Friday, March 22, 2024

HALLGARTEN + COMPANY

SECTOR REVIEW

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Boron:
the low-flying tech mineral

Company	Strategy	Ticker	Currency	Price	Mkt Cap mns
Boron One	**NEUTRAL**	BONE	CAD	$0.08	$13.77
5E Advanced Materials	**NEUTRAL**	FEAM	USD	$1.24	$64.74
		5EA	AUD	$0.20	$104.41

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Boron

The Low-Flying Tech Mineral

- ➕ Boron has an enormous range of uses, from high-tech to the mundane, with one of the most talked about being Neodymium-Iron-Boron permanent magnets in EV motors
- ➕ Turkey (EtiMaden) and the US (RTZ) are the dominant sources of mined borates, with Argentina as a long-term minor producer
- ➕ Some borates are sourced from *salares* as a by-product of Lithium extraction, and this should be a rising component of future supply
- ➕ Demand for the mineral is strong and growing with CAGR exceeding most forecasts of just a few years ago
- ➕ Potential new producers are evolving in Serbia and California
- ✖ Boron production has become increasingly focused in its geographical sources
- ✖ Boron is not in many critical minerals listings, despite its multiplicity of uses, because its sources are not under Chinese control
- ✖ There is no foreseeable driver for a quantum leap in demand, so therefore no driver for a major up-move in pricing
- ✖ The environment for funding Boron projects remains tough, with the most advanced new player (5E) having suffered many travails on its way to production

Borates Go Sexy

It might be stating the obvious, but Neodymium Iron Boron magnets contain Boron. The chemical symbol is the giveaway here…. $Nd_2Fe_{14}B$. Technically this makes Boron (and Iron), the forgotten magnet metal.

The global borates market is not insignificant at over two million tonnes of B_2O_3 equivalent per annum with a myriad of uses ranging from the prosaic to high-tech. Some common applications of Boron include: glass production, insulation, fertilizer, silicon, metallurgy, LCD screens, stealth technology, sports equipment, nuclear reactors and waste storage, lithium batteries, computers, heat shields and medicines.

We started writing about this sector in 2022, but a sort of writers' block evolved as the two public companies in the mineral were less than forthcoming about their status and evolution. The task regained impetus in mid-2023 when we actually had the opportunity to visit a real producing facility in the form of Borax Argentina's long-standing plant in the Altiplano of Salta province in Argentina. This had been in public ownership (Orocobre, and before that RTZ) but has passed back to the private sphere when sold to a company owned by local Salteño entrepreneurs.

As none of the companies in the space are clients of ours, the priority for publishing was much lower

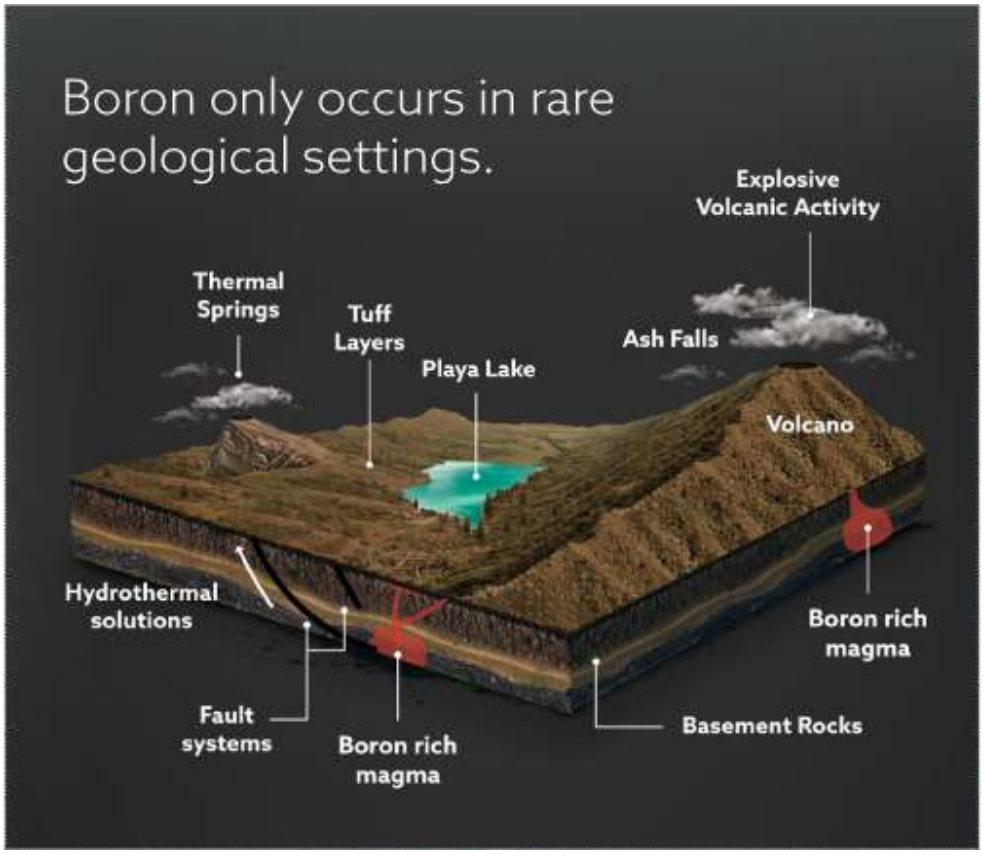
than many other tasks. However, in the interim there have been developments at both publicly-listed entities, and they have moved out of their slumbers/travails. In this review we shall look at Boron and its uses and sources, then we shall review the three players that are most accessible (or might become so).

The Element and Its Geology

Boron is ubiquitous in the environment, occurring naturally in over 80 minerals and constitutes 0.001% of the Earth's crust. The chemical symbol for Boron is B with an atomic weight of 10.81. Boron is not found as a free element in nature.

The highest concentrations of boron are found in sediments and sedimentary rock, particularly in clay-rich marine sediments. The high boron concentration in seawater (4.5 mg B L-1), ensures that marine clays are rich in boron relative to other rock types.

Boron occurs as an orthoboric acid in some volcanic spring waters, and as borates in the minerals, borax and colemanite. The graphic below shows the conjunction of geological and climatic factors that are most propitious for the formation of borate deposits.



Source: 5E Advanced Materials

Extensive borax deposits are found in Turkey. It is also present in lithium *salares* in the Argentine *altiplano* (e.g. Salta). However, by far the most important source of Boron is rasorite. This is found in the Mojave Desert in California, USA.

Processing

Boric acid is mainly prepared from borates and minerals and is produced by reacting sodium borax with an inorganic acid such as sulfuric acid or hydrochloric acid.

To produce boric acid using sulfuric acid, sodium borohydride is first poured into the reaction tank, and then the dilute sulfuric acid is slowly added until the solution is highly acidified and the pH approaches zero. Then a saturated solution of borax or ortho-borate forms. The hot solution then crystallizes and cools in a vacuum. Boric acid crystals will then be formed. Separate the crystals from the solution and cool the remaining solution until sodium sulfate is obtained as a secondary and secondary product. In the next step, boric acid is recovered by hot water, purified boric acid, ready to be packed and sold.

Boric acid production leads to either calcium or sodium salts by-products depending on acid utilised, the Boron mineral, and Boron mineral impurities. The use of strong acids in production processes is not preferred due to economic considerations, waste-water problems, and shortened equipment lifetimes (especially for the reactor vessel). Some have posited utilizing CO_2 as a leaching agent and as a plausible alternative to use of acids in boric acid production from minerals.

