



Hallgarten & Company

Sector Review

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Lithium Sector Review:

Life in the lithosphere

Company	Ticker	Price	Mkt Cap mn	Stage	Call
Soquimich	SQM	36.38	\$9,580	Producer	Neutral
FMC Corp	FMC	50.94	\$3,680	Producer	Neutral
Rockwood	ROC	21.91	\$1,620	Producer	Neutral
Talison Lithium	Unlisted	n/a		Producer	N/A
Rincon	Unlisted	n/a		Near-producer	N/A
Galaxy Resources	GXY.ax	1.25	162.7	Near-producer	Buy
Canada Lithium	CLQ.v	0.44	64.9	Development	Neutral
Salares Lithium	LIT.v	0.63	20.2	Development	Neutral
Western Lithium	WLC.v	1.52	158.1	Development	Sell
Orocobre	ORE.ax	2.05	126.6	Development	Buy
American Lithium	AMLM.ob	1.07	51.0	Development	Neutral
Latin American Minerals	LAT.v	0.225	15.2	Development	Sell
Rodinia Minerals	RM.v	0.53	27.2	Development	Neutral
First Gold Exploration	EFG.v	0.55	30.7	Development	Sell
TNR Gold	TNR.v	0.30	33.7	Development	Sell

The Lithium Mining Scene

Brine (still) beats rock mining any day

- + The lithium mining sector is one where a clear dichotomy exists between brine extraction and hard rock/clay mining. The former (with a strong bias to South America in sourcing) has a massive lead over hard rock mining due to a dramatic cost differential (hard rock processing being 100% more expensive in general terms).
- + The simplicity of the brine process means that the road to production for these facilities is relatively inexpensive and with little lead time. It also has almost no environmental impact (evaporation being the main component in the processing).
- + The lithium resources in the lakes of the *altiplano* of Argentina, Chile and Bolivia are substantial (that of Rincon alone is enough to supply the planned production for 40 years, while the potash resource as currently delineated is around three times the annual production of the industry giant, Potash of Saskatchewan). The situation is similar for the other potential producers in the region.
- + Lithium demand for the longer term appears robust despite the global slowdown with the biggest upside coming in automobile batteries. The hybrid auto industry may become enormous in the next few years more than making up for maturity in the other two principal applications (laptops and cell phones) for lithium ion batteries.
- ✘ The pace of growth in lithium demand is clearly linked to economic activity. The current slump in global economies has crimped demand with consumption down more than 12% in 2009.
- ✘ Hybrid auto outlook is bullish but potentially subject to slowdowns or lowering in projections. These were luxury items that did well in the boom times, which corresponded with high oil prices. In the near term hybrids are suffering with the rest of the auto industry. While the oil price are not low by any means, neither is it as high as it was pre-crisis.
- ✘ A step-up in the effort to recycle lithium ion batteries could mean that 10-12 years down the track, consumption could run into a brick wall with an increasing amount of "old production" lithium reappearing in recycled form
- ✘ Potash demand has weakened with the economy, but seems more to have been hit by lower grain commodity prices since that bubble (again partly driven by oil driving up corn because of its ethanol applications). We see agricultural commodities demand being likely to rebound due to excellent fundamentals that override slower economic conditions.
- ✘ The problems of the Talsiman Lithium IPO with its seriously large hunt for cash may suggest that the frothy market is also bubble and not much substance i.e. easy to do small raises but baulking at supplying serious money for serious players. In short, another purely speculative Toronto construct not interested in real output
- ✘ Beware attempts by the "cartel" to instill discipline in the space

Fluctuating Favour

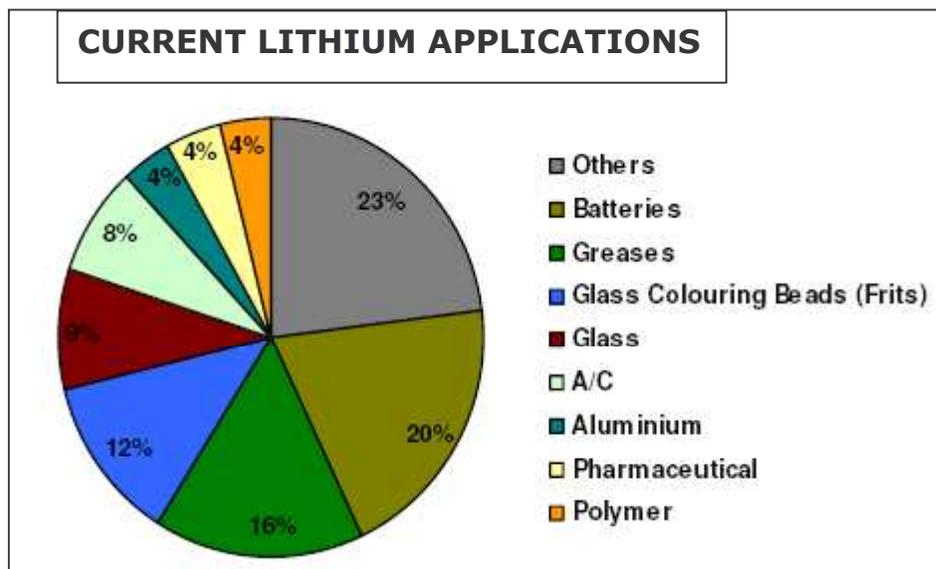
Lithium started to get up a head of steam in the second half of 2008, boomed through the first half of 2009 (as a concept, but not price-wise in the physical), lost momentum as gold hogged the headlines and the cognoscenti moved on to the rare Earth space. Now it seems to be gathering up energy again as some of the corporate slicing and dicing mooted in early 2009 has started to bear fruit in spin-offs of pure lithium plays.

The tenor of the times is best summed up by this email snippet which crossed our field of vision, the company it deals with we shall leave unstated: “..the last issued news on the company was that it had discovered a significant near-surface deposit of Lithium and had delineated it with an initial drill program, with assay results still coming. ... , the company issued a note about high-grade Lithium grab sample results, and there are market rumors of rare earth elements in this discovery. This unfolding play is worth following closely, and we see it as possible that the stock could be undergoing a significant re-rating”.

The fact that a bit of REE had to be thrown into the pot to spice up the mix was typical of the alchemy being applied by the newsletter writers to these “hot metal” stories in recent times.

Meritorious fundamentals despite the meretricious pumping

Lithium was never a product to inspire much enthusiasm due to its linkage in the popular imagination to psychiatric drugs, its real attraction is in applications related to lithium-ion battery applications (cellphone, laptop, automotive) amongst other high tech uses. The spotlight had been turned upon the metal by the rising perception that lithium supplies were relatively limited in the short-term and that demand was burgeoning both from the electronics and the automotive industries.



The upsurge of interest resulted in a stampede in early 2009 into the few names that were already in the space and the creation of a blizzard of extra players via new listings or the recycling of miners from other sub-sectors into this new area. Several players that were positioned in Latin American mining found it easy to switch on to the new buzz.

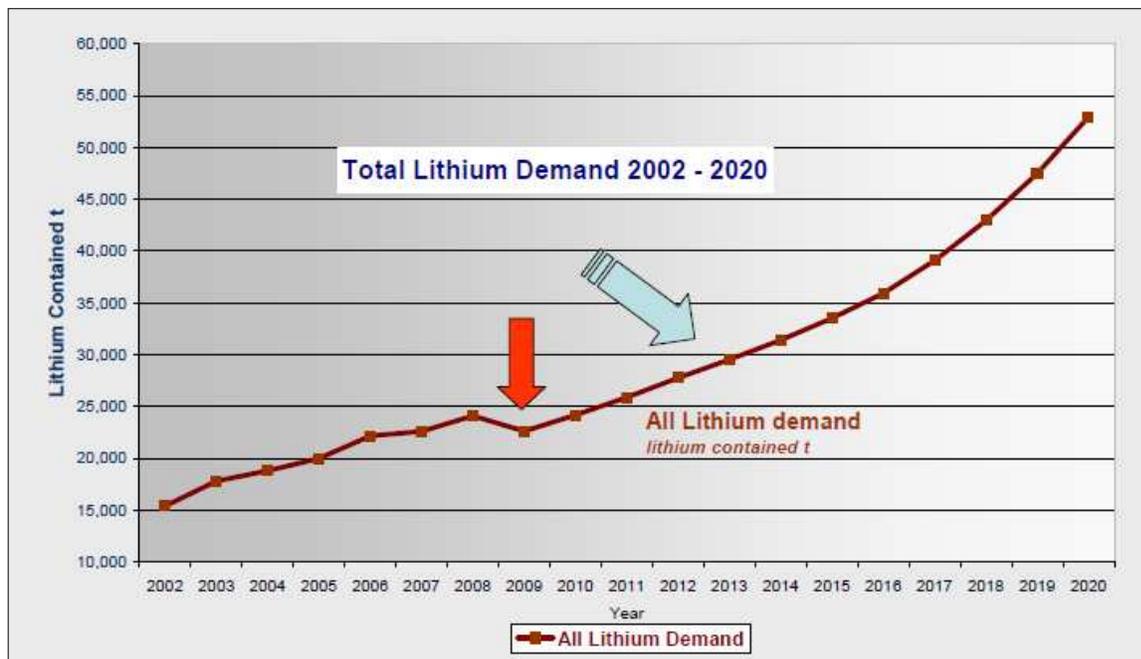
The sector is firmly divided into two types of companies, those with exposure to lithium in brines (essentially where the metal has upwelled in liquids through the earths crust) and those with exposure to lithium in rock/clays. The latter long dominated the space (particularly during the period when the US was the dominant producer) but had been eclipsed in recent decades by the cheaper to extract brine lithium that largely came from Chile and Argentina.

The Lithium Market

Lithium compounds have long been used for various applications, though they were primarily marketed to the glass and ceramics industries. Thus the metal has moved to a new level of interest in recent times with the dynamics of firstly the cellular phone industry with its demand for lightweight batteries and more

recently the massive upsurge in hybrid automobile demand and production. A long-term negative for the electric powered auto niche had been the weight of batteries involved.

Demand for lithium (according to the consultants Roskill) displayed strong growth in the mid-2000s, with world consumption estimated to have increased by 4-5% p.a. since 2002 to reach a record level close to 80,000 tonnes of lithium carbonate equivalent (LCE) in 2005. The estimates for lithium demand growth below come from the esteemed consultants TRU Group. They show the 2009 recession-induced consumption dip before demand powers higher over the next decade.



Source: TRU Group

The new applications for lithium have produced a surge in specialist demand with the usage of lithium in secondary batteries rising at a compound annual growth rate of 25% between 2000 and 2005. In 2009, batteries accounted for 18% of total lithium consumption, more than double the 9% share held in 2000. Growth in the use of lithium secondary batteries has been driven by the rapid expansion in the portable consumer electronics sector. By 2005, nearly all mobile phones and over 90% of laptop computers incorporated lithium-based secondary batteries due to their higher energy density and lighter weight than nickel-cadmium and nickel-metal hydride products. Global Strategic Analysts predict that the market for lithium ion (Li-ion) batteries is likely grow at a compounded annual growth rate of over 32% to 2010. TRU are predicting that batteries will make up 40% of total lithium demand by 2020.

We would note that the real surge in hybrid demand didn't really begin until after 2005. The automobile manufacturers that are now using Lithium-ion batteries include Ford with its the Escape 4WD and the Mercury Mariner while General Motors has the Sierra and Saturn and Honda has the Accord. Citroen announced at the 2007 Frankfurt Motor Show that all Citroen cars would be hybrid diesel-electric powered by 2012.

Lithium-ion batteries remain the only currently viable solution with the cost of hydrogen infrastructure currently prohibitive for hydrogen fuel or hydrogen fuel cell technology. This will inevitably change but already the spread of hybrid vehicles is being hampered by rampant and high purchase costs (which make the hybrids thus far as upper-middle class conscience toy).

The response of the battery manufacturers (which is largely driven by the Japanese at the technology front) has been to get new battery technologies near market ready to “cut hydrogen off at the pass”. A critical mass of usage makes it difficult for alternative technologies to gain a foothold, particularly when it would need a massive new “filling station” infrastructure to implement the hydrogen alternative. Amongst the new lithium products evolving is a Lithium Polymer (that allows the battery to be molded like putty, particularly into very thin shapes) and Lithium Ceramic anodes, which would provide higher energy density/greater number of recharges.

Beyond battery usage, most observers feel that demand from the core traditional users, the glass, ceramic and pharmaceutical industries will not grow more than the GDP growth rates in the Western economies. TRU are estimating growth from glass/ceramics to be only 2.4% p.a. between 2007-2020. Thus scenarios of massive lithium demand expansion (and its corollary the need for more production) are almost entirely battery usage linked.

Pricing – a strong element of tea-leaf reading

One interesting feature of the supply side of the market is its opaqueness. Some refer to it as an oligopoly. As the chart below shows there are some quite dramatic variances in output statistics by industry experts and insiders. For example, visitors to the website of FMC (and its lithium specific subsidiary) are greeted by some bland usage descriptions, but scant hard information on its lithium production and assets. “Don’t ask, don’t tell” seems to be the watchword in lithium.

	Admiralty Estimate	Japanese Corporate Estimate	Industrial Minerals Estimate	Roskill Report 2006	SQM 2006 Estimate Annual Report
Hombre Muerto FMC	12-15,000	16,000	17,500	12,168	
Attacama / Silver Peak, Chemetall	10-15,000	23,000	30,000		
Attacama SQM ³	25-28,000	28,000	27,800	44,140	
Rincón Admiralty ²	17,000	17,000	17,000		
Other	10,000 CITIC ¹ China			14,600	
Total FMC+SQM+ Chemetall (Andes Brines)	57-68,000	67,000	75,300	70,908	83,800 ⁴
Admiralty production as a percentage of total Brines	29.8%- 25%	25.4%	22.6%	23.9%	20.3%

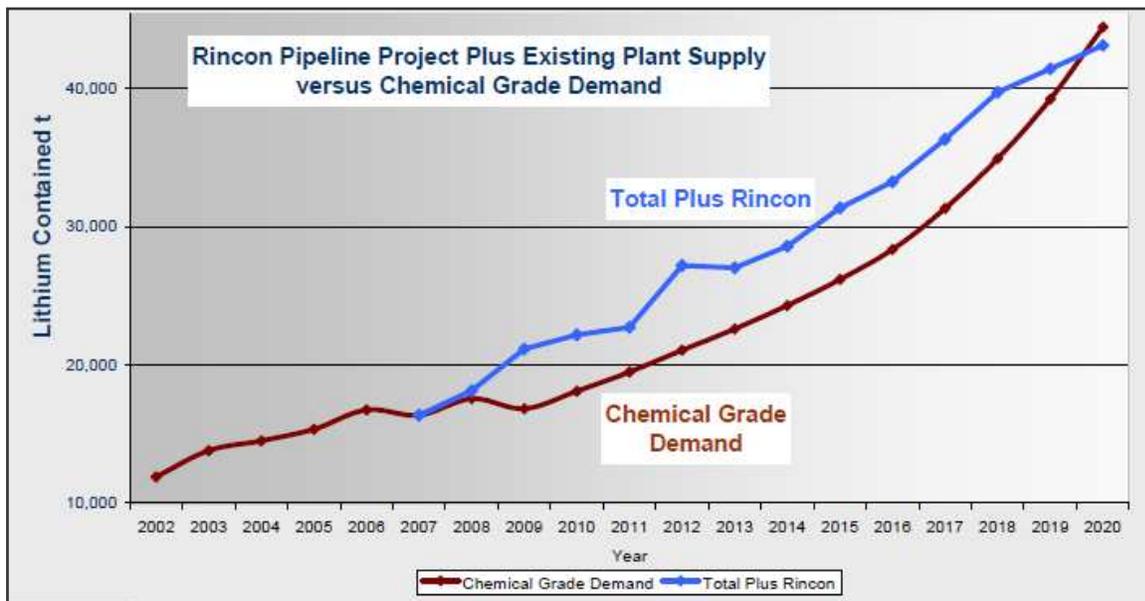
Source: Rincon Lithium

Demand from the battery market and higher production costs spurred a recovery in lithium carbonate prices from 2003, with a quickening in the pace through 2006. Tight supply was reflected in a 20% rise in Chilean lithium carbonate prices in 2005. SQM saw a 40% rise in prices between the first quarter of 2005, and the same period of 2006.

Pricing for 99% (or lower) lithium carbonate was around US\$6,000 per tonne in recent times but escalates rapidly upon further refinement. The previously mentioned **Four 9** (99.99%) grade achieves over US\$13,000 per tonne. Lithium hydroxide fetches US\$10,500 per tonne while lithium chloride is priced around US\$8,500.

The market purchase price of lithium carbonate in 2008 exceeded US\$6,600 per tonne making for attractive margins and firing the imaginations of new entrants to the field. However, due to the relatively small number of deposits exploitable in size, there was no scope for new parties to step into this situation and take advantage of the higher prices.

Many of the *salares*-based lithium projects being contemplated in the Argentine *altiplano* have the potential to become meaningful contributors to global lithium supply (or maybe over-supply). Balancing this lithium production increase are markets that are anticipated to grow solidly owing in part to the expanded uptake for lithium batteries utilized in "greenhouse gas friendly" hybrid motor vehicles and other major applications in the glass and ceramics industries.



