introduced would depress pricing further from these levels. In other words, it is incorrect to assume that these prices will hold if another project enters the market, because the RoW production level assumed in this analysis is only 81,000 tonnes per year by 2020, and much of this is cerium (Ce) and lanthanum (La). The rare earth market is unlike the copper or gold markets, where additional reasonable levels of supply are incapable of perturbing pricing. It is only our "pessimistic" price deck that describes something of a floor.

While most financial investors have chosen to ignore rare earth companies at present, we believe strategic parties remain interested in the space. They are interested in a very select few of the large number of prospective projects available. Those projects can likely generate robust profits for investors that understand the rare earth market well enough to apply proper discrimination.

Keywords

Industry	Rare Earths, Critical Materials, Critical Metals, Mining, Industrial Minerals	
Relevant Companies	GREAT WESTERN MINERALS – GWG:TSXV	MONTERO MINING – MON:TSXV
	ARAFURA RESOURCES – ARU:ASX	PEAK RESOURCES – PEK:ASX
	MOLYCORP – MCP:NYSE	LYNAS CORP – LYC:ASX
	FRONTIER RARE EARTHS – FRO:TSX	NORTHERN MINERALS – NTU:ASX
	RARE ELEMENT RES'S — RES:TSX	NAMIBIA RARE EARTHS – NRE:TSX
	UCORE RARE METALS – UCU:TSXV	HUDSON RESOURCES – HUD:TSXV
	AVALON RARE METALS – AVL:TSX	MATAMEC EXPLO – MAT:TSXV
	QUEST RARE MINERALS – QRM:TSX	STANS ENERGY CORP – HRE:TSXV
Why do we use keywords?	*We feel people who could stand to benefit from the contents of this report, are not solely ones who already follow the specific company or sector discussed herein. As such, we hope to provide this free service to as wide an audience as possible—and keywords help to this end.*	

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