The Magnet Trade

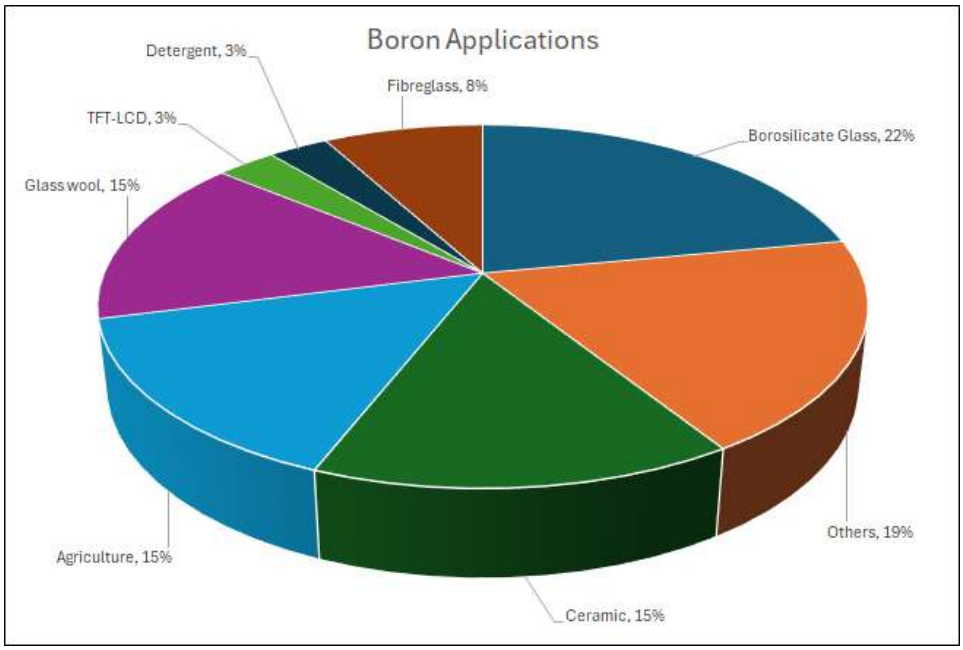
Neodymium magnets, with an important Boron component, are the most widely used type of Rare-Earth magnet. A Neodymium magnet (also known as NdFeB, NIB or Neo magnet) is a permanent magnet made from an alloy of Neodymium, iron, and Boron to form the $Nd_2Fe_{14}B$ tetragonal crystalline structure.

NdFeB magnets can be classified as sintered or bonded, depending on the manufacturing process used.

This technology was developed independently in 1984 by both General Motors and Sumitomo Special Metals.

Neodymium magnets are the strongest type of permanent magnet available commercially and have come into wider discussion now that they are perceived to be a key input in the EV industry. They have replaced other types of magnets in many applications in modern products that require strong permanent magnets, such as electric motors in cordless tools, hard disk drives, magnetic fasteners and the motors of EVs.

Finally, it's worth noting that Boron priced inside of a permanent magnet is around 150th the price of the Rare Earths that go into it. And despite the eye-catching nature of REE magnets they are mainly a rounding error in global Boron consumption (figuring in the *Others* category in the pie chart below).



Applications

In reality, the main application of Borates is in glass production and insulation. Borates increase the mechanical strength of glass, as well as their resistance to thermal shock, chemicals and water. Glass manufacturing is a key market for borates accounting for more than 50% of global consumption, predominantly comprised of fibreglass (both insulation and electronics) and borosilicate glasses.

The other headline usage is in fertilizers with agricultural markets accounting for a significant share (~15%) of the total global consumption. At the cellular level, Boron is integral to a plant's reproductive cycle. Boron controls flowering, pollen production, germination, and seed and fruit development. As a

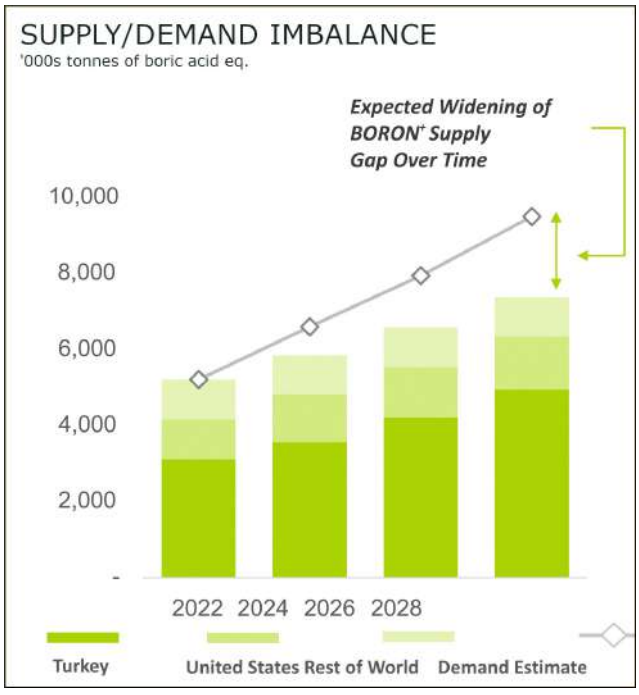
non-substitutable micronutrient, Boron also acts as a plant's fuel pump, helping move sugars from older leaves to new growth areas and root systems.

Other technology usages are in silicon, metallurgy, LCD screens, stealth technology, sports equipment, nuclear reactors and waste storage, Lithium batteries, computers, heat shields and medicines, Boron can also be found in automotive products like motor oil, brake fluid, steering fluid and antifreeze.

Boron is found in the ceramic floor tiles and porcelain enamel on sinks, refrigerators, pots and pans. Boron is also in heat resistant cookware, crystal glass and dishwasher detergent. These are not new as borates have been an essential ingredient in ceramic and enamel glazes for centuries, integral to affixing glazes or enamels, and enhancing their durability. Borates continue to gain acceptance as an essential ingredient in ceramic tile bodies, allowing manufacturers to use a wider range of clays, heightening productivity and decreasing energy usage during production.

Boron's other applications in the construction industry include uses in roofing materials, wallboard, paint, fibreglass & cellulose insulation. It is also used as a treatment for construction materials such as wood, plastic, bricks, pipes and wires, helping to protect these products from mold, fungus and insects.

Boron is also found in soap, shampoo, creams, lotions, makeup, shaving cream, lens solution, hair products (dye, straighteners, perms etc.) and even dental/denture products. Sheets, bed coverings and clothing contain Boron that improves fibre performance. Boron is also used in detergents, laundry boosters and bleaches.