Source:TRU Group

It is not us that are Jeremiahs in the industry. The chart above from the industry's leading consultants shows existing demand plus Rincon (a project we shall discuss later). Frankly, this chart shows that Rincon is enough to cover demand and produce excess supply. In this scenario, ALL other projects are surplus to requirements until 2020. Even under this Rincon scenario one must suspect that prices will come down because there will be oversupply in the interim. There is certainly not space for all the other wannabes to crowd into an already full lifeboat.

A harbinger to maybe spoil the party

One small event in September of 2009 caught our attention but seems to have been overlooked as the thundering herd poured into the lithium space pushing logic and prudence to the side. This potential spoiler was the awarding by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of a 5.7 million Euros grant to Chemetall Lithium, a unit of Rockwood Holdings (a company we shall discuss further on) to set up a pilot plant for the recycling of lithium ion batteries. The total cost of the project is expected to be over 10 million Euros with Chemetall putting up the balance of the funds.

Existing techniques concentrate on the recycling of lithium ion batteries for portable electronics with low recycling rates and little to no recovery of lithium. As is well-known the batteries in cellphones and laptops are relatively small and the economics of devoting much effort to their recycling are dubious. However

with the onset of more usage of lithium-ion batteries in hybrid automobiles the scale of the task and the viability of recycling increases exponentially.

Currently there is no process for the recycling of automotive batteries for electric cars, especially for the recovery of lithium out of cathode material and electrolytes.

Thus a consortium of companies is participating in “LithoRec”, a comprehensive research and development project related to the recycling of lithium ion batteries. The members of the group reads like a who’s who at the sharp end of lithium processing, technology development and end-usage:

- Audi AG, Ingolstadt
- Chemetall GmbH, Frankfurt
- Electro cycling GmbH, Goslar
- Evonik Litarion GmbH, Kamenz
- Walch Recycling & Edelmetallhandel GmbH & Co. KG, Baudenbach
- H. C. Strack GmbH, Goslar
- I+ME ACTIA GmbH, Braunschweig
- Recylex GmbH, Goslar
- Süd-Chemie AG, Moosburg
- Volkswagen AG, Wolfsburg
- Technische Universität Braunschweig
- Universität Münster

Frighteningly, for those in the lithium mining industry who are touting charts showing consumption heading towards outer space, the main target of the “LithoRec” project is the development and approval of recycling technologies for lithium ion batteries for electric cars. The consortium is planning to study the whole life cycle of a battery, starting with a recycling-friendly battery design through the final recovery of battery materials that can be used in the production of new batteries. The “LithoRec” team is aiming to achieve high recycling efficiency of large-scale automotive batteries for the automotive industry in Germany and Europe. In addition to ecological considerations, the project aims to “secure the supply of battery raw materials like lithium and cobalt”. With recycling of auto batteries giving the economies of scale then the cellphone/laptop batteries that are currently tossed in the trash will end up in the recycling process as well, with the potential to create a relative stasis in lithium usage growth once a critical mass of lithium-ion batteries is in circulation. We could muse that this might be 10-12 years out.

With such heavyweights on board the possibility is high that they can achieve an official mandate from the EU and other governments on whatever norms they come up with. We cannot see why the US, with little lithium production of its own would be resistant to the concept of heavily swinging towards recycling, as is current in the lead battery market.

It is interesting to wonder why Chemetall, with its current “mining” activities in lithium, might be on board with this potentially competitive process. It may just be that in light of entry (or expansion) costs being so high in the hard rock part of the lithium space and with Chemetall happy to make money in the processing (and recycling) part of the lithium “life-cycle” it may be content to see its erstwhile brothers in arms in the mining space turned from roosters into feather dusters by an almost closed cycle of usage-recycling-usage evolving once the demand for an initial base of lithium ion batteries has been created in the brave new world of lithium ion batteries.

The “hard” rock push

The lithium industry at the global level was dominated by the US until the 1980s with hard rock mining from spodumene, mainly in North Carolina. This industry was made extinct (except in Australia) over a short period by the better economics offered by the Chilean and then the Argentine brine lake deposits.

The rock (mainly bentonite clay or spodumene) miners of lithium were the most prominent in 2009 in beating the bushes to get investors interested in their stories. Historically lithium mining from rocks and clay was the dominant source of supply. Spodumene is a pyroxene mineral consisting of lithium aluminium inosilicate - $\text{LiAl}(\text{SiO}_3)_2$. Spodumene occurs in lithium rich granites and pegmatites. These type of deposits are found in locations such as Afghanistan, Australia, Brazil, Madagascar, Pakistan and the USA (North Carolina & California). Lithium is extracted from spodumene by fusing in acid.

World production of lithium via spodumene is around 80,000 metric tonnes per annum, primarily from the Greenbushes pegmatite of Western Australia, and some Chinese and Chilean sources. The Talison mine (discussed further on) at Greenbushes in Western Australia has an estimated reserve of 13 million tonnes.

The chief problem for the hard-rockers is that they have large capital costs to get going (a formidable hurdle in current financial markets) and the fact that their production cost is around \$2 per lb compared to around \$1 per lb for the brine exploitation process. They trot out all sorts of arguments in favour of North America as a source of product including the old chestnut of "resource security" dragging the false bogeyman of Evo Morales into the argument. Somehow we suspect that Evo might be sending lithium to global markets before some of the hard rock miners can do it. Argentina and Chile both have global players, as well as the juniors, in the space with no problems that we have ever heard of. When a miner like Rincon can have 400 years of mine life at half the price of the potential North American competition, it is hard to see why massive capital expenditure would go towards that area in preference to advancing the easier (and cheaper) option of the brine lakes.

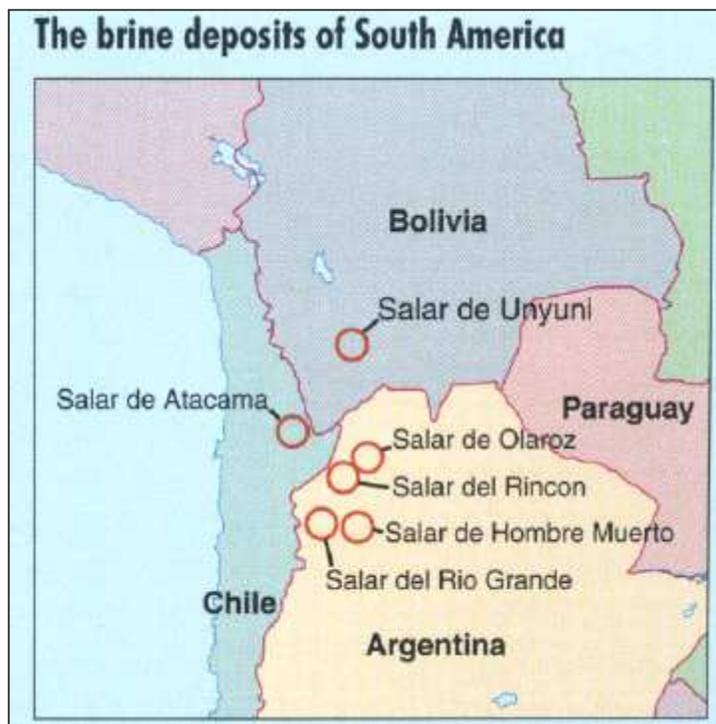
Lithium in brine lakes (salares)

Latin America is not the only place with lithium rich brines and salt-pans but it was the focus of the first wave of *de novo* attention on the lithium space in 2009. Since then it has become obvious that the US also hosts such deposits and that in fact its only current lithium output comes from a saltpan in Nevada (which we shall discuss further on) that is exploited by Chemetall. This area has also attracted the attentions of American Lithium and Rondinia Minerals (also to be discussed anon). However the bulk of Western supply currently comes from the brine lakes of the southern Andes.

In the first flush of lithium enthusiasm the mid-Andean region became a hot spot for its ample resource of lithium/potassium brine lakes, called *salares* by the locals.

The Puna plateau, covers a portion of Argentina, Chile and Bolivia. It is at an elevation of around 4,000m and contains the largest concentration of economic evaporate deposits in the world.

The map above shows the intense concentration of activity in the Andean region. The evaporate deposits are formed by intense evaporation under hot dry air in a closed basin. The brine, under the crust



formed on the surface of the salt lakes, contains high concentrations of sodium, lithium, potassium, magnesium and boron (the major element of borax).

Also interesting in the LatAm lithium lakes is the associated potash deposits. In a world of high energy costs (coinciding with escalating agricultural commodity demand) potash has assumed magical properties. It is not dependent upon natural gas consumption (as urea production is) and has an expanding demand linked to farmers switching over to alternatives to the rapidly inflating price of traditional agrochemical fertilizers. In this aspect even humble guano is getting a second wind as an alternative. The latter is not available in amounts even vaguely sufficient to satisfy demand but potash resources do exist in quantities to make a meaningful difference in the supply balance in world markets. Until now this trade has been dominated by Saskatchewan producers, however Argentina is now surfacing as a major potential source of new supply.

The Argentine Salares

There are around 50 *salares* located within the Antofallos-Pocitos volcanic rift valley in the high Andean plain.

The map at the right shows the relative close proximity of these deposits to each other, largely in the far northern Argentine province of Jujuy. This is an extremely mining friendly jurisdiction, as Silver Standard (SSRI) has often attested. Some are located more to the south in Salta province (also mining friendly).

On the Argentine side of the border there are a couple of currently producing deposits:

- ❖ FMC Corp.'s Fenix brine complex located on Salares Hombre Muerto in Argentina contains high uniform concentrations of lithium with low levels of other contaminants and is the fifth largest lithium producer in the world
- ❖ Rio Tinto's Tincalayu complex also located on Salares Hombre Muerto in Argentina and is

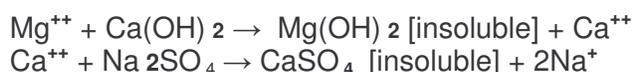


South America's largest borate mining operation. Interestingly this asset was not included in the sale of Rio Tinto's potash assets in Argentina to Vale that closed in February 2009.

One thing worth noting also is the partial ownership that many of the players have in their *salares*. Now, owning part of a salt-pan is rather clear cut as the material to be excavated is solid. However, in a brine lake the first mover gets the distinct advantage of being able to take out the best material before the slowpokes can do anything about it. The brines have different densities (and thus different grades) at different depths. Draining the best densities is not a task that respects theoretical lines on the surface of a liquid body. This is similar to a common problem in the oil industry but in this case it seems to us almost more egregious. To the swift will go the race.

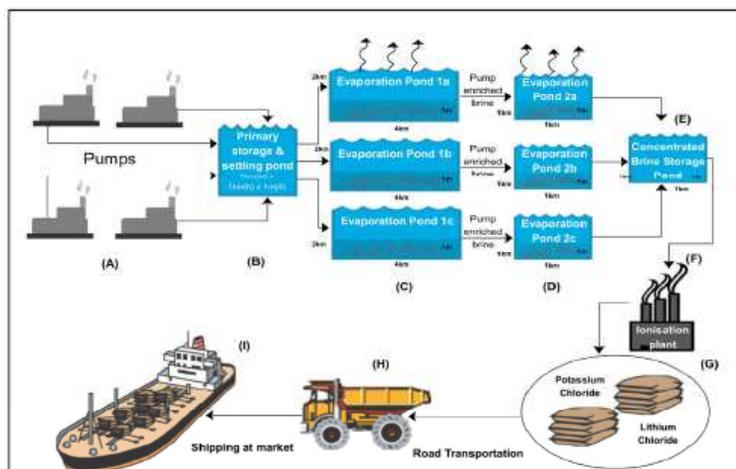
The processing of output from *salares*

All mining is a chemical process to some degree. The production of lithium and its by-products are more chemical than most mining processes. Firstly the brines are evaporated in lined evaporating ponds. The evaporation rate at high-level *salares* can be around 3,000mm per annum (this depends most upon the number of cloudless days per annum at any given site). Then the output from the *salar* requires the selective precipitation of calcium and magnesium cations (positively charged ions) that interfere in the recovery of lithium of sufficient quality. These cations are precipitated in a two step pre-treatment process:



These pre-treatments require the input of lime. This is a key ingredient and the supply of this input is one of the most onerous conditions of the process. To produce 15,000 tpa of LiCl will require approximately 84,000 tpa of sodium sulphate.

The Lithium Extraction Process



- b. Salt removed
- c. Magnesium removed
- d. Sodium sulphate removed
- e. Potash removed
- f. Lithium Chloride produced, then LiCO₃, LiOH

The brine passes through a series of evaporation ponds (phases B, C & D above). These are all of one metre in depth. Then the potash is extracted at the concentrated brine phase (E). Finally the ionization plant (at phase F) creates the finished chemicals for bagging and then export.

In some brine lakes magnesium (at phase C) can be produced as a by-product. However in some cases this byproduct is of no economic value. It is widely commented that Magnesium (Mg) levels are

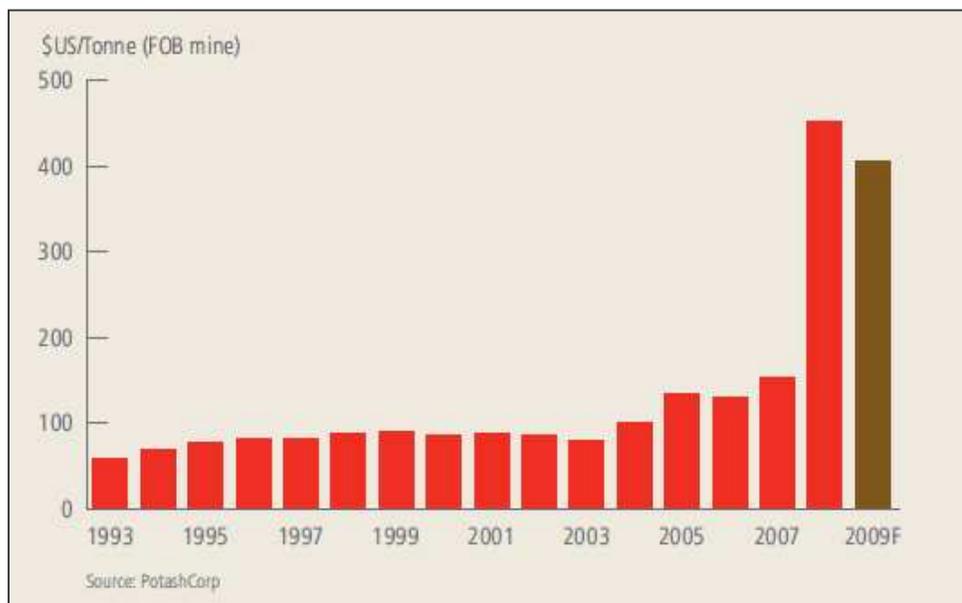
deleteriously high in the Bolivian *salaes* making them less attractive than those further south in the Andes.

Sodium sulphate - the vital ingredient – grab your positions

As we have noted, extraction of lithium carbonate is a process of chemical reactions with sodium sulphate being a key input in this process. The first mover in the Argentine space was Admiralty Resources, an Australian company. It was developing the Rincon project (we shall elaborate on its evolution further along). As the first mover it needed to secure all the moving parts for the operations eventual startup. Interestingly this also meant securing a supply of sodium sulphate and this was most easily done by its purchase, in September 2007, of the Rio Grande *salar*, approximately 250 kms distant from the Rincon asset. The key takeaway here is that the company stated, while not revealing the purchase price, that it represented less than the first year's savings to Rincon. Essentially all the producers will need to have access to sodium sulphate or risk being made less economic than Rincon (and others with access to this product).

The Salar del Río Grande purchase was critical in that it has given Rincon a resource capable of supplying all the requirements for its production of lithium for the foreseeable future (more than 40 years). Via this purchase Rincon has grabbed a strategic hold on a unique asset with more applications than just mining. The *salar* represents the most significant resource of sodium sulphate in Argentina and one of the most significant resources in South America. The Salar del Río Grande has yielded almost all of the domestic production of this commodity over the last 25 years.

Those without sodium sulphate are going to have to work out alternative supplies. If we were Rincon we would be tempted to sell it all the surplus to requirements as detergent additive and starve out the competition.



Potash – a key by-product of lithium salares

The past two years have seen a wild ride in sentiment towards potash. The initial move up (as shown in the chart below) was prompted by the rush into agricultural commodities at the very peak of the generalized global asset boom. Unlike much of the other speculative activity the push in wheat, corn and

soy prices had a strong grounding in rising demand in Asia and other merging economies (though with the somewhat bogus ethanol frenzy underlying corn's rise).

Ironically, prices for potash made a bigger jump than many of the agricultural products that use potash as a fertilizer. A report by Resource Investor (and some broker upgrades) in March 2008, set off a chain reaction in the price of major stocks in the sector propelling the industry leader Potash of Saskatchewan to a market cap of over \$75bn. The article noted that bullish sentiment originated when both Belarusian Potash Co., a Belarus-based potash supplier, and Indian Potash Ltd. agreed to a contract potash price of C\$625 per metric tonne, a strong jump up from the previous price of C\$270 per tonne (compared to prices of averaging only C\$170 in 2001).

The party rapidly ground to a halt when the global financial crunch descended. Speculators offloaded stockpiles they had been hoarding, some countries reduced their imports and the price tumbled.