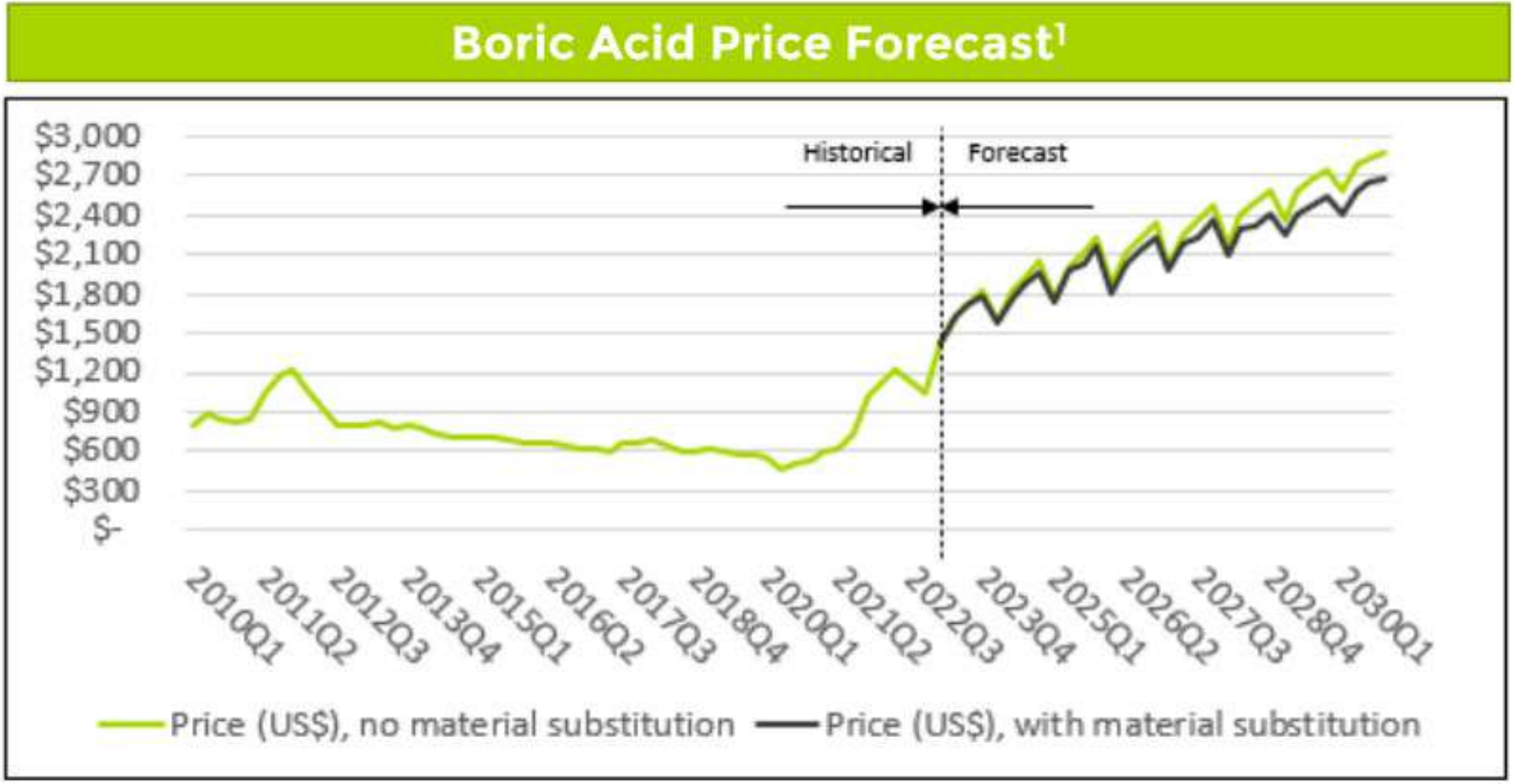
Source: 5E Advanced Materials

Demand Outlook

The major demand drivers in the borates market are growth in urbanisation (global housing market), global population, sustainable food supply and energy production.

The chart on the left, showing supply/demand balance (excerpted from 5E's presentation), is positing a fairly rapid widening of the gap between supply and demand.

According to a study commissioned in 2019 by Borax (the Borates division of RTZ) the global borates market was expected to grow at 3% CAGR for the next five years to reach 2.65mn tonnes per annum of B_2O_3 equivalent by 2023.



Source: 5E Advanced Materials

This projected increase in demand of refined borates is equivalent to 344,000 tonnes of Borax Pentahydrate and 201,000 tonnes of Boric Acid, a very substantial amount. The study reported that the trade in Borax Pentahydrate and Decahydrate had grown by 30% from 1.371mn tonnes in 2016 to 1.781mn tonnes in 2018. Despite this, prices were stable over that period (see following page).

These growth rates over just two years would seem to suggest that Borax's estimate of a 3% CAGR is substantially different from the reality of the marketplace. This might indicate a looming supply crisis.

Pricing

As largely a duopoly the Boric Acid market is fairly well-disciplined. Both major parties know what is needed to keep prices in order as they both have their fingers on the pulse of the demand situation, and they are, essentially, the supply side of the market. Smaller players are along for the ride.

Thus, prices and supply are fairly evenly balanced and if anything looks certain it is that they wish to see gradualist price moves without any spikes or plunges. This is essentially how cartels work, though we would not call two participants that think alike to necessarily be a cartel.

It is poignant that the Lithium market went totally haywire when the old Lithium "Cartel" broke down in its discipline in 2022-23, due to the entry of a large number of undisciplined players.

On the preceding page is a relatively recent price projection that 5E Advanced Materials have been using in their presentations. It posits a fairly dramatic uplift in Boric Acid prices between 2022 and 2030, indeed nearly doubling.

As there are not projections of demand growth that are so aggressive, we do not see why such an ebullient price scenario should evolve.

Over and beyond the supply/demand balance we wonder whether the potential new players that we highlight in this review will "follow the lead" of RTZ/EtiMaden, or not, should they get into production.

Producers

Rio Tinto Borates (Borax) in the US with ~30% of global production and ETi MADEN of Turkey at >50% account for approximately 80% of total global market share, with Asia maintaining its position as the largest regional consumer of borates, accounting for more than 50% of total global consumption.

EtiMaden's operations are primarily three mines, while Rio Tinto now has one mine that is located in California. RTZ used to own several mines in Argentina, which it sold to Orocobre (on this, more anon).

Rio Tinto's mine is located at the appropriately named, Boron, where mining began in 1927. Today, the

mine –produces one million tonnes of refined borates every year and is the largest in the world.

Above can be seen Rio Tinto's US Borax mine.

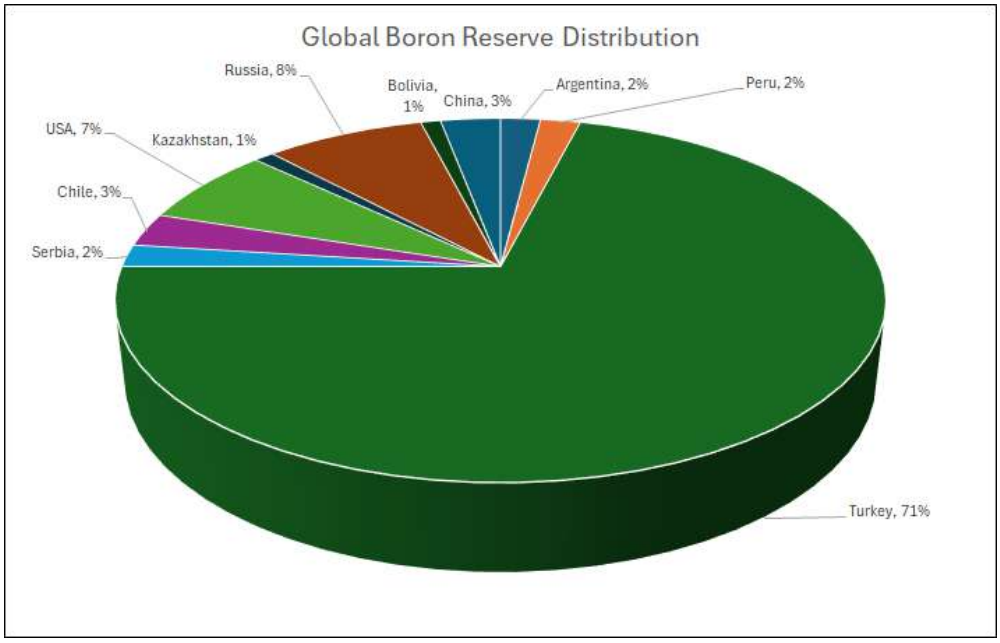
Turkey holds pole position in Borates both in reserves and production with 73% of world boron reserves; Eskişehir province– the Kırka mine, Kütahya province – the Emet mine and in Balıkesir province – the Bandırma & Bigadiç mines.

The most abundant borate minerals in Turkey in terms of reserves are tincal and colemanite. Tincal reserves are located in Eskişehir - Kırka, colemanite reserves are located in Kütahya – Emet, Balıkesir – Bigadiç and Bursa – Kestelek. In addition, there is an ulexite reserve in Balıkesir – Bigadiç as well and Ulexite is extracted as a by-product in Bursa – Kestelek from time to time.

The pie chart that follows shows the global borate reserves. This, unsurprisingly, shows Turkey with a dominant share.

However, we would note that the Turkish state miner has put in the most effort towards defining reserves of the mineral as it makes the most out of it. We suspect that reserves in Chile and most particularly Argentina and Bolivia could prove to be massively larger than currently assessed due to the relatively unexplored/unquantified nature of borates in the myriad *salares* in the Andes. The Lithium Triangle is thus also the Borates Triangle. Do not be surprised if Ganfeng suddenly pops up as a leading

producer in coming years.



Additionally, Serbia is only just appearing on the radar, though it has been a producer in the past.

If **Ioneer** gets across the line into Lithium production, its borates sideline could be substantial, and this could also move the dial for some of the Clayton Valley lithium wannabes.

The Listed Companies

Since Borax Argentina exited Orocobre/Allkem's grasp back into private ownership, the universe of listed Boron developers, that are likely to achieve production, has been numbered at two and the universe of listed producers has gone from two down to just the behemoth diversified miner, RTZ.

The two surviving developers have been showing liveliness in recent times. **Boron One**, snapped out of a multidecade somnolence and lifted its game. On the other side of the world, **5E Advanced Materials** struggled to maintain its mojo, as its stock price was crushed and it was besieged by financial problems and build-out challenges. It may now be coming out the other side of a very long and dark tunnel, but with its ambitions (and market cap) severely cut down to size. Maybe not a bad thing.

There are a number of other wannabes in the Boron space. **Euro Lithium**, a privately-owned Canadian company, not to be confused with European Lithium, has the Valjevo project (in close proximity to Belgrade, the capital of Serbia). This was halted by local resident actions in late 2021.

Ioneer (ASX: INR | NASD: IONR) that has the Rhyolite Ridge project in Nevada has a resource showing some 14mn tonnes of contained Boric Acid and it has an ambitious timeline showing production by 2026. The Boron component of its deposit grades at 0.685%. This is dramatically less than the grades of

the two companies we focus on in this note. Its progress towards production is predicated by Lithium factors rather than a boron-focus.

Balkan Mining & Metals (BMM.ax) might have merited greater coverage here but it has become distracted with Ontario & Quebec lithium projects, provinces where we have often signalled our scepticism on the Lithium (production) potential. The eponymous asset of BMM is in Serbia but has seemingly been relegated to the backburner. The Rekovac project area is located 110 km away from Belgrade, in the south of the country. The project is comprised of three separate licences (Rekovac, Ursule and Sikovac) with an aggregate land area of 273km^2 and is located within the Vardar Zone.

We shall review in the next section the current state of play of Boron One, Borax Argentina & 5E Advanced Materials (though not RTZ).

Boron One

Lifting Its Game?

Key Metrics	
Price (CAD)	$0.08
12mth high -low	$0.04 to $0.16
Market Cap (CAD mn)	$15.83
Shares Outstanding (mns)	197.8
Fully diluted	240.9

- ➕ The MRE shows a deposit that is both high-grade and substantial in size with potential for expansion with further exploration
- ➕ The PEA from 2022 displays extremely robust economics and a low capex at less than $60mn
- ➕ The company has a Serbian-compliant PFS in hand, that is not NI43-101 compliant, and is thumbing its nose at the Canadian "consultancy mafia" that produce such documents
- ➕ The Piskanja project will be the only borates producer in Europe
- ➕ With an underground format the mine will have minimal surface disturbance
- ➕ The project is in a traditional mining area where a state-owned coal mine is soon closing down creating a pool of workers needing redeployment
- ✖ The company has not come to grips with its communications problems
- ✖ The Osmose deal seems to have come to grief and the company has seemingly decided not to inform the market thereof though the ancient presentation (March 2023) still refers to it
- ✖ Serbia has somewhat blotted its copybook with the poor treatment meted out to RTZ on the Jadar lithium project
- ✖ The environment for funding REE project builds remains tough so capex to the low side is seen as a virtue

Playing Hard to Get

Boron One (back in its guise as Erin Ventures) was a stock that almost prided itself on being low-key, but being a blushing maiden rarely gets one far in mining equity markets when up against the 2,500 listed juniors out there waving their arms as if at a *Feed the World* rock concert. Even its website was a mid-

1990s template dating from the dawn of the internet age which might be seen as extremely retro or meriting a position in a display case in a museum.

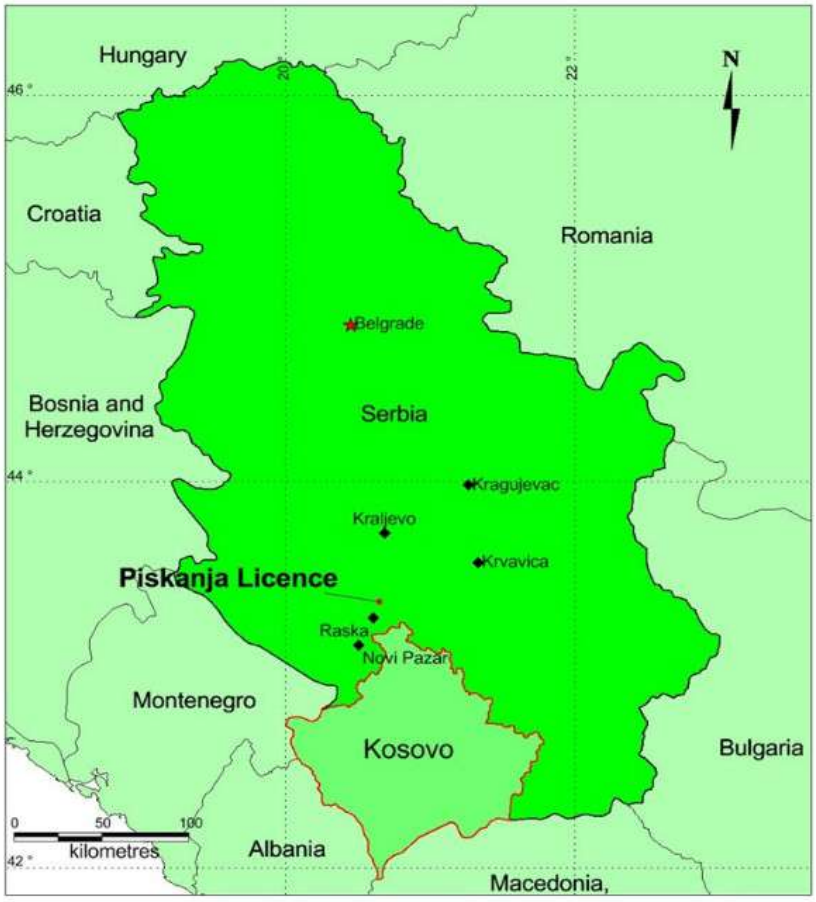
The company is best known (if known at all) for its position in Serbia, where it has been developing the Piskanja Boron project. The stock's ticker on the TSX-V is BONE and EKV on the Berlin Stock Exchange.