The bigger factor though in the potash dynamic is the China (and India) possibilities. In a meeting last year with Potash One (KCL.to) they stated to us that they felt that China was using 8 mn tonnes per annum of potash but they really needed to be using around 20 mn tpa.

As for price trends there is a cartel in place in the industry that was very successful in pushing the envelope in 2008 and getting away with it. The International Fertilizer Industry Association estimates that demand fell 5.1% in 2008-08 and that it will grow by 3.6% in 2009-10. While demand slackened off prices did not responded proportionately to the downside. Presumably that was the discipline of the cartel at work. The Chinese at this point don't seem to have got their head around the new price regime and seemingly hope for a retreat. When they finally do realize they will have to pay up to increase crop yields for a demanding populace then \$500 per ton may well be seen as a base level.

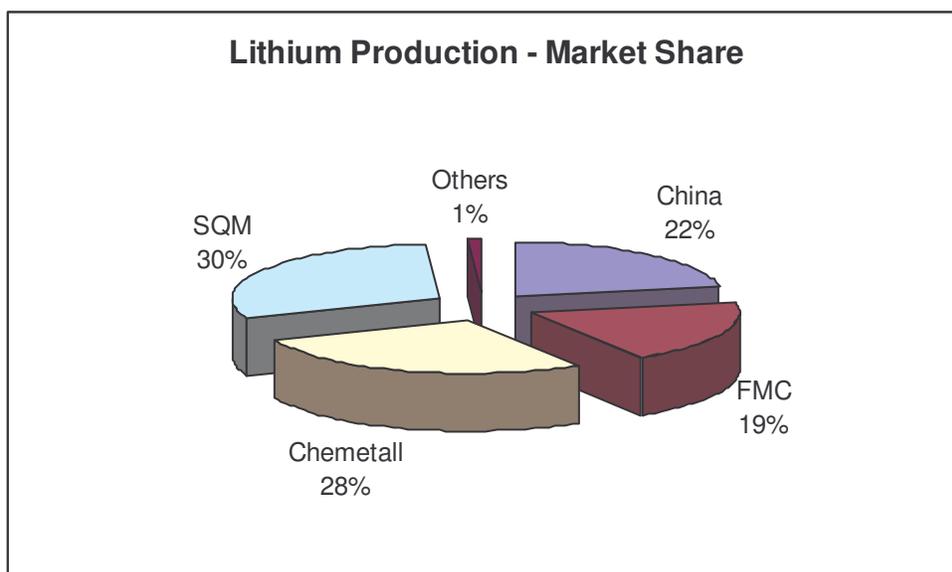


Good potash prices going forward may mean that the lithium miners (or at least those with strong potash credits) may be able to justify their operations despite sloppy lithium prices. Even some of the hard rock lithium miners may be viable and the *salares* will be very profitable. Then again they may bust the cartel's

discipline and compete themselves out of business. Potash Corp though has deeper pockets than any of the pretenders in the potash/lithium space. A side effect of more lithium (with potash credits) miners could be to derail primary potash projects. With the investment required for the solution process mining being very high, companies like Potash One, facing a capex spend of at least \$800mn to get into production, may find themselves outmaneuvered. There is no cheap “half-measure” or staged production possible in the solution mining process.

The real players

The lithium space is a small club indeed if one is talking of actual producers. The pie chart below shows the shares in 2008 when around 92,000 tonnes was produced.



Source: Soquimich

This chart pretty much sums it up. This group controls the market and it has been a very lucrative market for them. The biggest players are the sometime emerging market investor darling Soquimich (which trades as an ADR under the symbol SQM) and the German company, Chemetall (formerly associated with the ill-fated Metallgesellschaft) that is now part of the low-key US chemicals company, Rockwood. Meanwhile in Argentina, the US agrochemical major FMC controls the only major mine (thus far) in the country while Rincon is looking to move into commercial production shortly (it currently has a test production facility).

Company	Holding company	Location	Current production
Comibol	Bolivian government, Bolivia	Salar de Uyuni	Pilot plant construction begins May 2008
Minera del Altiplano SA	FMC Lithium, USA	Salar de Hombre Muerto	17,500 tpa lithium carbonate
Rincon Lithium Ltd	Admiralty Resources, Australia	Salar de Rincon	8 tpm lithium carbonate, 10 tpm potash (pilot)
Sdad Chilena de Lito	Chemetall, Germany	Salar de Atacama	30,000 tpa lithium carbonate
SQM SA	SQM SA, Chile	Salar de Atacama	42,000 tpa lithium carbonate

Over the border in Bolivia, Comibol, the State mining franchise is trying to move into the lithium space. Recent negative publicity has surrounded the Bolivian moves but that has only made it more likely that Bolivia will trend towards the blandishments of Russian or Chinese operators rather than the “all talk and

no action” Western players. While currently in production Chinese are not much of a factor globally because they are making a small proportion and largely consuming what they produce so a wash, for now.

Names in the lithium space

Names have been piling up in the lithium space in recent months, so much so that it is hard to get a grip on them all. The key thing to remember here is that there are four big producers. These producers (Soquimich, Chemetall, FMC and Talison) are currently serving the demand of the market. They are out there in the markets (or shortly will be). There is NO current shortage. Most of these players are large and well-funded, compared to the new entrants.

This is NOT the Rare Earth space where everybody is potentially up and coming. There is a base industry of Western producers here. Thus the addition of less than a handful of extra producers will deal with added demand over the next few years. There is NOT space for all these projects from ALL these companies to move forward.

In the following pages we shall briefly review the key characteristics of the names that are in most circulation at the moment. We do not intend to cover the large diversified names. Soquimich, Rockwood (Chemetall) and FMC are far more like diversified specialty chemicals companies than mining companies. However, mining analysts and investors that exclude them from their field of vision risk getting blindsided by commercial reality. They ARE the “lithosphere”. The rest are just ornaments on the Christmas tree at this time. We have **Neutral** ratings on these majors, merely because we don’t intend to start covering chemical companies. All have their virtues, some have many virtues.

As for the rest they are largely concept stocks, excepting Galaxy that should be in production by year-end. Rincon may get into production but its status is difficult to ascertain now that it has moved private. We can definitely say that none of the others shall be in production within the next three years with the exception of Orocobre, where the date of likely construction, let alone production, remains yet to be advised.

Read the code language. Many of the managements know they are on the road to nowhere even if they are not sharing that observation with their investors. When they start buying projects in the next sexy metal, you can write down the value of their original lithium “project” to zero for they are clearly “moving on”.

To make a short list Talison Lithium (when it debuts), Orocobre and Galaxy are the real names in the space.

The coverage is arranged with producers and near-producers first, followed by the “rest”.

Soquimich (SQM) Strategy: Neutral

Key Metrics		2008	2009e	2010e
Price (USD) - ADR	\$ 37.67		\$1.27	\$1.28
12-Month Target Price (USD)	n/a		n/a	n/a
Upside to Target	n/a			
12-mth High-low	\$22.61-43.93			
Market Cap (USD mn)	\$ 9,915			
Shares Outstanding (millions)	263.2			
		Consensus EPS		
		Halgarten EPS		
		Actual EPS	\$1.90	
		P/E	19.8	29.7
				29.4

- + The company is perfectly positioned to see off any and all potential threats. It has enough cash to take out the principal new arrivals, namely Rincon. With this position of strength it can exercise discipline over the flow of new production, at least in the very near future.
- + The company is broadly diversified and not dependent upon lithium, while the lithium market is dependent upon its share of production. It can survive tough times for an almost unlimited period.
- ✘ The biggest danger is that too many players get into production mode in the space. Prices could take a tumble in an undisciplined free for all with desperate new entrants trying to justify their investments and remain viable by pushing up production (and down prices).

This company (officially Sociedad Quimica y Minera de Chile S.A.) has been around as an ADR since at least the early 1990s. It has had various phases of investor enthusiasm depending on the fickle tendencies of the international emerging markets crowd. In 2008 it caught something of a second wind. It was able to cast aside some of the negative vibes surrounding the Chilean energy crisis and forge to new highs. While the processing of lithium and potash requires some energy, it is important to remember that evaporation is the most important component and the Atacama Salt Desert (located between the first and second region of Chile), where SQM has nine plants, is one of the driest places on the planet and nature drives the SQM production process (as it does to a lesser extent at Rincon).



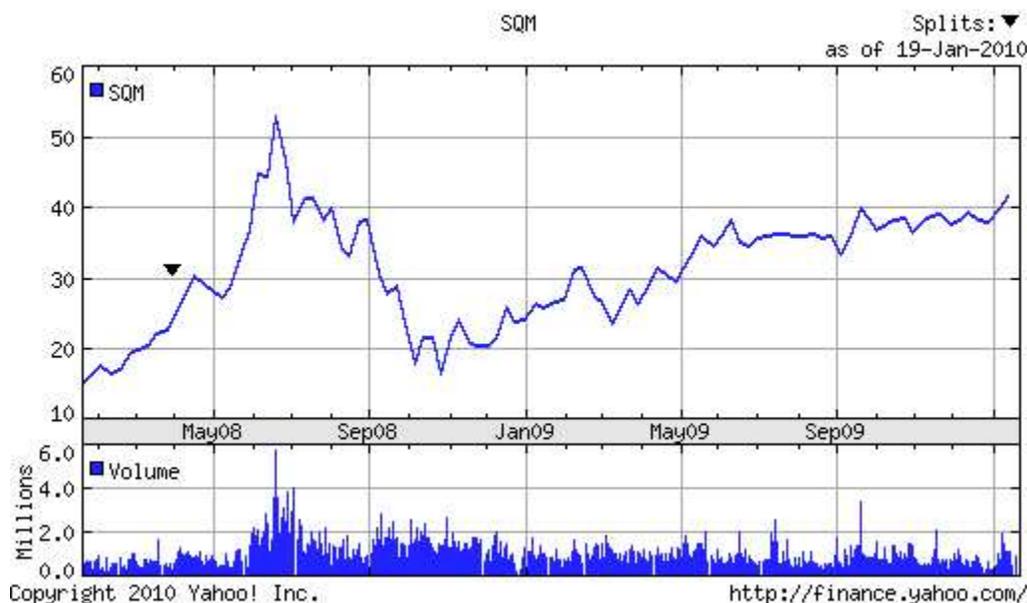
SQM's Salar de Atacama is the world's largest lithium brine mine and a significant potash producer is located on the Atacama. SQM has exclusive access to the Atacama reserves that include the biggest iodine and nitrate reserves in the world and the highest lithium and potassium concentrations currently recorded. SQM has the mining and exploration rights of over 2.5 million hectares of these deposits, accounting for almost 75% of current mineral economic deposits in Chile. It was control of these

assets that prompted the War of the Pacific in the late 1800s that resulted in Chile seizing these territories from Bolivia and Peru.

The chemical resources in SQM's mining areas (shown above) have leached down from the high Andes, originating in the areas where Rincon (and FMC) have their resources. SQM's *caliche* (iodine and nitrate deposits) and *salar* brine reserves provide the minerals that feed its three main lines of business: specialty plant nutrition, iodine, and lithium. SQM claims it produces 30% of the world's lithium supplies. As at October 2009 the company had trailing twelve-month lithium revenues of \$137mn (8% of the total), and 10% of its gross margin came from the element.

SQM is much more of a potash story than a lithium story (despite its dominance of the space). It gains 14% of revenues from potash but 27% of its gross margin comes from that product. It shows its potash reserves from the Salar de Atacama at 29.4mn tonnes while the lithium reserve is only 900,000 tonnes.

The company is enormously cashed up with \$473mn on hand at last count. Strategically it might make sense for them to take out Rincon, get it into production and then use it as a swing producer to scare off other wannabes and bludgeon smaller new entrants to the production field with the threat of higher production from Rincon and lower prices. This would be a way of disciplining a market that has hitherto been a cozy triumvirate.



Rockwood Holdings - Chemetall (ROC)

Strategy: Neutral

Key Metrics		2008	2009e	2010e
Price (USD) - ADR	\$ 22.21		\$0.48	\$1.03
12-Month Target Price (USD)	n/a		n/a	n/a
Upside to Target	n/a			
12-mth High-low	\$3.36-25.86			
Market Cap (USD mn)	\$ 1,655			
Shares Outstanding (millions)	74.5			
		Consensus EPS		
		Hallgarten EPS		
		Actual EPS	(\$8.58)	
		P/E	n/a	46.3
				21.6

- + The company has the potential to be declared a “national champion” should he US government come to regard lithium as a strategic asset again. It is the only onshore US owned producer of lithium.
- + The company has a strong position in Argentine brine lithium. This helps average down its groyup wide production costs for lithium
- + The company also has the look for being a European company, even though that is only historical, however it is well-positioned to work with midstream and downstream users in Europe on lithium battery recycling which might mean that it is a winner even if recycling ultimately becomes the most profitable aspect of lithium production
- ✘ The results for FY08 were truly horrible but the company’s finances are on the mend.

Rockwood Holdings is the owner of the German Chemetall group, which in turn owns Chemetall Foote Corporation that has long been the leading US lithium producer and a major international producer (namely in Chile). The company was founded as the Foote Mineral Company in 1876 as a purveyor of rare minerals. It became a major producer of lithium chemicals when it acquired the right to mine spodumene at Kings Mountain, NC in the early 1950's.

In the 1960's Foote pioneered the production of lithium carbonate from brine with the opening of the Silver Peak mine in the Clayton Valley in Nevada. In 1984, the world's richest commercial brine deposit began production at the Salar de Atacama located in the desert of northern Chile. The company styles itself more as a industrial chemical company and they are not far wrong in that the production of lithium brines is a process far removed from the traditional blasting and excavation techniques of the mining industry.

The New Johnsonville, TN facility of Chemetall Foote has produced normal and secondary butyllithium since the early 1960's. There are two separate manufacturing facilities located at the New Johnsonville site to insure uninterrupted supply of butyllithium to the customers. New product development is accomplished at Chemetall Foote's pilot plant located in Kings Mountain producing experimental quantities of a wide variety of new products including amides, hydrides and alkoxides. In addition to Lithium carbonate, Silver Peak is one of the world's leading producers of Lithium hydroxide. At Kings Mountain, Lithium bromide brine is produced for use in industrial absorption air conditioning systems. Lithium chloride brine is important for dehumidification in food and other industries where moisture control is critical. Lithium sulfate is produced for use in photographic developers. Other products at Kings Mountain include USP grade Lithium carbonate for use in treatment of bipolar disorder and reagent and high purity grades of Lithium carbonate. Chemetall Foote is a leading producer of Lithium metal products for the primary Lithium battery industry including Lithium ingot and Lithium metal foils.

Talison Lithium (TLH.ax) Strategy: N/A

- + The Greenbushes mine has been the most long-lived spodumene lithium mine and keeps powering on. It certainly helps to have tantalum (and formerly tin) in the mix as a strong source of by-product credits. As the company is now private it is hard to know how the accounting for the two products will be done in the future now that they have been demerged into two thematically separate entities
- ✘ The company has a spodumene mine and as such cannot compete in a real price crunch against the brine producers. This is currently not a problem but could be if oversupply sets in.
- ✘ The company has had problems getting its IPO off the ground. It may have missed the Golden Age of investor interest in the lithium story, though it will likely be the only pure play listed producing story for quite a while to come

Talison Lithium was formed in 2009 after the division of Talison Minerals into two separate companies focusing on their respective tantalum and lithium businesses. Talison itself was incorporated in 2007 for the purpose of acquiring the advanced minerals business of Sons of Gwalia, a prominent Australian miner than had gone bankrupt. In November 2009, it was announced by Talison Lithium that it was planning simultaneous IPOs in Toronto and Sydney to raise between C\$140 and C\$170 million. It seems that the IPO process has run into some heavy weather though, despite the ebullient market.

Until the split Talison's businesses included lithium and tantalum mining and processing operations at Greenbushes; tantalum mining and processing operations at Wodgina in Western Australia; and the marketing of tantalum and lithium that is managed out of Talison's office in Perth, Western Australia.

Talison's operations are located adjacent to the town of Greenbushes, approximately 250km south of Perth, Western Australia. The initial development of the lithium ore body at Greenbushes commenced in 1983 and a 30,000tpa lithium processing plant was commissioned in 1985 to produce a variety of different lithium concentrates for the technical market. The processing plant capacity was increased to 100,000tpa in the early 1990s and to 150,000tpa capacity by 1997, including the ability to produce a lithium concentrate for the production of lithium chemicals.

In 2008, Talison commenced an expansion of one of its main pits in order to ensure continued supply of the high quality ore used to supply the technical markets. Production capacity was increased to 260,000tpa in 2009. The company claims that its lithium operations accounted for roughly one-quarter of the world's lithium production in 2008.

Talison Lithium is in the throes of listing on the ASX and TSX. It shortly plans to offer 35 million shares for between C\$4 and C\$5 a share. It expects gross proceeds of between C\$140 million and C\$175 million from the offering. Talk though is that the IPO has been derailed. The amount that it is attempting to raise is more than all the other lithium wannabes have raised collectively over the last two years. It is easy enough to raise \$6mn in Toronto for a speculative story in a "hot" metal. As we have often noted, production is very much an acquired taste in Canadian mining circles. Maybe Talison's owners deluded themselves in thinking Toronto was really interested in a serious production story in the lithium space. This company might better consider casting its bread upon the water in the London market.

Galaxy Resources (GXY.ax) Strategy: Buy

Key Metrics		2008	2009e	2010e
Price (AUD)	\$ 1.18		n/a	n/a
12-Month Target Price (AUD)	\$ 1.80		n/a	n/a
Upside to Target	53%			
12-mth High-low	\$0.265-2.40			
Market Cap (AUD mn)	\$ 162.7			
Shares Outstanding (millions)	138.5			
		Consensus EPS	n/a	n/a
		Hallgarten EPS	n/a	n/a
		Actual EPS	n/a	
		P/E	n/a	n/a

- + Financing in the bag, all the off-take arranged and construction under way. What more could one ask?
- + The company has excellent China connections (even to the extent of locating its downstream processing there. It has achieved this without selling out more than a small minority stake to the Asian investors)
- ✗ The financing in late 2009 was done at a relatively cheap price, but it was not exceptionally dilutive and it was a key enabler to get the project moving and accretive to market value
- ✗ The company's mine is spodumene so may potentially be competed out of business further down the track if there is excessive supply flooding the market from brine sources

We have placed Galaxy in our producer's list, as it recently broke ground on what will be Australia's second lithium mine, the Mt Cattlin project at Ravensthorpe in Western Australia. It is expected that production will begin in late 2010 and the mine will have a 16-year life based on the recently upgraded resource (see table below). Are we seeing a pattern here with yet another Australian company within sight of production while the Canadians slice and dice furiously without ever serving up a usable project?

Resource	Tonnes	Li ₂ O %	Ta ₂ O ₅ ppm
Measured	2,672,000	1.17	150
Indicated	9,629,000	1.09	171
Inferred	3,575,000	1.00	145
TOTAL	15,875,000	1.08	161

Note: Li₂O cutoff grade >= 0.4% Li₂O. Figures in the above table may not sum due to rounding

The Mt Cattlin mine shall be the world's second-largest hard-rock producer of lithium from spodumene, and would be one of three lithium minerals currently mined commercially, along with petalite and lepidolite. The project is comprised of a mine and minerals plant which will produce 137,000 tpa of 6% Li₂O spodumene concentrate. Galaxy intends to add value to the mine by establishing its own downstream lithium carbonate chemical facility in Jiangsu Province, producing 17,000 tpa of lithium carbonate. The budget for the Australian end of the plan is AUD\$79 and is now fully funded.

The company is in the midst of a second round of financing that shall conclude with Creat Group, an AIM-listed entity, holding 19.9% of Galaxy's shares. These it has been (and will be) issued at 88 cents, though

this was originally arranged back in August. Despite the London listing Creat actually represents Chinese interests. They have organized the financing for the mine buildout. Creat will provide Galaxy with 100% debt finance of approximately A\$130 million for the purpose of developing both the Mt Cattlin and Jiangsu facilities. The loan is for a period of seven years at what the company calls "very attractive interest rates". Creat also wins one non-executive board seat. Interestingly though there is no off-take agreement required. However with the processing plant being in China, we somehow doubt that finding a buyer will be an arduous task. The company announced as long ago as last April that it had offtake demand from Korean, Chinese and European customers for 130% of its planned production.

The tie-up with the Chinese is a smart move that virtually guarantees Chinese market penetration and moves the project forward. We are left wondering on some of the industry wannabes, particularly those in North America, whether they shall be able to secure the ideal scenario of a strategic investor that not only provides capital and underwrites production financing but also secures the offtake. All three factors must interact. While we are very benign towards government's blocking Chinese participation in "strategic" mine developments, the corollary has to be domestic users stepping up to the plate and committing to offtake and soft financings to make mines viable.

We regard Galaxy Resources as a **Long** with a 12-month target price of \$2.30. This is actually lower than the company's twelve month high.



FMC (FMC) Strategy: Neutral

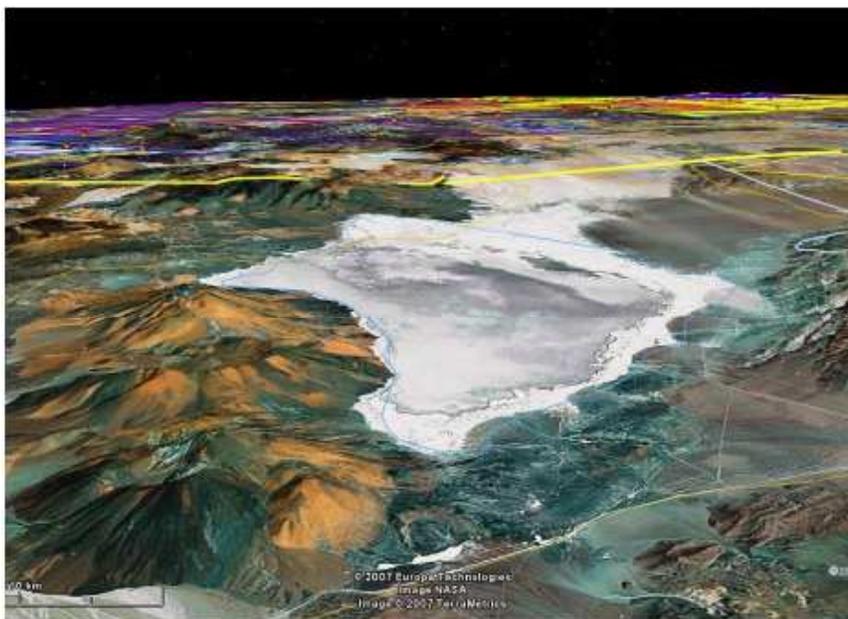
Key Metrics		2008	2009e	2010e
Price (USD) - ADR	\$ 53.22		\$4.11	\$4.6
12-Month Target Price (USD)	n/a		n/a	n/a
Upside to Target	n/a			
12-mth High-low	\$34.90-58.15			
Market Cap (USD mn)	\$ 2,711			
Shares Outstanding (millions)	50.9			
		Consensus EPS		
		Halgarten EPS		
		Actual EPS	\$4.35	
		P/E	12.2	12.9
				11.6

- + The company is well-positioned already as a successful lithium producer. It has its own downstream uses for the element in its many chemical products. Thus even if prices should fall due to oversupply this will just move the profit margin from the upstream to the downstream end of its earnings flows

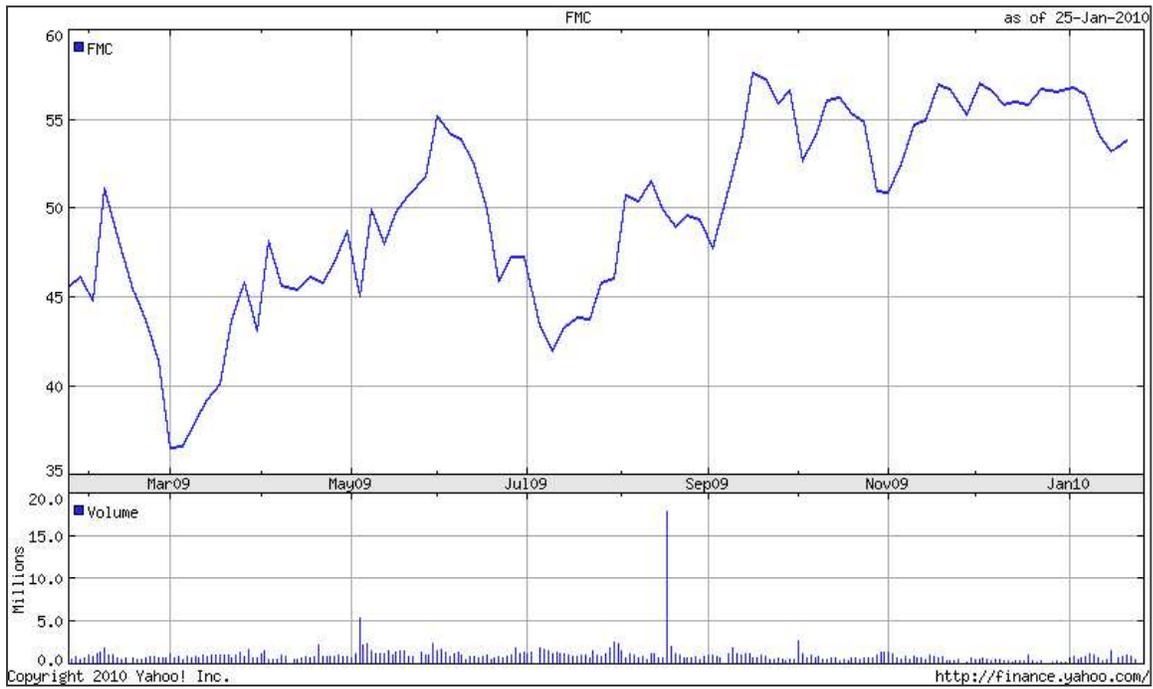
The US-listed agrochemicals company, FMC is a major global player in lithium and operates in Argentina via its subsidiary, Minera del Altiplano S.A.. Its prime "mine" is El Salar del Hombre Muerto located in the Andean province of Catamarca, in the far northwest of the province in the department of Antofagasta de la Sierra, some 700 kilometers from the provincial capital.

The photo below shows the FMC resource/mine in all its Martian splendour. There are only three regions in the world with deposits similar to those in Antofagasta de la Sierra, that of FMC being the most significant.

There are conflicting numbers out there. The useful life of this "mine" has been estimated at around 40 years, but the company's promotional material speaks of 75 years worth of supplies at the site. It produces lithium chloride and lithium carbonate, of which 100% goes to export markets. The product goes to its markets by rail to Antofagasta in Chile and then by ship to the US.



The lithium carbonate plant of FMC began production in the third quarter of 1997 and the lithium chloride plant, at Güemes in Salta, started up in January of 1998. Not much more information is forthcoming. This is novel for a US-listed entity that has been in the public markets for decades. Makes us wonder.



Rincon Lithium Strategy: N/A

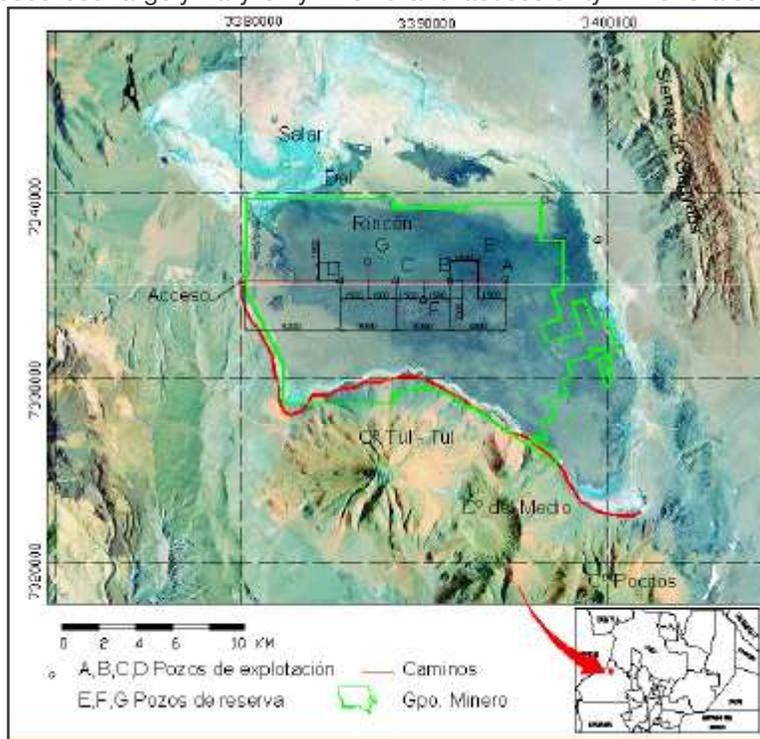
- + The first mover advantage lies with Rincon. It is unfortunate that Admiralty is not the subject of this focus but its own fecklessness meant that its prescience in highlighting the lithium opportunity will go largely unrewarded and Sentient will gain the spoils for having very wisely bottom-fished the asset in late 2008.
- + As the next producer to start up Rincon will be a target for the cashed up existing players (like Soquimich) who will want to see this company as part of their cartel rather than as a rogue elephant.
- + The company has secured its sodium sulphate source and in the process has trumped most of the other wannabes leaving them to seek out more distant and costly alternative sources
- + The potash output will be very substantial and have a receptive captive audience in the form of the enormous Argentine agricultural sector. This aspect alone may make Rincon of interest to Vale
- ✘ Rincon will shift the industry from near balance in the good times into temporary over-supply. This is a situation the company will need to manage carefully or risk damaging its own value and its potential revenues. Well handled it may be a means of blocking most other potential entrants from the industry leaving their plans to wither on the vine

We shall concentrate more on this asset, even though it is currently not investable, for what holds true for Rincon also pertains to several of the other up and comers in the LatAm lithium space. They face the same “chemical” challenges and the resources largely vary only in size and accessibility. This is also a name that we became familiar with well before the lithium craze descended upon the markets.

The project is situated at 3,700 metres above sea level (very near to the Chilean border). The tenements cover an area in excess of 250 square kilometers. The Rincon Salar asset is a lithium, potassium, magnesium-rich brine resource located in the province of Salta. It is a hyper-saline lake fed by three subterranean rivers percolating into the *salar* through volcanic rocks. The ponded evaporate deposit is estimated to contain:

- 7.4 million tonnes of lithium carbonate (LiCO₃) equivalent
- 51 million tonnes of potassium chloride (KCl)

The key resources that can be



produced from exploiting these deposits are lithium carbonate, lithium chloride and lithium hydroxide, potassium chloride (muriate of potash), sodium sulphate and magnesium.

This asset was the subject of an extensive research report by us in mid-2008 when it was scheduled to be spun-off from the Australian-listed miner Admiralty Resources (ADY.ax). The tenements had been acquired by Admiralty in February 2001. The plan in mid-2008 was to distribute shares in the Rincon Lithium subsidiary to existing shareholders and this transaction was expected to take place in the third quarter of 2008. This plan was well-regarded by us (hence our coverage) but came to grief due to the feckless financing by the company executives of their own purchases of shares in ADY through a second tier brokerage firm in Australia that hit the rock in the financial crisis. This necessitated a rapid sale of the asset to clear debts and Rincon was sold to a Cayman Island-based entity controlled by the **Sentient** hedge fund group. The price of around AUD\$35mn (USD\$27mn) was a howling bargain but such was the state of Admiralty's finances that the company could think of no better solution than divestment.

A study commissioned by Admiralty on the extraction methods for processing the brine has shown that pumping rates of as high as 375,000 litres per hour can be achieved by the production wells with no noticeable effect on the water level of the Salar. The capital expenditure program for the development of the Rincon Salar has been established at US\$105m. Major supplies of raw materials are located close by to produce calcium hydroxide and sodium carbonate needed for the separation processes.

It would appear in light of the JORC resource estimate (below) that Rincon Salar could also be considered a world-class resource with components of lithium, potassium, sodium and magnesium. The satellite photo at the left shows the salar. The Chilean border is just outside the photo to the left.

(1) Lithium Reserves, expressed as Li metal, after 75% recovery:

	Low	Expected	High	Uncertainty of the estimate
	kilo tonnes			
Proved Reserves	746	911±53	1,098	±10%
Probable Reserves	288	492±72	762	±25%
Total reserves	1,035	1,403±126	1,861	±15%

(2) Potash Reserves, expressed as KCl, after 70% recovery:

	Low	Expected	High	Uncertainty of the estimate
	mega tonnes			
Proved Reserves	27.1	33.0±1.9	39.5	±10%
Probable Reserves	10.5	17.8±2.6	27.4	±24%
Total reserves	37.5	50.8±4.5	67.0	±15%

Admiralty initially constructed five hectares of lined evaporation ponds (two layers of 100 micron PVC) to feed the pilot plant, where some steam evaporation is undertaken to speed what would otherwise be an entirely solar process in the full version of the evaporation process (with five square kilometers of ponds in that iteration).

As a result of very favorable evaporation conditions during the (Southern) 2007/8 summer and an improved production process the site showed consistently high recoveries of lithium. In the company's view the mass balance results were outstanding in terms of minimal loss of lithium as the brine moves through the production process. The pilot plant had already (in 2008) produced 12 tonnes of lithium carbonate (97% purity) using the new production process and chemical inputs that originate from

Rincon's vertically integrated supply model. The lithium carbonate so far produced will be further purified when the next stage of pilot plant (due to be complete by November 2008) will produce 30 tonnes per month of 99.0+% Li_2CO_3 . This additional equipment, when installed will generate other by-products such as sodium hydroxide. Battery standard lithium carbonate is 99.99% purity (known as **Four 9's** in the industry).

To move forward towards production the company needed to secure a supply of sodium sulphate and this was done by its purchase, in September 2007, of the Rio Grande *salar*, approximately 250 kms distant from the Rincon asset. The key takeaway here is that the company stated, while not revealing the purchase price, that it represented less than the first year's savings to Rincon.

The Salar del Río Grande purchase was critical in that it has given Rincon a resource capable of supplying all the requirements for its production of lithium for the foreseeable future (more than 40 years). Via this purchase Rincon has grabbed a strategic hold on a unique asset with more applications than just mining. The *salar* represents the most significant resource of sodium sulphate in Argentina and one of the most significant resources in South America. The Salar del Río Grande has yielded almost all of the domestic production of this commodity over the last 25 years.