Our (Brief) Previous Encounter

When covering Cloudbreak Discovery in 2021, we had cause to look at Temas Resources (CSE: TMAS, OTCQB: TMASF) that was part of the Cloudbreak mishmash of assets. Temas was primarily focused upon iron ore, Titanium and Vanadium in Quebec. However, more interesting for us was that company was also earning into 50% on the Piskanja Boron project in Serbia. Their thesis was that potential European-sourced Borates would reduce environmental impact of supply chains and support agriculture and industry "domestically", whatever that meant. Certainly, Piskanja appeared more interesting than the rather challenging task of multi-billion-dollar Titanium projects for a junior.

Piskanja

Piskanja is located in a historical mining region in the very south of Serbia, near to the Kosovar border.



There is, however, no history of borate production at the site. There is good infrastructure for mining including roads, rail, electric power, experienced miners, etc., 250 km south of Belgrade, Serbia. The site is accessed by good, paved roads.

The company was granted an exploration license with the sole right to apply for an exploitation (mining) license for the Piskanja Boron deposit located in Serbia in the third quarter of 2010. So this asset is not exactly a new one.

The Piskanja Deposit is located within the Jarandol Basin, a well-known historical mining district in southern Serbia which hosts two known boron deposits, an operating coal mine, and a (now depleted) magnesite mine. The Basin hosts excellent infrastructure for mining including local paved roads, rail, power, experienced miners, and sufficient support industries, located 250 km south of Belgrade by good, paved roads.

Geology

The Jarandol Basin is a Miocene age tertiary deposit located within the Vardar Zone of Neogene lacustrine deposits of evaporates. The Vardar Zone represents the suture from the subducted closure of the Tethys Sea. A series of inter-mountaine basins were formed in Miocene time that in the early stages of basin formation were marked by lacustrine sedimentation including tuffs from fractionated contemporaneous calc-alkaline volcanic rocks.

The Vardar Zone contains the world's richest borate deposits, including those found in Turkey, which are of similar genesis to the Serbia borate deposits. The Vardar zone is estimated to host ~75% of global boron resources.

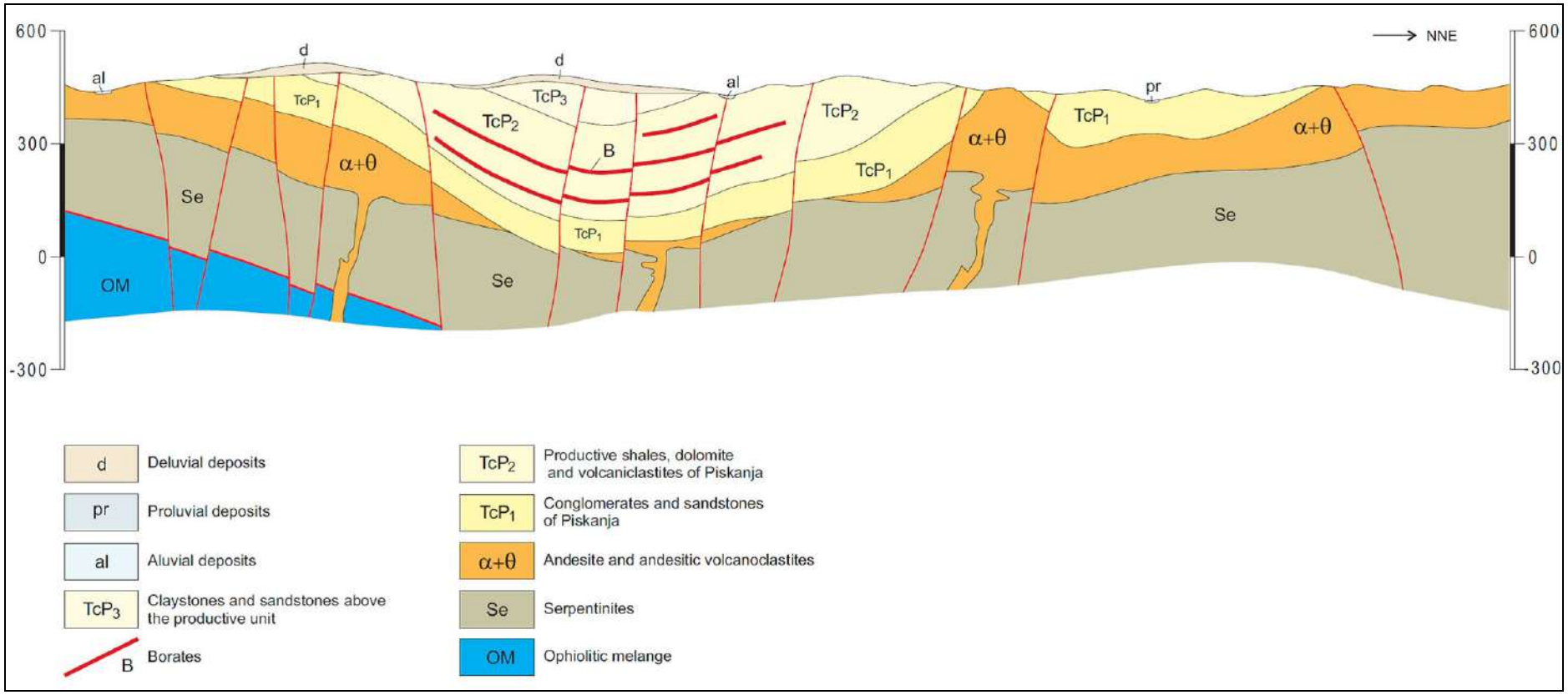
The Piskanja project consists of borate-rich sediments that developed within the Upper Jurassic ophiolite unit in the Vardar Zone tectonic belt during the Neogene Period (23-25 million years ago). These Neogene (mainly Miocene) basins in the VZ tectonic belt were continental in nature, their fills being a product of depositional processes associated with fluvial, lacustrine and swamp settings.

Growth faults are believed to have channelled mineral rich brines to the host strata during basin formation. Cyclic variation of paleo climate from very hot and humid to long-lasting arid conditions further enhanced evaporitic conditions within the region. The borate +/- lithium target is a result of diagenetic processes in Miocene Age evaporate sequences in buried salt lakes. The host rocks are typically pelitic, tuffaceous and dolomitic and have a strong analcime component reflecting the breakdown of volcanic glass.

The resulting sediments themselves comprise alternating units (as shown on the following page) of mudstone, shale, sandstone and lignite caused by fluctuation in water depth and sediment input.

Tuffaceous sediments related to on-going volcanism are also found within the basin and it is believed that related hydrothermal and tectonic activity led to borate mobilisation and deposition within the basinal sediments.

Lithology at Piskanja is typical of sedimentary basins, (primarily shales, marls and limestone) with two primary gently undulating borate beds. Mineralization is primarily dense, compact colemanite with some ulexite.


600
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d Deluvial deposits
pr Proluvial deposits
al Aluvial deposits
TcP3 Claystones and sandstones above the productive unit
B Borates
TcP2 Productive shales, dolomite and volcaniclastites of Piskanja
TcP1 Conglomerates and sandstones of Piskanja
α+θ Andesite and andesitic volcanoclastites
Se Serpentinites
OM Ophiolitic melange

Exploration History

The first record of Boron mineralization in the Jarandol Basin was a hand-sized sample containing howlite found in a tributary of the Ibar river in 1967 during State-organised geological prospecting. Following this, geological mapping was completed and the Pobrđe occurrence of Boron was identified some 2.6 km north-west of Erin's current exploration licence.