At the time of the deal we speculated that the purchase also provided an interesting possibility to sell excess sodium sulphate to the detergent industry in Argentina and Brazil. Detergent grade sodium sulphate currently sells for \$130-\$140 per tonne. Rincon was working on the feasibility of processing and selling 20,000-40,000 tonnes per annum of extracted and processed sodium sulphate in the domestic market. However, it might very well have a market much closer to its mine/lake if the other lithium *salar* owners are forced to deal with Rincon to obtain sodium sulphate for their processing needs.

Rincon's purchase of this asset was driven by the economic considerations related to the large distance alternative sources of sodium sulphate are from the Rincon site. Moreover, there is a globally tight supply situation for the mineral/chemical and it would cost approximately US\$160 per tonne to buy sodium sulphate on the open market for the fractional crystallisation process to produce lithium chloride and lithium carbonate. By buying the deposit and using the gas supply located at the plant site, Rincon should be able to produce sodium sulphate for less than US\$40 per tonne. Rincon will require 110,000 tonnes of sodium sulphate to produce 10,000 tonnes of lithium carbonate, 3,000 tonnes of lithium chloride and 4,000 tonnes of lithium hydroxide per annum. Procuring its own source should provide cost savings of US\$15 million p.a. lowering the projected annual operational expenditure to USD\$35million (shaving 30% off the costs). Where this leaves other wannabes in the Argentine lithium space is not so clear.

The *salar* represents an 18.5 million tonne deposit of Na_2SO_4 and contains approximately 18.5 million cubic meters of mineable material. The *salar* covers a surface of about 110 km and hosts a 56 square km central zone enriched with sodium sulphate. The area purchased by Admiralty covers 74 square km equivalent to two thirds of the *salar's* surface. They include the richest zones of mineralisation. The Salar del Río Grande is an evaporitic deposit in the Argentine Puna with measured, probable and inferred resources of about 3.8 million tonnes of recoverable anhydrous sodium sulphate

In addition, there are a number of groundwater bodies within the *salar* that could contribute an additional 670,000 tonnes of mineral from brines containing an average of 11.8% Na_2SO_4 .

Production of potash will commence when the necessary equipment is installed to bring it up to 99.75% purity. The focus to date has been on lithium carbonate production but potash will commence soon. Originally the company had plans to commence potash production before lithium. At that time the planned output was 40,000 tpa of potash. In 2005, it even signed a heads of agreement with Reochem PLC for the sale of all the production on an end-user and agency basis.

Tuesday, February 2, 2010

It is even harder to figure what is in the head of Sentient than any of the public players. We doubt they will flip it back into the public space, though it could be a nice earner. With piles of cash lying around at SQM, it could head that way or **Vale** could pick it up for its potash potential rather than its lithium.

The Nearly-Theres and the Wannabes

In this section we shall discuss the less-advanced players in the lithium/potash space. In doing so we latched onto the group that we knew of, only to find that there were even more names popping up like mushrooms after the rain. The names we have not dallied with here are Electric Metals (EMI.v), Channel Resources (CHU.v), First Lithium Resources (MCI.v), Lithium One (LI.to), Pan American Lithium (PL.v that was formerly Etna Resources), Lomiko Metals Inc. (LMR.v) New World Resources Corp. (NW.v) and North Arrow Minerals Inc.

The space is seriously overcrowded with at least half the names unnecessary to fulfill any foreseeable demand. The coming year should see a winnowing of their ranks as some of the realities of the supply/demand balance become apparent to even the most rabid fans of lithium's prospects.

The prices of the group have taken a severe battering since the lithium conference in Las Vegas last week. We feel sure they would attribute this to market weakness but many names have fallen by more than 10%, one by over 20%. Maybe the wake-up call is reaching some quarters faster than others.

Orocobre (ORE.ax) Strategy: Buy

Key Metrics		2008	2009e	2010e
Price (AUD)	\$ 1.90		n/a	n/a
12-Month Target Price (AUD)	\$ 3.00		n/a	n/a
Upside to Target	58%			
12-mth High-low	\$0.21-2.37			
Market Cap (CAD mn)	\$ 126.6			
Shares Outstanding (millions)	66.8			
fully diluted	75.6			
		Consensus EPS	n/a	n/a
		Hallgarten EPS	n/a	n/a
		Actual EPS	n/a	n/a
		P/E	n/a	n/a

- + The strategy at this Australian company shows up the fakery of so many Canadian “players” in this space. By moving forward first it has managed to grab the most interesting potential offtake partner (part of the Toyota group) in the downstream. This will enable eventual funding (via the Japanese government) and give the company a principal client who will not be interested in pushing prices lower as long as heir is a symbiotic relationship between the two sides
- + Again we note that of all those talking of splitting lithium into a standalone vehicle (the others being TNR and Latin American Minerals), Orocobre is the only one to have done the deed via its recent demerger of Elementos on the ASX to hold its legacy base and precious metals assets in Argentina
- + Orocobre is one of the real winners in the lithium space
- ✗ The potential for overcrowding and thus price weakness when both Rincon and Orocobre are added to the ranks of producers is not lessened by having a good industrial partner willing to take most of its production.

This is an Australian listed company that originally, as its name indicates, had a gold (“oro” in Spanish) and copper (“cobre”) focus in Argentina. In early 2009 it now shifted direction (whilst retaining the original metals assets) towards the easier pickings of the lithium market. In recent weeks it has been the first of the companies to demerge its non-lithium activities. In this case they were housed in a new ASX-listed vehicle called Elementos. Curiously the lithium entity retains the Orocobre name.

Its Olaroz Lithium Project consists of 118 square kilometres of tenements over a *salar* located in Jujuy Province. Olaroz is located just to the north of Rincon and has a similar geological model. Although smaller in area, the company claims it has higher indicative lithium grades.

The location has good infrastructure with access by sealed road and nearby high voltage electricity, gas pipelines and rail. Orocobre has rights to 100% interest in these properties by way of a purchase contract.

Indicative lithium grades based on sampling by government agencies is relatively high at 0.09% and this compares favorably with other possible brine sources of lithium.

Orocobre used Minnelex Pty Ltd, as its independent geological consultant. Their initial work suggests the exploration target is potentially in excess of 325,000 tonnes of contained lithium (i.e. greater than 1.7mn tonnes of lithium carbonate) based on 10% porosity. Orocobre feels that it is geologically reasonable to assume that the Rincon geological model will have similarities at Olaroz. If Olaroz has as high an effective porosity as Rincon, Minnelex considers the exploration target could be 3 to 4 times the size.

Likewise there is also potential for other products such as potash and borates. Recent work by Orocobre indicates average grades of 700 ppm Li and 1.3% K at Olaroz.

Earlier in January it had reached agreement to establish a joint venture with Toyota Tsusho (a parts manufacturer that is 22% owned by Toyota Automotive), to develop the Salar de Olaroz Project. In the current feasibility study phase, Toyota will provide US\$4.5million to fund the completion of the Definitive Feasibility Study and other associated pre-development activities. This is expected to be completed in the third quarter of 2010. If all goes well then after finalisation of the terms of a joint venture operating agreement on completion of the Definitive Feasibility Study, Toyota will acquire a 25% equity interest in the joint venture at a cost based on the NPV estimated from the Definitive Feasibility Study. Additionally Toyota will be responsible for securing a Japanese government-guaranteed low-cost debt facility (probably through JOGMEC) for at least 60% of the project's development costs. While the DFS is still pending, the capital costs for an operation producing 15,000 tpa lithium carbonate have been estimated by Orocobre to be in the range of US\$80m-US\$100m including contingency.

Let us spell this out rather simply. Toyota have chosen Orocobre. Toyota is the leading player by far in the hybrid auto space. They will have the full might of the Japanese government funding apparatus behind them so we foresee production as the inevitable next step after the DFS is out. Where does this leave the hard-rock wannabes?

We regard Orocobre as a **Long** at the current time.



TNR Gold Corp. (TNR.v) Strategy: Sell

Key Metrics		2008	2009e	2010e
Price (CAD)	\$ 0.32		n/a	n/a
12-Month Target Price (CAD)	\$ 0.28		n/a	n/a
Upside to Target	-11%			
12-mth High-low	\$0.05-0.38	n/a	n/a	n/a
Market Cap (CAD mn)	\$ 33.7			
Shares Outstanding (millions)	107.1			
fully diluted	127.9			
		Consensus EPS		
		Hallgarten EPS		
		Actual EPS		
		P/E		

- + The spread of assets this company has cobbled together is truly impressive, at least for its quantity, if not its quality
- + This is not to say that its Argentine assets are not worthy. They may yet be the salvation of the lithium push at this company
- + The company said all the right things at the right time
- + There are some tantalum and niobium assets in the mix and these may ultimately prove more viable but none of these extra things come with low capex requirements
- ✗ TNR has the look of the “boy bands” of the 1990s that were manufactured by impresarios to fill a niche. The commitment to lithium remains to be proven
- ✗ The plan to spin off the lithium assets in a standalone vehicle appears to have missed its ideal moment for launch and may remain earthbound. This will compromise the company's ability to move its plans forward

This is a minerals exploration company exploring a portfolio of properties for lithium and rare metals. It was almost exclusively a hunter for gold in Argentina until early 2009 when it jumped on the lithium bandwagon. The company accumulated a portfolio of lithium projects that it intends to demerge into a new TSX-listed vehicle called International Lithium. TNR has both pegmatite and brine projects - pegmatites with the advantage of presence rare metals such as tantalum and niobium, while brines offer the low-cost large scale production of lithium carbonate that will be increasingly important. TNR has secured over 292 squared kilometres of well-known pegmatite belt in Ireland, acquired a past producing tantalum mine area in Northwest Territories (never tested for other rare metals), staked USGS-tested lithium brine properties in Nevada around Chemetall, the only current lithium brine producer in North America, acquired 120 squared kilometres of salt lake in Argentina and recently announced some discoveries at Mavis Lake in Ontario. If you thought these activities were rather far-flung for an enterprise of this size you would not be far wrong.

The Mariana project is a lithium salar in the Salta province of Argentina with good infrastructure and accessible year round. TNR owns the entire salar which presents an unique advantage over several other lithium companies in the area sharing salars with others. Initial sampling and hydrogeology studies have been completed and exploration drilling will be underway in 2010 to work towards a resource estimate.

El Salto and El Tapau are situated 50km apart and both have year-round access. El Salto is a Copper-Gold-Molybdenum system that appears to be part of a series of porphyry systems known as the "Yellow Belt" district of San Juan. TNR's 10,500m drilling program is currently under way at El Salto. El Tapau is a Copper Gold target. Systematic rock chip samples over an area 600 metres by 400 metres uncovered gold values as high as 19 g/t, with an average value of 2.2 g/t. The 2008 Program for El Tapau includes

detailed geological mapping, systematic rock sampling, geophysical IP Survey, trenching, and the Phase One 3,000m Drill Program.

Too many projects all over the place is the problem of TNR. It talked of spinning off the lithium assets from the mainstream Argentina precious and base metal exploration targets in the first half of 2009. As yet nothing has happened. We wonder if they are afraid that “dividing the baby” Solomon-style might end up with both halves withering away. At least the formerly lowly rated non-lithium assets are finally part of a vehicle with some financing possibilities.

However, while TNR goes merrily picking up lithium assets like shells on the beach, other companies are moving forward. The race is going to the swift and TNR looks like a mule labouring up the Inca Trail loaded with lost of prospects and not much else. When this realization sinks in the stock will go for a tumble. Thus we rate it as a **Sell** at this time.



First Gold Exploration (EFG.v) Strategy: Avoid

Key Metrics		2008	2009e	2010e
Price (CAD)	\$ 0.62		n/a	n/a
12-Month Target Price (CAD)	\$ 0.20		n/a	n/a
Upside to Target	-68%			
12-mth High-low	\$0.07-1.03			
Market Cap (CAD mn)	\$ 30.7			
Shares Outstanding (millions)	49.5			
		Consensus EPS	n/a	n/a
		Hallgarten EPS	n/a	n/a
		Actual EPS	n/a	n/a
		P/E	n/a	n/a

- ✘ Too late to arrive on the scene
- ✘ Too faddish with its attempts to exploit both lithium and Rare Earths while adding the red herring of Rubidium to the alphabet soup
- ✘ If there is one thing worse than having another company on the TSX with virtually the same name it is that other company, being blocked from being acquired by Chinese interests by the US Treasury and then going into Chapter 11.

What a beast this stock is. First it looks like a gold stock then it starts to make lithium noises and then tosses in some rare earths just in case you didn't get excited enough with the first two metals *du jour*. Is this trying to be something for everyone or a mixing and matching of themes to suit the mood of the moment.

To further complicate matters there is another stock, listed on the Toronto main board called Firstgold Exploration (FGD.to) that in December was blocked from receiving a strategic investment due to US Treasury concerns that its Nevada properties were too near to an Air Force base. It seems the companies have nothing to do with each other.

The asset base of EFG consists of three properties, all in Northern Canada. The one that is making the most waves is the Lac Pivert/Rose concession. The properties are contiguous and located 50 km south-southeast of, and along strike to, the Cyr lithium discovery by Lithium One. Fifty kilometres however is not near in lithium system terms. The properties lie in the northeastern segment of the Eastmain greenstone belt. The Lac Pivert and Rose properties host pegmatites, occurring as irregular but generally continuous lenses within the biotite schists. Individual pegmatites can attain up to 60 metres in width and more than 100 metres in length, collectively forming part of a much larger bodies having kilometeric lengths and widths up to 300 metres. pegmatites contain 20% spodumene, beryl (a beryllium aluminum silicate) and trace molybdenite (a molybdenum sulphide). Grab samples gave up to 1.16% Lithium (2.5% Li₂O) and 74 ppm Beryllium.

The Rose Property consists of a number of en-echelon pegmatites, individually up to 15m wide, crosscut by centimetric quartz veins. Spodumene and lepidolite (a potassium lithium aluminum silicate) can form centimetric lenses locally making up to 40% of the pegmatites. Grab samples contained up to 0.21% (0.452% Li₂O) Lithium and 129 ppm Beryllium.

We could spend a lot of time recounting this company's drill results and other exploits or we could cut the conversation short early on. Thus we shall start with an excerpt from the press release of the 22nd of December 2009: "Previous regional work on Rose and Lac Pivert properties (Carlson 1962) identified grab sample containing rare Hearth up to 2.5% Li₂O up to 1.300 ppm Rubidium up to 130 ppm Beryllium up to 70 ppm Niobium and up to 50 ppm Tantalum which is typical of the albite-spodumene pegmatites (Cerny 1991)". We are not sure what a "rare Hearth" is, short of being a fireplace that with scarcity value.

Presuming a lamentable typo we are then more confused to find lithium, rubidium, beryllium, niobium and tantalum all described as “rare Hearths”. We can at least attest that none of these elements are rare earths.

First Gold claims it is “moving quickly” to test the potential and continuity at depth of spodumene dykes which in recent sampling yielded up to 2.48 % Li₂O (equivalent to 6.30% lithium carbonate).

Too little too late sums up this hurried arrival on the lithium scene (which is arraying itself in Rare Earth robes in case the lithium doesn't take with the punters). Our recommendation is **Avoid**. No-one needs this company. It is surplus to requirements.



Latin American Minerals (LAT.v) Strategy: Sell

Key Metrics			2008	2009e	2010e
Price (CAD)	\$	0.24	Consensus EPS	n/a	n/a
12-Month Target Price (CAD)	\$	0.15	Hallgarten EPS	n/a	n/a
Upside to Target		-38%	Actual EPS	n/a	
12-mth High-low		\$0.10-0.33	P/E	n/a	n/a
Market Cap (CAD mn)	\$	15.2	P/E	n/a	n/a
Shares Outstanding (millions)		63.4			
		fully diluted			
		68.4			

- + The spin-off of International Lithium might yet create an interesting stock in the space with a decent spread of brine assets in Argentina
- ✘ The mystery surrounding two “strategic” investors that have come on board in recent months is either unnecessary caution or news that would not be good if it were known.
- ✘ LAT is in danger of being diluted out of sight and the IPO of Lithium America’s may not even happen
- ✘ The rump of the company post-spin-off will not be very interesting. The issue at the time of the spin-off (if there is a financing) had better raise a decent amount of money or the progeny might end up being as perennially penniless as the erstwhile parent has been

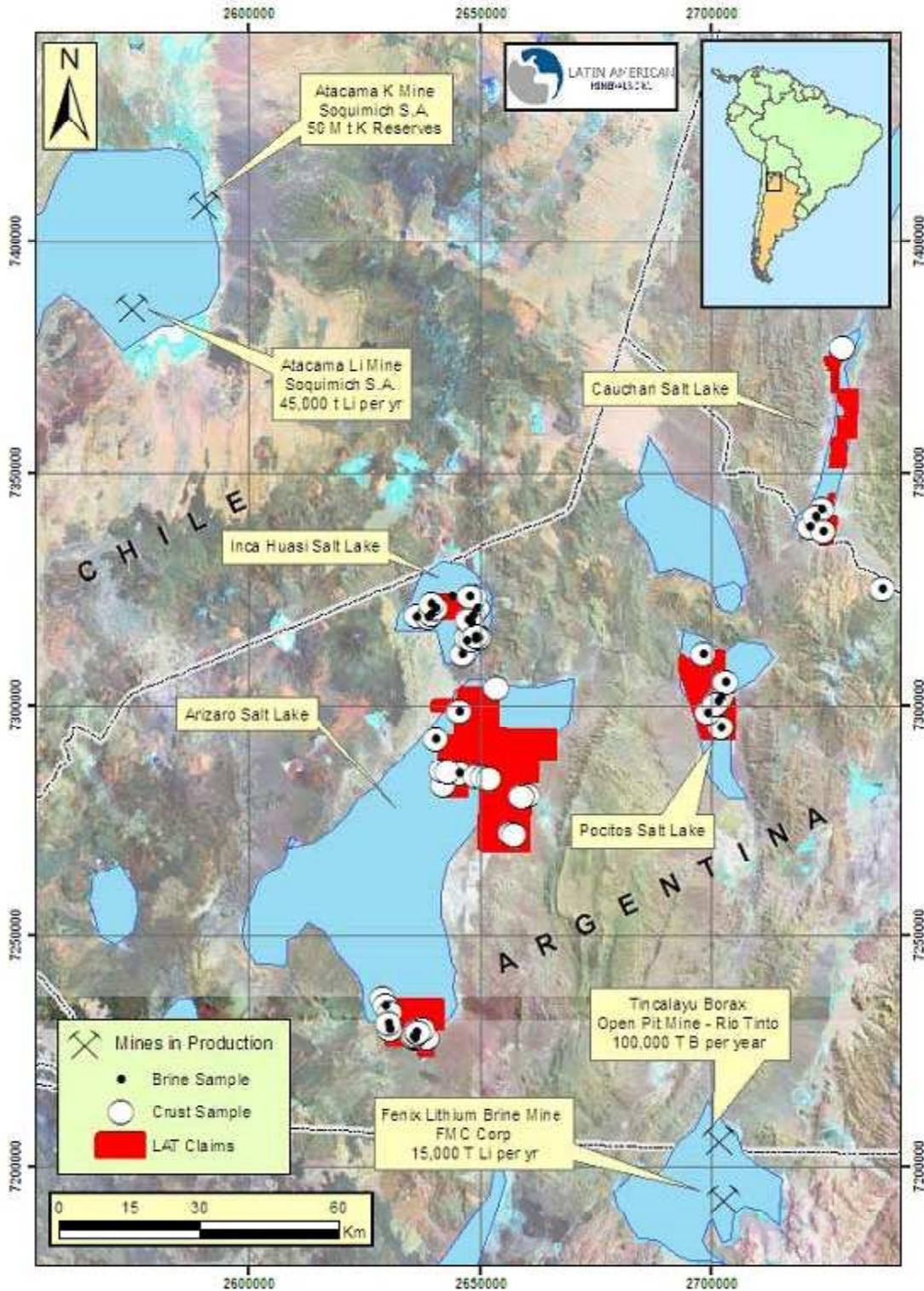
This Toronto Venture Exchange-listed explorer has an Argentine focus (with a little Paraguay for variety) and a handful of projects. In 2008 LAT started a regional reconnaissance-sampling program covering its *salares* properties and other strategic areas in the region. The program consisted of sampling the crust on the various salt lakes and excavating 1-2m deep holes through the salt crust to sample the brine below. A total of 93 samples of the salt crust and 113 samples of the brine were collected during the sampling program. It eventually acquired some properties in the Puna Plateau.

In January 2009 the company appointed the specialized lithium consulting group, TRU, to advise on the next moves in moving the lithium assets forward for LAT. The company announced in early June 2009 that it had combined its Argentine lithium-potash properties with those of Grupo Minero Los Boros S.A. to create Lithium Americas Corp. This brought together the contiguous lithium properties of LAT’s Cauchari salt lake and with Los Boros’s Olaroz salt lake that cover 30,000 hectares.

Lithium America’s territory now covers 93,000 ha on the Puna Plateau, of northwestern Argentina, in proximity to all the other Argentine players covered in this note. It wholly owns 83,424 ha, including: the Arizaro (60,314 ha), Incahuasi (7,168 ha), Pocitos (14,381 ha) and Cauchari (1,561 ha). Additionally, LAT has the right to purchase 100% interest in a second property located on the Cauchari salt lake covering 9,033 ha.

The Arizaro salt lake is located in the center of the project area and is the third largest salt lake in the world covering 1,600km². The company has two properties covering approximately one third of this poorly explored but highly anomalous salt lake while other properties cover significant portions of the Pocitos, Incahuasi and Cauchari salt lakes. Several highly anomalous hot springs near the salt lakes

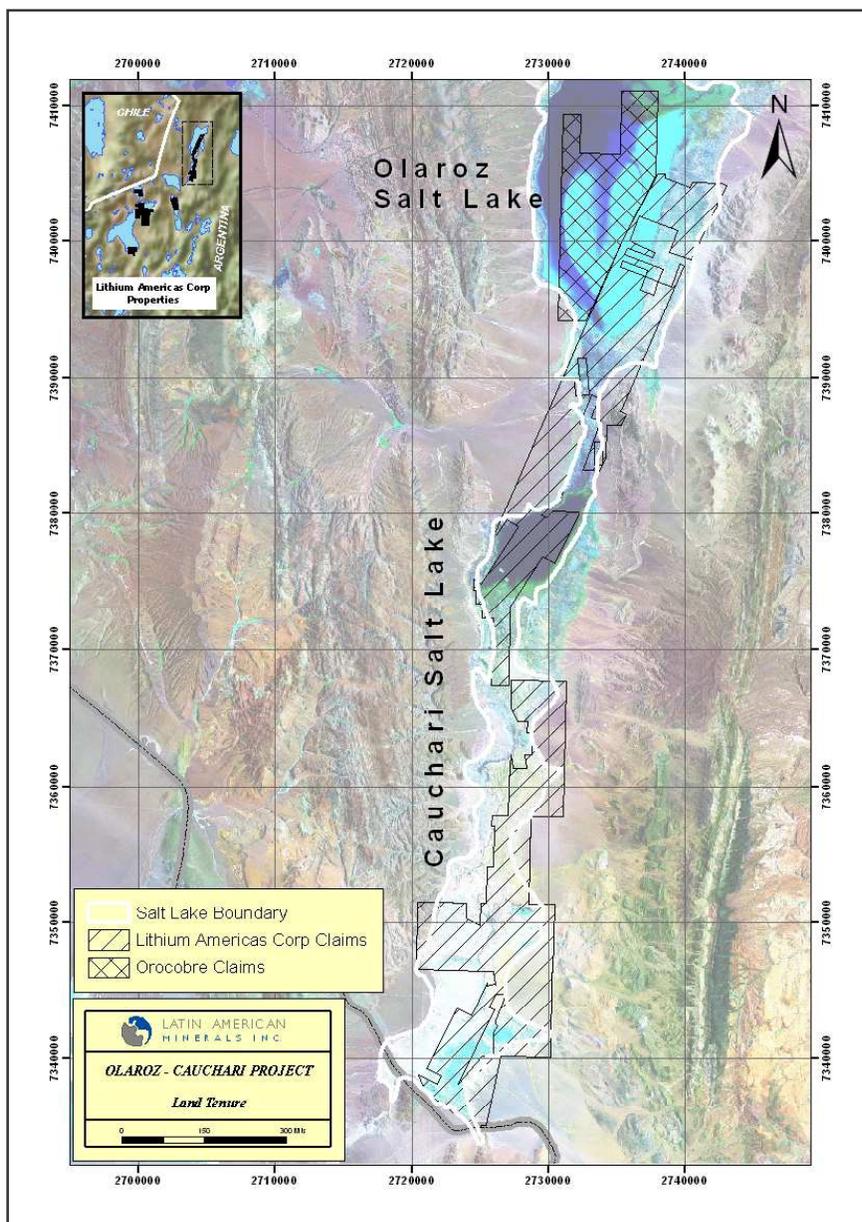
contributes hypersaline brines to the lakes increasing the already anomalous brine concentrations of the lakes.



The Los Boros properties (11,987 hectares) cover part of the Cauchari salar and approximately one-third of the Olaroz salar where Orocobre (ORE.ax) recently announced completion of a scoping study on its adjacent 7,600 hectare Olaroz salar property.

Over 37 surface brine samples collected in regular intervals across the 30,000 ha Cauchari and Olaroz salt lakes yielded lithium grades averaging 800 parts per million (ppm), potassium grades averaging 0.5% and a Mg/Li ratio averaging 3.6.

LAT transferred its lithium and potash assets in the region to Lithium Americas' Argentine subsidiary in exchange for 8.4 million common shares of Lithium Americas, a \$1,000,000 interest free (other than on default) promissory note, of which \$300,000 is payable within 45 days, and the balance payable from subsequent Lithium Americas financings.



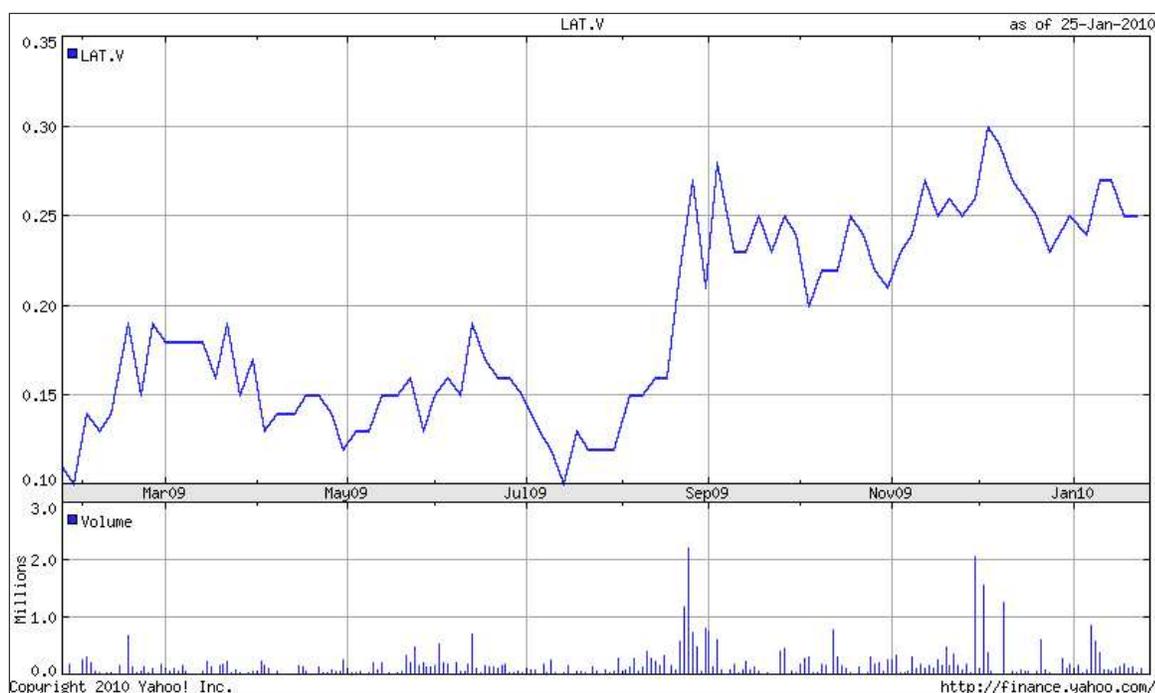
The plan was to get the new entity a listing within two years. LAT also has the right to maintain its pro rata equity interest in Lithium Americas while its interest is at least 10%. The move to list in the markets is evident from the condition that LAT has the right to reacquire its property interests after 24 months if Lithium Americas has not become publicly listed by that time (likewise for Los Boros). The board and management of Lithium Americas includes representatives of both LAT and Los Boros.

Lithium Americas' Argentine subsidiary holds an option to acquire 100% of the subsurface brine salts on the Los Boros Properties in consideration of US\$3 million in exploration expenditures in the first three years, US\$3 million in expenditures towards a feasibility study in the following two years, yearly property payments of US\$70,000 and a 3% net profit interest on commercial production. When the listing takes place Los Boros is to receive 3 million Lithium Americas common shares.

A series of issues by Lithium Americas diluted LAT down to its current 17.1% and

intriguingly a mystery “strategic” investor came on board in September. The release at the time stated “A significant strategic investor has been granted Lithium Americas board representation, a pre-emptive right to maintain and in certain circumstances increase its equity interest in Lithium Americas and an option to acquire a percentage of any lithium carbonate production, up to a maximum of 50%, from Lithium Americas’ properties provided that it maintains its equity interest in Lithium Americas and provides a loan for part of the funds necessary to build the mine following a positive feasibility study”. Then in December another mystery investor “also strategic came on board” with similar step up rights.

As a transaction, which dilutes LAT and has made it a minority investor, we feel the hush-hush nature of the strategic investor is not fair and not professional treatment of LAT’s shareholders. This has the distinct odour of being an investor that you wouldn’t want to be an investor if you were allowed to know who it is. Moreover the listing proposal seems to have gone AWOL, despite the provisions that might trigger the reversion of the assets to their former owners (i.e. LAT and Los Boros). Though that right is lost should LAT’s stake fall below 10% that is drawing nearer with each issue.



We added LAT as a Long in our Model Mining Portfolio in mid 2009 (when we published a stand-alone note on this company’s multifarious activities) and it promptly doubled in price (cause and effect?). A few months later we took our handsome profits and walked away. Compared to Orocobre’s asset base in the *salares*, LAT is significantly behind. But we would rather have LAT’s exposure than most of the larger (market cap) North American hard rock plays. The cloak and dagger regarding the strategic investor makes us glad we are gone from the story. We regard the stock as a **Sell**.

American Lithium (AMLM.ob) Strategy: Neutral

Key Metrics		2008	2009e	2010e
Price (USD) - ADR	\$ 1.02		n/a	n/a
12-Month Target Price (USD)	\$ 1.00		n/a	n/a
Upside to Target	-2%			
12-mth High-low	\$0.31-2.99			
Market Cap (USD mn)	\$ 51			
Shares Outstanding (millions)	50.0			
fully diluted	52.0			
		Consensus EPS	n/a	n/a
		Halgarten EPS	n/a	n/a
		Actual EPS	n/a	n/a
		P/E	n/a	n/a

- + The project is brine which must be a positive
- + The location in Nevada is highly prospective, but this company needs more than proximity to drive it forward to production
- + Judy Baker, who was the President, CEO and a director of Canada Lithium, is the acquisitions manager for American Lithium. She was instrumental in restructuring the company and strategically positioning it into the forefront of the international lithium business. During her 20-month tenure the company's market cap grew from \$5 million to over \$30 million
- ✘ The stock is Bulletin Board listed at this time with all the baggage that goes with that

American Lithium Minerals is an interesting specimen in that it is a potential lithium brine producer that is NOT in Latin America. The company holds 100% of the mineral rights to 16,000 acres comprising four claim blocks in the Montezuma Valley, Nevada. The neighboring Clayton Valley in Esmeralda County contains the only operating lithium mine in the US as well as the only lithium brine operation in the country. Lithium exists in Clayton Valley area in two modes: in solution within a brine and multiple solid phases such as hectorite (a clay mineral) and halite (evaporite salts). The Clayton Valley area brines have been estimated to contain 700 million kg of Lithium to a depth of 1,200 ft. (Kunasz, 1975) The Clayton Valley area brines have the highest lithium content of all brines located in the southwestern United States. This deposit is exploited by Chemetall and is known as the Silver Peak facility.

The Montezuma valley is similar with volcanics surrounding the valley containing substantial lithium concentrations and their brines and evaporites (created by run-off then concentration via evaporation) have been accumulating in the Montezuma and Clayton Valleys for at least 33,000 years. The company claims that brines at this site have the highest lithium content of any brines tested by the USGS in the southwestern US.

In the latter half of January AMLM entered into an agreement to acquire both the North Borate Hills and South Borate Hills "lithium" projects in Nevada. These projects cover 3,400 acres located 20 miles west of Chemetall Foote's operation at Clayton Valley. This however is not a brine operation like Chemetall's. We even get the feeling that it is largely a boron (element symbol B) deposit. Not so sexy but maybe even more interesting in light of the challenging economics for lithium entrants. Elemental boron is used as a dopant in the semiconductor industry, while boron compounds play important roles as light structural materials, insecticides and preservatives, and reagents for chemical synthesis. Boron is also an essential plant nutrient.

The Borate Hills Projects was drilled by US Borax in the 1980s and at the time, the company stated that the project was the second largest boron deposit in the United States. Although US Borax initially drilled

the North Borate Hills Project, discovery of the South Borate Hills Project identified a larger project with higher lithium values. The South Borate Hills Project is a strata-bound claystone unit that is approximately 1.5 miles long and up to 1,300 feet thick.

Recent sampling of the South Borate Hills Project returns boron grades of over 1% B, lithium grades of up to 0.275% Li, and Strontium credits. All other metals concentrations are low, including iron that can be deleterious for processing.

Proximity to operating mines is not good enough though at this point. We would prefer to see Ms Baker more in the driving seat here and less of her colleagues. In a toss-up between Rodinia or American Lithium the former gets our attention for Nevada lithium brines exposure. Our stance on this stock is **Neutral**.