The geochemical investigation of Boron in the Jarandol Basin began in 1979 with the first identification of colemanite in a structural borehole occurring later in 1987. Between 1987 and 1992, the Yugoslavian state-owned company Ibar Mines completed a number of soil and stream sediment sampling programs, followed by 21 diamond core holes totalling 6,508 m of drilling to an average hole depth of 300 m. A total of 89 core samples, averaging 1m in length, were collected from 11 boreholes which intersected mineralization and were analysed for Boron.

These two campaigns are documented within the "Report on the results of geological exploration of Boron minerals in deposit "Piskanja" near Baljevac on River Ibar finalised until the end of 2010", by Geological Institute of Serbia published in 2011. Mineralization was identified in two horizons with an average thickness of 4.5 m for the upper bed and 3.5 m for the lower bed, lying between 50 m and 260 m depth. No work was conducted on the property between 1992 and 1997.

Erin's involvement with the project began in 1997, as part of a 50/50 Joint Venture with Elektroprivreda d.o.o. (Serbia). The JV company, known as Ras Borati d.o.o., completed 10 reverse circulation (RC) holes, totalling 2,304 m. A total of 206 chip samples were collected from eight RC holes. The samples were prepared and analysed at the Geozavod-Nemetali laboratory in Belgrade using wet chemistry analysis.

No work was conducted on the property between 1998 and 2006.

Resource Estimates

A resource was initially published for the Piskanja Boron deposit in October 2016 and was updated in February 2019. The NI43-101 is titled "Mineral Resource Estimate Update on The Piskanja Borate Project, Serbia, October 2016 - Amended February 28, 2019" and was prepared by SRK Consulting (UK) Ltd. The responsible persons for the Updated MRE were Dr Mike Armitage and Dr Mikhail Tsypukov and it posited an Indicated mineral resource of 7.8 million tonnes (averaging 31% B^2O^3) and an Inferred resource of 3.4 million tonnes (averaging 28.6% B^2O^3).

Then

Piskanja Resource

Category	Ore Tonnage	B_2O_3 Grade	Contained B_2O_3 (tonnes)
Measured	1,391,574	35.59%	495,251
Indicated	5,478,986	34.05%	1,865,677
M&I	6,870,560	34.46%	2,360,928
Inferred	284,771	39.59%	112,732

The latest resource utilized a cut-off grade of 12% B_2O_3, at a minimum mining thickness of 1.2m, considering reasonable underground mining, processing and selling technical parameters and costs benchmark against similar borate projects and a selling price of US$700/tonne (boric acid) and US$500/tonne (colemanite 40% B_2O_3).

The PEA

Then in late June of 2022 the results of a PEA were published. It had been prepared independently under the supervision of Prof. Miodrag Banješević PhD P.Geo, EurGeol, with contributions from Prof. Saša Stojadinović PhD (a mining engineer). The PEA was prepared in accordance with the requirements of National Instrument 43-101 and was based on the aforementioned Mineral Resource Estimate for Piskanja with an effective date of 24th of June 2022.

The economic outcomes were:

Piskanja PEA - Key Metrics

Post-tax Net Present Value (NPV10%)	$524.9mn
Post-tax IRR	78.70%
Initial capital cost (Capex) (including 30% contingency)	$79.9mn
Capex payback from commercial production	12 months
Life of Mine (LOM)	16 years
Gross Project Revenue	$2.02bn
Net project Cashflow (post-tax)	$1.21bn
Average Annual Gross Revenue	$126mn
LOM average annual EBITDA	$91.3mn

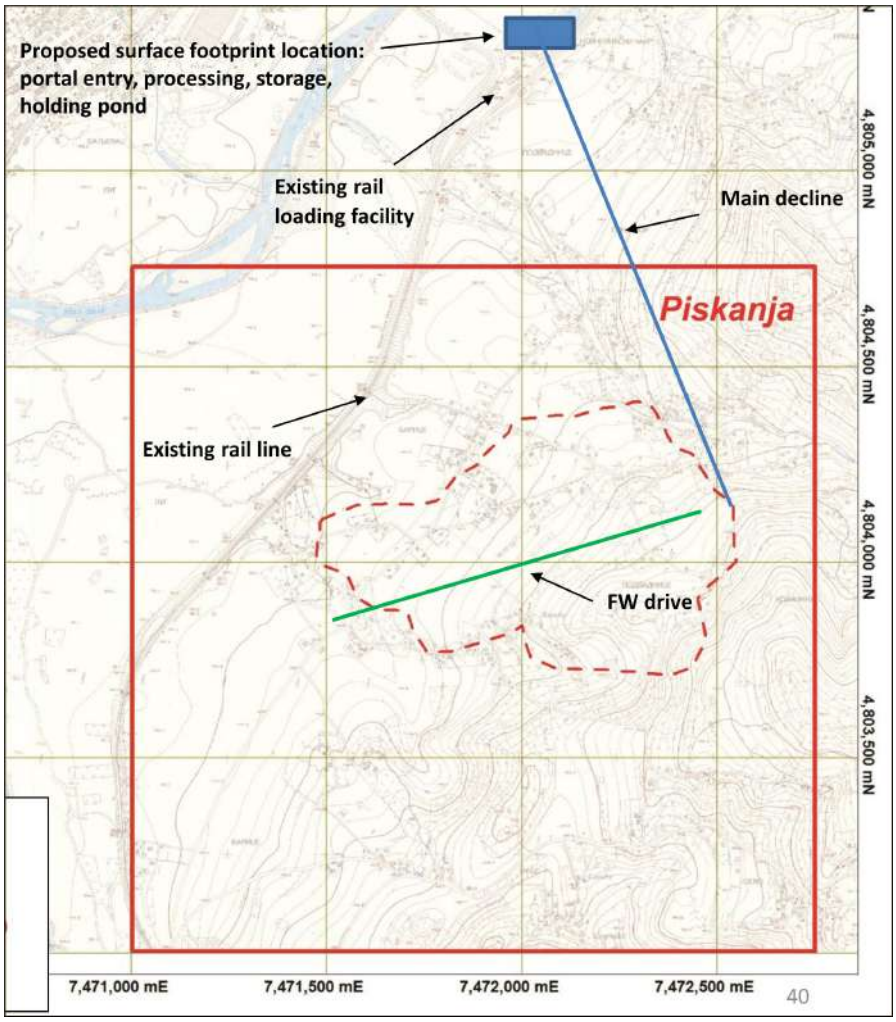
With the estimated production metrics being:

- Average annual production of 330,000 tonnes
- Mean mining grade of 27.8% B_2O_3
- All Run of Mine (RoM) ore to report to a Colemanite Plant for Colemanite production
- An average recovery of B_2O_3 from RoM ore to Colemanite of 92.9%
- ~ 50,000 tpa of Colemanite product (at 35% B_2O_3) to be subsequently processed to produce 25,000 tpa of Boric Acid product, with an assumed grade of 56.3% B_2O_3 (the remaining Colemanite product is sold)
- A mean mass yield of Colemanite to Boric Acid product of 49.7% and an assumption that 80% of the B_2O_3 is recovered to the product

The economics arising from this production plan were:

- a Colemanite (at 35% B_2O_3) price of US$400/t product
- a Boric Acid (at 56.3% B_2O_3) price of US$800/t product
- Royalty deduction of 5% on gross revenue
- Other sales and marketing costs of USD$1.50/t product sold
- Total Construction Costs of US$85mn
- Sustaining Capital Costs of US$19mn
- Closure Costs of US$15mn
- Operating Costs of US$170/tonne product

The map below shows the concession, delineated in red, and the site of the proposed main decline and the siting (off the proposed mining license area) of the processing facilities and ancillary services.