Rodinia Minerals (RM.v) Strategy: Neutral

Key Metrics			2008	2009e	2010e
Price (CAD)	\$	0.66		n/a	n/a
12-Month Target Price (CAD)	\$	0.50		n/a	n/a
Upside to Target		-24%			
12-mth High-low		\$0.80-0.05			
Market Cap (CAD mn)	\$	27.2			
Shares Outstanding (millions)		41.2			
fully diluted		61.5			
			Consensus EPS	n/a	n/a
			Hallgarten EPS	n/a	n/a
			Actual EPS	n/a	n/a
			P/E	n/a	n/a

- + There are two interesting assets in Rodinia. It has prospects that are up close with the already producing lithium mine of Chemetall in Nevada. It also has brine assets in Argentina as a means of hedging its bets on where the industry goes next.
- ✘ Too late on the scene

Rodinia Minerals is another lithium claimant with a foot in both camps, continentally speaking. It is a product of the Bharti mining “stable” and as such represents that well-known group’s horse in the Lithium Stakes.

Its first project was the mineral rights (100% owned) to 50,440 acres comprising 534 claims in Nevada’s lithium-rich Clayton Valley in Esmeralda County (as mentioned in relation to Chemetall). It is currently in the process of assessing the size, quality and processing alternatives for a lithium brine project at the site.

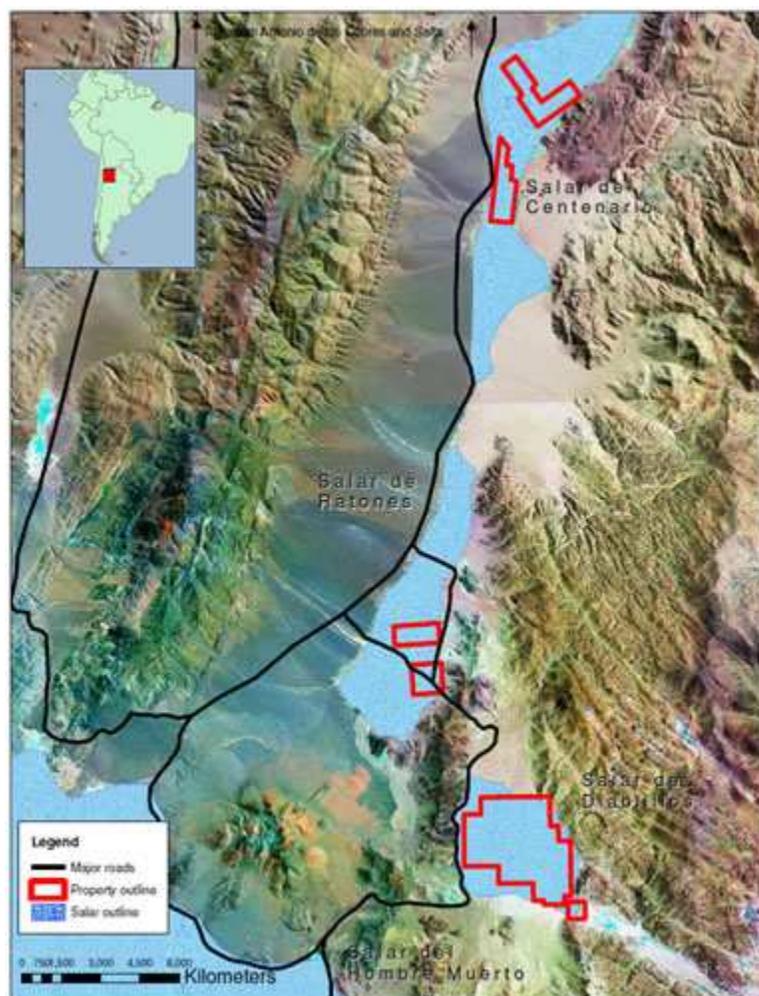
The company does not pull back on the reins in self-promotion when it makes the claim that it “...expects to develop its Clayton Valley lithium resource into one of the world’s largest strategic, scalable and reliable sources of battery grade lithium carbonate”.

As if this was not enough, in an interesting turn of events, Rodinia, in early January 2010, announced that it had entered into an agreement with Borax Argentina SA (a subsidiary of Rio Tinto), to acquire three separate lithium-brine projects in Salta, Argentina: Salar de Diablillos, Salar de Centenario; and Salar de Ratones.

The Diablillos land package comprises 2,700 hectares and represents the central three-quarters of the entire *salar*. The project is adjacent to Silver Standard’s silver-gold deposit of the same name, and is 11 kms from FMC’s Salar del Hombre Muerto facility. Thus infrastructure is not a problem.

Rodinia, in its option agreement with Borax, has the option to acquire a 100% interest in the lithium-rich brines located on the Diablillos property. Past academic studies (not NI 43-101 compliant) on the brine chemistry in Diablillos concluded lithium concentrations averaging 960 milligrams per liter with a reported magnesium-to-lithium ratio of 3.96. Borax will grant Rodinia a three-year exploration license to explore the lithium bearing brines and a subsequent forty-year mining licence to acquire all recovered metals and minerals from such brines. Rodinia is paying Borax an aggregate of USD\$1,944,000 as follows: (i) USD\$500,000 on or before January 25, 2010; (ii) USD \$500,000 on or before July 15, 2010; and (iii) USD\$944,000 on or before November 30, 2010. In addition, Borax shall retain a 1.5% net smelter return royalty (NSR) with respect to the Diablillos Property. Rodinia has the option to purchase the NSR for USD\$1,500,000 at any time during the term of the Diablillos option agreement.

Rodinia says of Diablillos that it is "...reportedly the highest grade salar in the Argentine Puna, ranking alongside the best lithium bearing *salars*". We are hearing this claim so often from so many companies that we have now totally suspended disbelief.



The company also gained, in Salta, the Centenario land package that is comprised of 682 hectares and the Ratonés land package comprised of 600 hectares. These are part of the same complex as the aerial view above makes apparent.

Rodinia may acquire a 100% interest in the Centenario Project by paying Borax an aggregate of USD\$774,711 as follows: (i) USD\$154,711 on or before January 25, 2010; (ii) USD\$170,000 on or before July 15, 2010; and (iii) USD\$450,000 on or before November 30, 2010. In addition, Borax retains a 1% NSR royalty with respect to the Centenario property. However, Rodinia has the option to purchase the NSR for USD\$1mn at any time during the term of the Option Agreement.

Similarly to acquire a 100% interest in the Ratonés Property, Rodinia is required to pay Borax an aggregate of US\$180,000 as follows: (i) USD\$100,000 on or before January 25, 2010; and (ii) USD\$80,000 on or before July 15, 2010.

Academic studies conducted in the early 1990s indicate that Centenario's subsurface brines contain 400 milligrams per litre lithium, while brines within Ratonés contain 600 milligrams per litre lithium. These

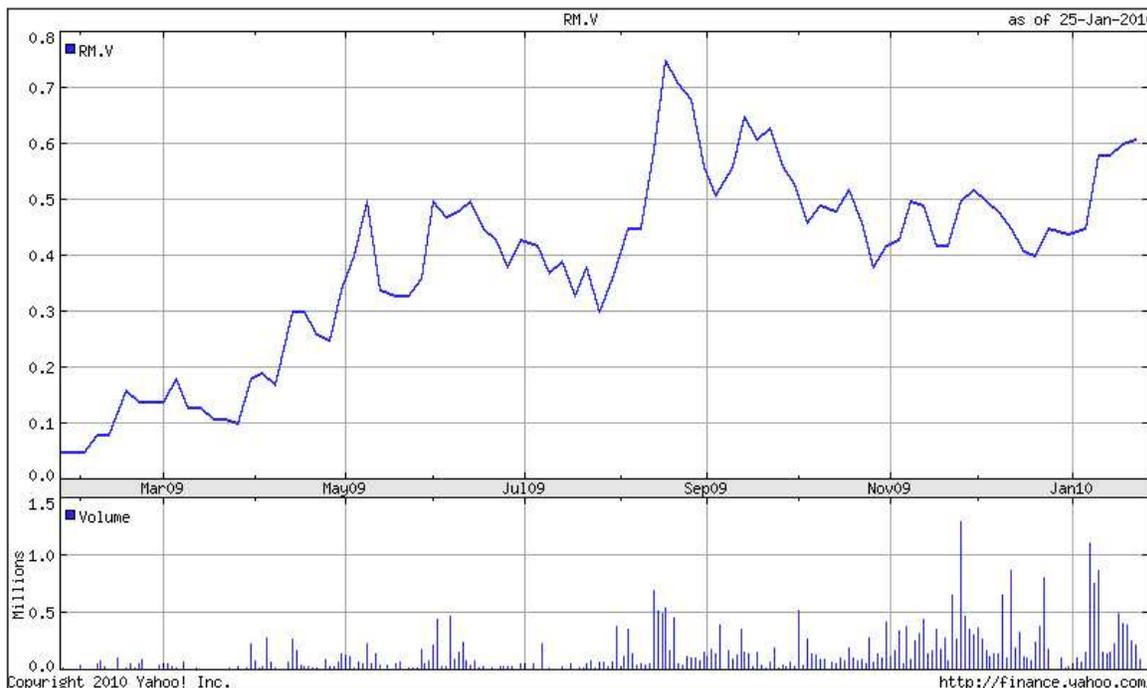
reports though are not NI 43-101 compliant. Curiously, though not unsurprisingly, Borax will retain the rights to mine the surface phase borates at Ratones.

Ratones is within eight kilometres of Diablillos and connected by an existing road. According to the company the close proximity of the two projects provides for various production alternatives, including multiple options for the construction of evaporation ponds. The Centenario properties have installations and infrastructure such as housing, weigh scales and stor

In early December 2009, the company entered into a definitive agreement with a private party in Argentina to acquire approximately 4,500 hectares of the Salar de Salinas Grandes, located in the province of Jujuy, Argentina. This is around 90 kms to the northeast of the Rincon *salar*. Under this agreement, Rodinia is required to make cash payments in the aggregate of USD\$900,000 over the next two years, of which USD\$150,000 was payable immediately

The company did some sampling of brines during the due diligence period with lithium values, with numbers as high as 950 parts per million. The samples taken from within aquifers on the Salinas Grandes property averaged 440 ppm Li. An exploration program consisting of surface geophysics, including gravity and TEM, in conjunction with extensive sampling of the near surface aquifers, is being planned.

The company also has an option to acquire 100% of the Strider Lithium Property hosting spodumene bearing pegmatite dykes is located on the east shore of Crowduck Bay, 20 km east of the mining community of Snow Lake, Manitoba. There have been various lithium seekers on this property in the past but not much in the way of usable data. Canada Lithium's predecessor even held it for a while and did nothing with it.



Rodinia is an interesting bundle of assets. In the pure explorer category it has the fact that it is overwhelmingly brine oriented going for it. Due to it not being much more than a concept with a fistful of interesting assets, we can only give it a **Neutral** rating at this time. It might attract a merger proposal though from another brine player wishing to gain more heft.

Salares Lithium (LIT.v)

Strategy: Neutral

Key Metrics		2008	2009e	2010e
Price (CAD)	\$ 0.63		n/a	n/a
12-Month Target Price (CAD)	\$ 0.72		n/a	n/a
Upside to Target	14%			
12-mth High-low	\$0.05-0.85			
Market Cap (CAD mn)	\$ 20.2			
Shares Outstanding (millions)	32.1			
fully diluted	46.8			
		Consensus EPS	n/a	n/a
		Hallgarten EPS	n/a	n/a
		Actual EPS	n/a	n/a
		P/E	n/a	n/a

- + The ownership of Chilean brine assets gives the company some novelty value and places it in the same country as the world's leading producer
- ✗ Too late on the scene

This company is the only lithium explorer in Chile that we know of. Its 'Salares 7' project covers 966 sq km with 39,404 hectares (394 sq km) of exploration potential solely within actual *salares*. The company claims that this is one of the largest land and pure *salar* concession packages in the lithium exploration sector. Though we would counter that size isn't everything. Grade, depth and accessibility might make much smaller concessions more viable of attractive.

Historic sampling (non NI43-101 compliant) has returned lithium and potassium in all seven *salares* with grades up to 1,080 ppm lithium and 10,800 ppm potassium.

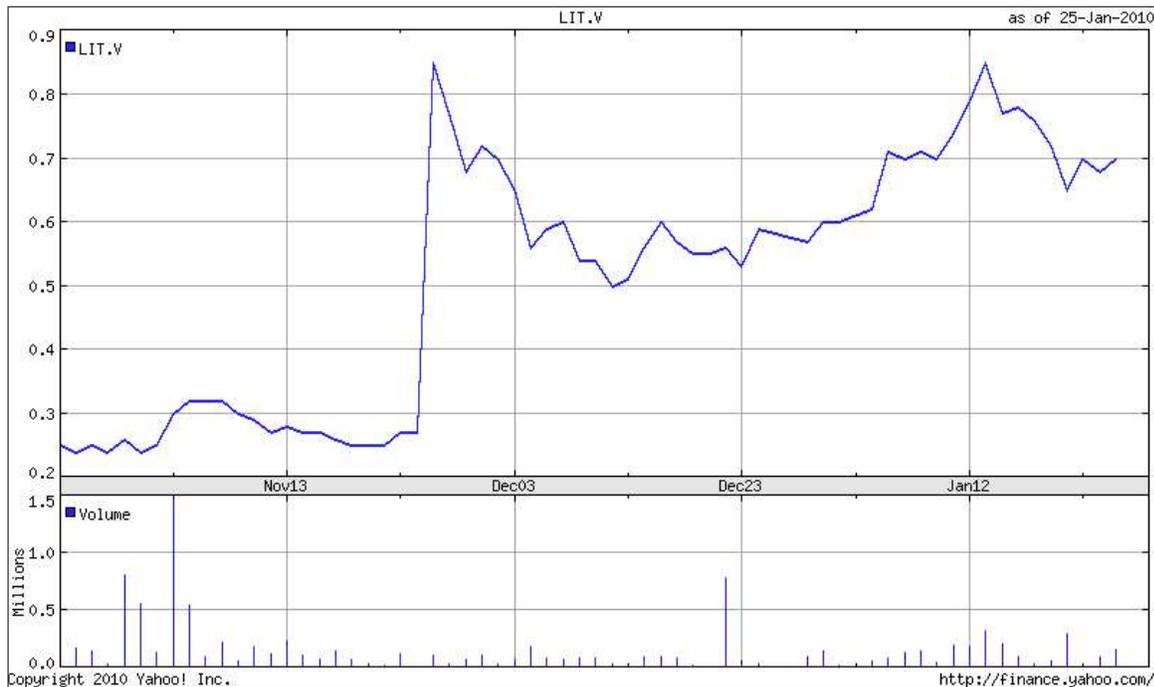
With its local partner, Salares controls 100% of five *salares* clustered within 200 sq km's, resulting in no severed ownership, as is quite common in the Argentine lakes.

<u>Salar</u>	<u>Hectares</u>	<u>Samples</u>	<u>Li (ppm)</u> up to	<u>K (ppm)</u> up to
Salar Grande	4,000	4	123	2,770
Piedra Parada	1,500	14	103	2,040
La Isla	16,500	19	1,080	10,800
Agua Amarga	3,100	6	157	2,490
Las Parinas	5,400	7	477	7,820
Aguilar	8,800	3	337	3,990
Maricunga	104	18	916	11,400
Total	39,404			
Note: 1 ppm is approx 1 mg/l				

From the table above, though cursory and not representing a resource statement of any kind, we might make the off the cuff comment that only two of the lakes (La Isla and Maricunga) appear highly prospective and one of those is very small (one sq km in the case of Maricunga).

The company does not have a long trajectory (only being injected into a listed shell in November 2009) and as such has not appeared on many radars and is thus counted by us as very early stage.

This company has been around a little longer in the lithium space than First Gold, but we are talking weeks not months. This company has a bundle of assets that might be good, who knows. Even TNR and Lithium Americas are more advanced than this one. The only thing saving it from a Sell, rather than the **Neutral** rating we are giving it, is its novelty value in being in Chile (a country with track record in the lithium field) and the positive that it owns all of its territories.



Canada Lithium (CLQ.v) Strategy: Neutral

Key Metrics		2008	2009e	2010e
Price (CAD)	\$ 0.46		n/a	n/a
12-Month Target Price (CAD)	\$ 0.50		n/a	n/a
Upside to Target	9%			
12-mth High-low	\$0.09-0.89			
Market Cap (CAD mn)	\$ 64.9			
Shares Outstanding (millions)	141.0			
fully diluted	165.0			
		Consensus EPS	n/a	n/a
		Halgarten EPS	n/a	n/a
		Actual EPS	n/a	
		P/E	n/a	n/a
		P/E	n/a	n/a

- + A former producing mine (even though underground) which we always regard as a good starting point
- + Excellent infrastructure in an extremely friendly mining jurisdiction with very skilled workforce in close proximity
- + Interest from a major Japanese trading house in offtake and marketing future output
- + Potential to maybe repeat the Orocobre experience
- + Moving rapidly towards a BFS giving a strong impression of a commitment to production
- + A fast move to production may trump, and stall, some other potential players
- ✗ This is a hard rock mine and as such must be at a disadvantage to any and all lithium brine producers on costs per lb and capex requirements

The hard rock project in North America with most merits would appear to be that of this company. Its 100%-owned project is located approximately 38 km south-east of Amos, 15 km west of Barraute and 60 km north of Val-d'Or. Access to the site is via a paved road from Val d'Or, a famed gold mining district with excellent infrastructure and skilled workforce.