Running Rings Around NI43-101

We have to credit Boron One with a new innovation, the PFS that is not NI43-101 compliant but "like one". We have long disliked the mafia-like nature of the relationship between regulators and consultants in Canada to the detriment of listed corporates and, dare we say it, the investors in the mining sector. Whilst claiming to be protecting investors they are actually protecting their revenue flows and status.

One does not get very far in Canadian capital markets without tugging one's forelock and emptying one's pockets to the consultants who have supposedly "saved" Canadian mining equity investors from scandals like Bre-X ever happening again.

They do things differently in Eastern Europe as we have noted before and Boron One has shown itself to be quite iconoclastic in going for approval of the Serbian government for its project, over approval from

some consultants on the other side of the world (and regulators in Toronto or Vancouver) who may, or may not, know the difference between a mine and hole in the ground…

Thus, we had to do a double take when the follow up to the PEA of 2022 was a "Serbian-standard" PFS, which of course it is not allowed to publish. In late September of 2023, it announced the completion of what it termed an "independently authored Feasibility Study" for the Piskanja project and that it was ready for submission to the Serbian Mining Ministry in compliance with the terms of its exploration license. Submission of the Feasibility Study, which has been drafted in accordance with Serbian mining regulations, is to fulfill the company's second and final obligation in the mineral exploitation license approval process.

No details were forthcoming on the authorship beyond the Feasibility Study having been "authored by an independent, experienced mining engineering institute, located in Serbia".

At the time, the company was awaiting completion of the vetting process of its so-called Geological Elaborate by the Serbian Mining Ministry's independent Mining Commission, as the mandatory first step in the exploitation license approval process. Approval of a Geological Elaborate results in the issuance of a Certificate of Reserves by the Mining Ministry. Upon receipt of the Certificate of Reserves, it is included with the Feasibility Study as a requisite part of the Feasibility Study submission process.

Boron One went on to describe a Serbian-compliant feasibility study as being "of similar scope, scale and confidence level as a CIM (Canadian Institute of Mining, Metallurgy and Petroleum Standards on Mineral Resources and Reserves) compliant pre-feasibility study".

The Piskanja Boron Feasibility Study defines the optimal development scenario for an underground mine, product beneficiation circuits, plant site, infrastructure, environmental safety, and a closure plan. The Feasibility Study includes an analysis of all aspects of the project, and incorporates data from several external studies, including the Geological Elaborate, metallurgical testing, 3D-resource modeling, and others.

At the end of October 2023, the company reported the submission of an Annex to its Geological Elaborate to the independent review commission of the Serbian Mining Ministry after a query had been received. Then in the first half of December the company released to the market that announce that its amended Geological Elaborate had received approval from the Serbian Mining Ministry's Independent Commission of local mining experts.

In accordance with Serbian mining regulations, the Commission's approval of the Elaborate was required for the Mining Ministry to issue a "Certificate of Reserves" to the company. Upon receipt of the Certificate of Reserves, the company's recently completed Serbian-compliant Feasibility Study and other

ancillary documentation will be submitted to the Mining Ministry, in order to receive its "Approval for the Exploitation Field".

On January 15th of 2024 it received its Certificate of Reserves. Then in the first days of February it was granted a new exploration license by the Serbian Ministry of Mining and Energy for the Piskanja project. This new three-year license ensures Boron One's continued exclusive rights to the Piskanja property.

In late February, the company submitted an application to re-acquire an exploration license for the Jarandol Basin in Serbia, which it had previously held from 2013 to 2018. The Jarandol License application covers 20.97 square kilometers and includes all territory directly adjacent to, and in between, the Piskanja boron project on the eastern edge of the Jarandol Basin, and the Serbian government-owned Pobrdje Boron Mine, some 2.5 km away from Piskanja on the opposite edge of the basin.
Previous exploration has shown that Jarandol has the potential to host extensions to both the Piskanja and Pobrdje boron deposits, and/or the potential to host separate, similar boron deposits. In a previous drill program conducted by Boron One (reported in December of 2015), all eight drill holes returned occurrences of borates. Additionally, three of the drill holes intersected two borate beds of potential commercial grade and thickness.

Temas Deal – Easy Come, Easy Go

In XXX of 2021, Temas Resources Corp. (CSE: TMAS, OTCQB: TMASF) announced that it had entered into a letter of intent with Erin for the joint development of the Piskanja borate project.

Upon execution of a definitive option agreement, Temas was to have the sole, exclusive, immediate, and irrevocable option to earn up to 50% equity interest in Balkan Gold (Erin's wholly owned subsidiary that holds the license to the Piskanja project) by expending a total of €10.5mn towards the development of Piskanja, within a 36-month period (subject to acceleration at the election of Temas).

Upon receiving necessary regulatory approvals, Temas will make a one-time payment of 250,000 Temas common shares and 250,000 share purchase warrants (at $1.00 for 4 years) to Erin.

The terms of the LOI will form the basis of the Option Agreement, which the parties contemplate will be entered into no later than April 15, 2021.

Each €210,000 advanced to the project by Temas will earn Temas an additional 1% undivided equity interest in Balkan Gold, to a maximum of 50% interest for €10.5M.

Upon acquisition of 50% interest in Balkan Gold by completing its expenditures, Temas will be entitled to representation on the board of Balkan Gold, voting rights, and dilution provisions, among other rights regarding the governance of Balkan Gold.

Erin will remain operator on the project until such time as Temas has exercised the Option and earned

its 50% interest in Balkan Gold, at which point Temas will become operator of Piskanja.

During the three-year option period, a joint technical committee made up of members from both Erin and Temas was to have final say on matters pertaining to programs and budgets.

This LOI is non-binding, with the terms subject to the parties entering into a binding Option Agreement.

The Option Agreement will be subject to satisfactory completion of due diligence, applicable regulatory approvals, board approvals, shareholder approvals as may be required, amongst other factors.

When we had looked at Temas in the Cloudbreak context we were struck by the talk about the Piskanja deal, but not by the action, of which there was scant evidence. Thus it came as no surprise that, in December of 2022, Erin released a rather damning news release signalling that its joint venture and option agreement with Temas had been cancelled. As a result, Temas no longer had any right to participate in the equity of the Piskanja Boron project.

In accordance with the terms of the option agreement, Temas had contributed less than the threshold amount required for it to secure a 1% interest in Piskanja. Therefore, as a result, Piskanja remained a 100%, wholly owned subsidiary of Erin.

Our sole surprise was in the sheer meagreness of Temas' participation in a transaction which had "dined out upon" for so long.

Moving On

In anticipation of the possibility of Temas falling by the wayside, the company was dialoguing with several other potential strategic partners who are showing an interest in participation in the development of Piskanja. In tandem, the company was continuing with the requisite studies, and claimed to be still on its timetable to meet its obligations towards receiving an exploitation permit on Piskanja.

In the release the company's CEO stated, inter alia, "…. we anticipate being able to secure a highly suitable new strategic partner in the near term."