The deposit outcrops on surface and the former mine owners drilled over 400 diamond exploration holes from surface and underground. Drilling has intersected mineralised pegmatites to depths of over 320m. Canada Lithium is currently drilling to depths of up to 500m to increase the size of the deposit. At the time that mining operations were suspended, the ore Reserve (non-NI-43101 compliant) was stated to be 15,612,300 tonnes at a grade of 1.14% Li₂O in the proven, probable and possible categories calculated down to the 150-metre level. The reserve was calculated using an 85% recovery rate and a 7% dilution factor. In October 2009, Caracle Creek International Consulting digitized and modeled the historical data from the former Quebec Lithium mine and increased the target estimate for the mine area to 29-30 million tonnes grading 1.1%-1.2% Li₂KO.

A Pre-Feasibility Study is currently in motion that anticipates production of up to 19,200 tonnes of 99.5% lithium carbonate product annually, commencing around 2012. The initial operation shall probably consist of open pit mining to a depth of 150 metres, utilising 150-tonne haul trucks and hydraulic excavators. Mining will be carried out at a rate of 2,950 tonnes per day. This will give 15 million tonnes of ore over a 15-year period (with the further upside being that this number is only half of the target estimate). Mined ore from the pit will be crushed and stockpiled for treatment in the lithium carbonate processing plant. There exists the possibility that mining may go beyond the 150-metre level depending upon the outcome of the Bankable Feasibility.

The site is a past producer, as it operated as underground mine between 1955 and 1965, drawing ore from a system of underground spodumene-rich dykes. The mine, with its 150-m-deep shaft and lateral workings on three levels was operated under the former Quebec Lithium Corporation. Over a period of 10 years of operation, the underground ore averaged a grade of 1.25% Li₂O. The site also had a surface concentration plant and refinery.

In its producing days the mine output was ceramic-grade and chemical-grade spodumene concentrates, lithium carbonate, lithium hydroxide monohydrate as well as a small quantity of lithium chloride and feldspar. Recent metallurgical tests by SGS Lakefield of samples from the site produced battery-grade 99.6% lithium carbonate. Currently a pilot-scale test, planned to commence in January 2010, will produce additional battery-grade material for pre-marketing purposes.

The on-site lithium carbonate production facility that is being contemplated will treat an estimated 1,200,000 tonnes per annum of crushed pegmatite ores to produce an intermediate 6.5% spodumene product that will be upgraded, on site, to produce the aforementioned battery-grade lithium carbonate.

The current timetable is rather a tight one:

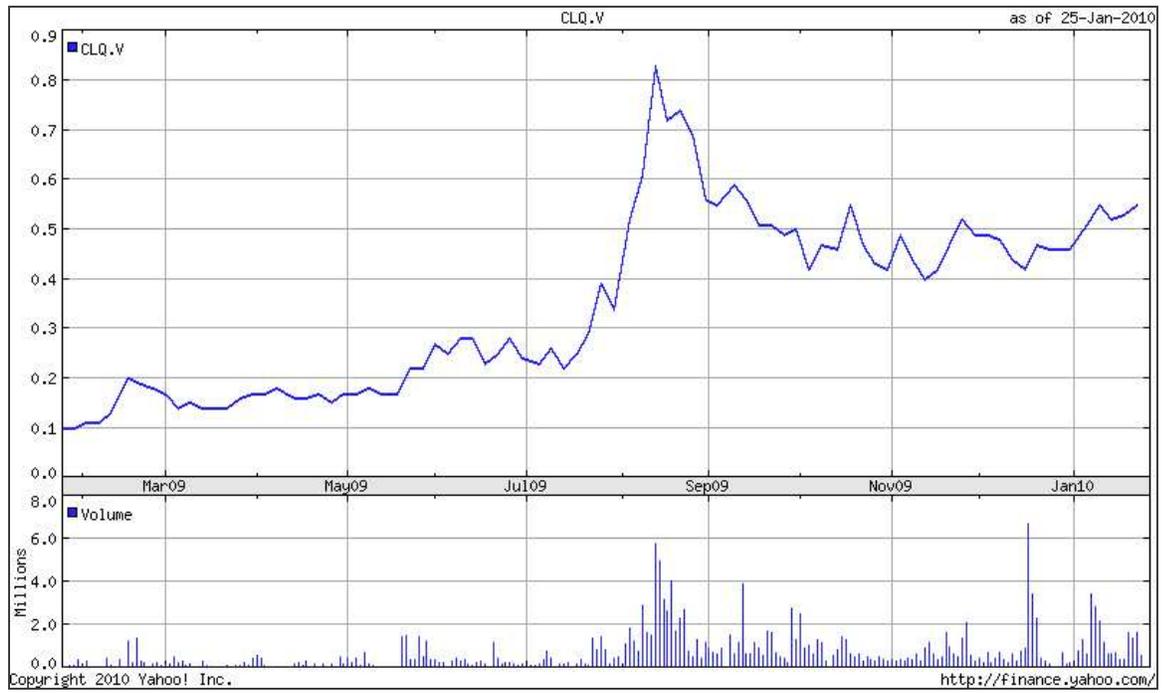
- ❖ February 2010: Pre-Feasibility Study
- ❖ February 2010: 43-101 Resource statement
- ❖ December 2010: Bankable Feasibility Study
- ❖ Q1, 2011: Engineering and construction
- ❖ Q2, 2012: Commissioning

This tends us to believe that Quebec Lithium is the most serious of the Canadian contenders. The current drill program is expected to lead to the completion of a NI 43-101 report on the deposit by the end of the year. This should firm up the number on the resource size and mine viability.

An interesting point that may lift this one above the other unlikely candidates is that, in April 2009, the company signed an exclusive Marketing Agreement with Mitsui Corp relating to the distribution of battery-grade lithium carbonate in Japan, China and Korea. However this lasts only until April 2010, though Mitsui retains an option to extend the agreement annually for six subsequent years.

The key factor is going to be financing. The Japanese can finance whatever project they throw their weight behind, but two factors are key here. First is production costs per lb. Why would they back a project if the price of the output is too high *vis-a-vis* cheaper alternatives in LatAm? Secondly, if the production cost is OK, or absorbed by the producer (so a margin problem for Canada Lithium rather than Mitsui), then we might ask whether the capex is going to be of magnitude of Western Lithium' plans. That would be highly prohibitive except with the Japanese funding the vast bulk of the project.

Of all the North American hard rock lithium candidates this is the one that looks to have the most potential to move forward but we would give it a **Neutral** recommendation because we just don't feel there is going to be enough unsatisfied demand unless CLQ can beat some of the *salares* players into production.



Western Lithium (WLC.v) Strategy: Sell

Key Metrics		2008	2009e	2010e
Price (CAD)	\$ 1.95		n/a	n/a
12-Month Target Price (CAD)	\$ 0.80		n/a	n/a
Upside to Target	-59%			
12-mth High-low	\$0.44-2.49			
Market Cap (CAD mn)	\$ 158.1			
Shares Outstanding (millions)	81.1			
fully diluted	108.8			
		Consensus EPS	n/a	n/a
		Hallgarten EPS	n/a	n/a
		Actual EPS	n/a	n/a
		P/E	n/a	n/a

- + The Nevada property of this company is very sizeable... and world class... but..
- ✘ The costs associated with production on a per lb basis are likely to be twice the level of any of the brine competitors
- ✘ The likely capex is over \$400mn
- ✘ The BLM is in dispute over the royalty calculation for potassium products in the State of Nevada which may mean that the company may not be able to use this product for by-product credits to ameliorate high production costs for the lithium. This may be a project killer.

This company is the holder of the Kings Valley, Nevada lithium deposit. Its largest shareholder is Western Uranium with a stake of just over 20%.

Western Lithium has completed a National Instrument 43-101 resource estimate for the envisioned initial stage of development. The current resources are part of the historical estimate of 11 million tonnes of lithium carbonate equivalent (LCE) prepared by Chevron Resources.

In January the company announced its NI 43-101 compliant Preliminary Assessment and Economic Evaluation on its Kings Valley project. The assessment was prepared using several major engineering firms and independent consultants. The chief points of note were:

- ❖ Planned Stage I nominal production of 27,700 tonnes per year of lithium carbonate equivalent (LCE) and 115,000 tonnes per year of potassium sulphate (SOP).
- ❖ Stage I average revenue estimated at US\$263 million per year.
- ❖ Stage I pre-tax net present value (NPV) discounted at 8% of US\$714 million
- ❖ Pre-tax internal rate of return (IRR) is 28%.
- ❖ Cash operating costs estimated to be US\$1,967 per tonne (US\$0.89/pound) of lithium carbonate, after potassium sulphate by-product credit.
- ❖ Initial 18 year operating life with potential scalability to expand to multiple stages.
- ❖ Total capital costs estimated to be US\$427 million
- ❖ LOM of a round 18 years

A key point to note here is that the recent scoping study estimated cash operating costs to be US\$4,463 per tonne LCE with cash credit of US\$2,496 per tonne LCE derived from the sale of "by-product" potassium sulphate. The issue of the usability of these credits (due to BLM royalty calculation rules) is a matter of conjecture still. Without these credits (which frankly reduce operating costs by half) we would rate the chances of this mine moving forward as very lowly indeed. In light of the by-product credits being higher than the lithium component one might even see this as a potassium sulphate mine with lithium credits. That wouldn't be the flavour of the moment though would it?

In late October 2009, Western launched a takeover offer for Rocky Mountain Resources, an industrial metal and minerals exploration and development company. Rocky Mountain's primary asset is the Gibellini development stage Vanadium project in Nevada. Is this an attempt to hedge bets against a lack of traction in the lithium space using the WLC's currently supped-up market capitalisation?

How best to sum up our antipathy to what looks like one of the largest lithium resources around? Well for starters, it will take more than four times as much as Orocobre is spending to get WLC into production. Its production costs will be double those of brine producers. Then it does not know if the BLM will agree to a royalty recalculation that makes it economic to extract the potassium sulphate by-products (we have heard that Chemetall is stockpiling its potassium byproducts at its Nevada mine because of this problem). Without these the byproduct credits are not going to be there to help the rather dodgy economic equation. It's not clear to us how this omelette is going to be made without breaking eggs. At current prices we would **SELL** this company's stock and reposition in other more viable names in the space.



Spotting a trend

Do you see what we see? In the blue corner there are Galaxy, Talison, Orocobre and Rincon. All Australian-owned, listed or managed and all in, or moving towards, production. In the red corner is a vast heaving mass of self-promoters who are, well, promoting. All of the parties in that corner happen to be Canadian. Funny that..

If one presumes that the first four getting into production will take the wind from the sails of the rest then this may indeed be the highpoint of the lithium boom. The lithium conference this week in Las Vegas may be somewhat akin to the Summer of Love in 1969, representing both a high point of the movement it represented and also its swansong. The four Australian names are not the sum total of the industry. They are just the icing on the cake of an industry that has been around for decades and already has three large players in the West.

Cartel? – circling the wagons

What tell-tale signs should one look for when seeking the hidden hand of a cartel? A very good indicator is an industry that has only three competitors. Then we might look for a product with opaque pricing that is conducted on a by-appointment basis. Then we might look at the participants' willingness to let the world know about what it is doing. Let us look at FMC. It has a separate website for FMC Lithium but the website is masterful in what it does not say. It is difficult to even work out where the company's facilities are, their process or their meaning to the larger corporation. One would get the impression that the company is 100% vertically integrated and is its own client for all its lithium output. In fact the vagueness is so extreme that one can deduce more from Wikipedia about lithium than from FMC. Then we have Rockwood. This company is quite frank in that its lithium operations are conducted through Chemetall. Everyone knows that one of the mantras of US corporate life is integration and that another is branding. Curiously though this subsidiary has been owned for nearly 16 years now, and despite having a major operation in the US it still has the look of an activity only bolted on yesterday. Of course, such an approach might be useful if one didn't want to fall under the beady eye of competition authorities intent on antitrust action in the space. And then there is Soquimich, from Latin America, the continent of restrictive trade practices where cartelisation is perfected to an art-form.

One might well wonder how this group looks upon the swarming horde of lithium wannabes in its space. The addition of a player like Rincon helps to solve the supply shortage through the next ten years. Thus opening the magic circle to a new entrant seems desirable. Even better that Rincon should be absorbed by one of the current players and neutralized as a pricing and volume threat. Beyond Rincon however is where a real cartel would draw a line in the sand. Too many new entrants threatens chaos and "undisciplined markets". As yet the "Empire" has not struck back but when it does investors in the juniors may not see the action but they will definitely feel it.

Interestingly the most dangerous thing for the cartel would be LME trading and pricing of its commodity. There are many lithium users out there and very few suppliers. If the up and coming lithium players were to push the LME for a contract to be issued on the element (such as Moly and Cobalt shall see from this month) then the bat and ball in the lithium space would be taken away from those who profit from it being run from smoky back rooms.

Risks

The biggest risk in the sector is that the horse on which one decides to place one's bets drops dead before it is even in sight of the finish line. Some two-thirds of the companies in the space are surplus to requirements and have projects with too larger tickets on their Capex and problematic locations or host bodies.

One might have said that the prime risk for the new batch of lithium miners may be perceived to be their exposure to Argentina back in 2008. But these days there is Argentina and *Argentina* for those in the know. Mining in the country is essentially in the hands of the provinces though the Federal government can levy taxes on exports from the sector (a subject currently causing controversy). In assessing the risk in Argentina it is important to do this on a province-by-province basis. All of the *salares* are in mining-friendly provinces.

The reality driving the pragmatism of governors in these Andean provinces is that they are “hard-scrabble” agricultural areas and dramatically poor compared to the industrial and grain belt regions of the country. Mining has not only bought skilled and unskilled jobs and infrastructure, but also royalty flows which have helped in giving these provinces better leverage with the Federal government and made them slightly less dependent upon the “charity” emanating from Buenos Aires. Thus we do not expect problems at the provincial level. Moreover the *salares* are so isolated that there are no local populations to raise environmental issues within any conceivable distance.

Might prices for the output collapse? Lithium was a hot topic in 2008 and the first half of 2009. Not being a product with a spot market, it could not however attract speculative buying of the type that keeps US Congressmen awake at night fantasizing of conspiratorial hedge fund managers. The price is thus a real one driven by supply and demand. The sexy new demand is hybrid cars. This business is still in its infancy with a strong component of fringe dwellers and *Hollywoodites* leading the charge at the showrooms. However, should hybrid go mainstream then lithium at current levels will be just a distant memory. Then again as we have noted recycling could crimp future demand once a decent “base” has been established. The biggest danger is likely to be from the eventual rise of hydrogen powered vehicles. This is still early days for that option.

Then there is the potash output. This is looking most healthy. As we noted fertilizer is still only a very small component in the cost of grain production. It is generally felt that higher grain prices are here to stay. We prefer to posit that they will fluctuate but at a higher level than the give-away average prices of the last 50 years. Natgas is an increasingly scarce resource and thus urea production from this source may be priced out of the fertilizer market. This leaves great scope for potash to increase its share even further. The reality for *salares* miners is that they do very well firing on only one cylinder (lithium) but if they fire on two (or more if we include the sodium sulphate potential), then the potential will be enormous to expand profits and market capitalization.

Conclusion

Lithium does not fit any conventional metal group. It's out on its own in the way that uranium, REE and mineral sands tend to be. It requires an entirely different mindset to understand the implications particularly when one is looking at the brine lakes. The hard rock lithium phenomena is an easier study but why would one plump to invest in a product with double the production cost from one mode of mining than that of brine lake operators?

Lithium is not about to be superseded; indeed it looks like its consumption is holding up relatively well though the opacity of the market (and the supply) means that this is hard to judge. What one can look at are the identifiable uses of lithium and certainly the “go-go” purposes to which it can be put to use (cellphone batteries, laptop batteries and hybrid cars) are holding their own or surging ahead.

Below we include an image. This is what construction of a lithium mine and processing plant looks like. We include it for all those investors who may get to visit North American lithium “miners” “projects” (doubly ironical, no?) over the next ten years and will never get to see anything actually being built or in production. This is Galaxy's mine being built. Enjoy...



Concrete footings for the Crusher Structure

The lithium miners with *salares* as their source material are clearly ahead of the hard rock pack with a margin advantage that is, quite literally, killing for the hard rock crowd. Scare tactics evoking the bogeyman of Evo Morales will not wash as the Argentine producers have more than enough potential product to leave Bolivia in the Stone Age should it choose to do so. Raising “national security” issues only starts to get some traction in our minds when the Federal government in the US starts to subsidise the hard rock miners to help them surmount their production cost disadvantage and massive upfront capital costs. Until such time they remain pie in the sky. Thus the hard rock fad is expected by us to go the way of the pet rock fad.

Meanwhile back in Argentina we suspect that some Asian end-users (Korean and Japanese most likely) may make moves to JV (as in the recent Orocobre deal) with the smaller *salares* holders or at least fund their move to production with VPP-type arrangements. Any deals along these lines would make this **sideline** for these juniors be more than worth multiples of their market caps and move them from the “wannabe” to the “producer” column in doubletime.

Important disclosures

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