Then in January of 2023, the company announced it had signed a Letter of Intent (LOI) with a London-based strategic investor, Osmose Limited to provide equity funding for the development of the Piskanja project. Osmose agreed to provide funding which totals CAD$3.550mn plus Euro22,000,000, in three tranches (the "Funding").

In April of 2023 Boron One agreed with Osmose Ltd. to amend certain terms of the LOI to "reflect the improving fundamentals" of boron project since the parties negotiated the original terms of the LOI.

The majority of the terms in the LOI remained unchanged, including the terms, conditions, timing and amount of project level financing to be provided by Osmose, totalling 22 million euros in two tranches, in return for a 45% interest in the Piskanja project.

Under the amended deal, Osmose would subscribe for:

- 35.5 million units of Boron One at a total cost of $4.26-million (12 cents per unit);
- Each unit shall consist of one common share and one share purchase warrant;
- Each warrant is exercisable into one additional share of Boron One at a price of 24 cents;
- Each warrant shall have a two-year expiration term from the date of grant;
- Osmose may exercise warrants if, and only if, in doing so, Osmose remains at below 19.9% ownership of Boron One;
- Osmose shall complete the unit purchase on or before close of business (PT) April 30, 2023.

In the event that Osmose failed to complete the unit purchase on or before the close of business (PT) on the 30th of April 2023, the terms of the equity unit purchase would change to:

- 35.5 million units of Boron One at the greater of either 12 cents per unit or X per unit, where X equals the closing price for Boron One on the TSX Venture Exchange on the day prior to when funds, which are sufficient for the unit purchase, are confirmed to be sent by Osmose, multiplied by 1.25
- Each unit shall consist of one common share and one share purchase warrant
- Each warrant is exercisable into one additional share of Boron One at a price of the greater of either 24 cents or Y, where Y equals the price per unit multiplied by two
- Each warrant shall have a two-year expiration term from the date of grant
- Osmose may exercise warrants if, and only if, in doing so, Osmose remains at below 19.9% ownership of Boron One

Then everything went silent…. Does that imply then that the post-April 30th arrangements come into play?

Financing

In September of 2021, the company announced a private placement offering of up to 6,666,667 units at a price of $0.075 per unit for gross proceeds of approximately CAD$500,000. Each unit was comprised of one common share plus a full warrant exercisable for two years from the closing date at a price of $0.10 per share.

In August of 2022, the company announced a warrant exercise incentive program intended to encourage the exercise of up to 9,618,322 unlisted common share purchase warrants exercisable for one common share of the company at a price of $0.05 per common share.

The offer had quite a good response with the holders exercising 7,499,570 eligible warrants for proceeds of ~CAD$375,000 which were to be used for general working capital. Participating holders were then issued 7,499,570 additional warrants allowing the holders to purchase one additional Common Share until the close of business on 9th of September 2023 at a price of $0.05.

On the 17th of January 2023, the company announced that it intended to complete a non-brokered private placement offering of up to 9mn units at a price of $0.05 each for gross proceeds of up to $450,000. Each unit was one common share plus a full warrant exercisable for two years from the closing date at a price of $0.05 per share.

Conclusion

Maybe it is shallow of us, but our initial impressions were initially impacted by the fact that management hadn't updated its website for 20 years and had a Boron page untouched since 2010? Maybe they are exceptionally busy? But the project did not, and could not, advance during the mining industry's low point from 2012 to 2019, so maybe that was an opportunity to spend a few hours on brushing up the image. Even the company's name (Erin Ventures) could have done with five-minutes of afterthought and have been made more pertinent to the project in hand… sigh….

However, somewhere in 2023 the clouds parted, and a ray of sunshine descended upon the C-Suite of Erin Ventures and a *Road to Damascus*-style event occurred. Hallelujah!

A name change to reflect the company's activities was instituted, a new website dragged the corporate image into the 21st century and an openness to investors was instituted. One can teach an old dog new tricks! This may seem harsh but we note that the presentation on the company's "new" website dates from March of 2023 and more than a few of the slides are still headed up with Erin Ventures. Even worse though was that the Osmose deal is still shown on the extant presentation on the company's site though we have the distinct impression that it has come to grief.

The company needs a "details-oriented" person on the team.

Progress at the project has been rapid over the last year permitting and improving the IR, however on the latter front there is still much to be done. There is no evidence that the Canadian market understands Serbia or Boron so a repositioning of the listing might be overdue.


CA:BONE Daily
3/19/24
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
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0.04
0.03
0.02
Volume
©BigCharts.com
800
600
400
200
0
Thousands
A M J J A S O N D 23 F M A M J J A S O N D 24 F M

Borax Argentina

Pass the Parcel

- ➕ The prime asset of this company has been exploited for over 50 years and for most of that time was under the ownership of RTZ
- ➕ Despite its longevity this set of assets is showing no sign of exhaustion
- ➕ There is no reason to think that adjoining or nearby lithium *salares* are not also exploitable for their borates potential
- ➕ The company has around AUD$5mn in cash on hand
- ✖ Unfortunately, the asset passed out of the public limelight when Orocobre/Allkem vended it to a private Argentine group
- ✖ The environment for funding REE project builds remains tough so capex to the low side is seen as a virtue

Borates in Argentina

One of the longest established borates mines in the world has been in and out of publicly listed ownership over the decades. It currently has moved back into private hands but it is worth mentioning as it is the one we have been most up close & personal with as it was on the itinerary of our July 2023 mine trip to the *altiplano* of Salta province in Argentina. Our observations of this journey were written up in our Salta Mine Trip Note.

Borax – Some Background

Borax Argentina S.A. has operated in the Salta-Jujuy region for over 50 years and its operations include two open pit mines, concentrators, refining capacity and significant land holdings. The mining operations are located in Tincalayu (the open-pit is shown on the following page) and Sijes. Interestingly while working on this Review we noted many sources don't even mention this operation.

There is more to the *salares* than just Lithium and, except for Livent's operation, the only fully formed mining operation on the *altiplano* (and one with extensive heritage) is the borates mine of Borax Argentina. For many decades this was the property of RTZ, and indeed was one of the few non-state-owned mining operations in the country.

Orocobre acquired Borax Argentina S.A. in August 2012 from RTZ. At the time, we hailed the deal because it gave Orocobre revenues in the short-term while it was advancing its still nascent Lithium efforts. Ther assets purchased included, at the time, three open pit mines in Tincalayu, Sijes, and Porvenir, concentration plants in Tincalayu, Sijes and Porvenir (at the time unused), and refinery facilities in Campo Quijano. Additionally, there were undeveloped deposits at Diablillos and Ratones.

The consideration for the purchase was US$8.5mn. The consideration comprised US$3.7mn for all of the issued shares of Borax Argentina and US$4.8mn paid to an RTZ subsidiary as consideration for the assignment of a loan made by it to Borax Argentina.

Production

Under both RTZ and Orocobre the company evolved (and sustained) a reputation as a reliable supplier of high-quality products, with long-term customer relationships based on a track record in reliably meeting their needs within both the industrial and agricultural sectors.

Borax's products can be divided into three groups; minerals, refined products and boric acid. The minerals historically produced are ulexite, colemanite and hydroboracite. Ulexite has traditionally been used as a feedstock to produce boric acid, however hydroboracite is now the primary feedstock allowing for a lower cost of production and a product with a lower chloride content. Hydroboracite and colemanite are supplied into the ceramic market with hydroboracite also supplied into agricultural and oil and gas markets.

The refined products are comprised of borax decahydrate, borax pentahydrate and borax anhydrous. These refined products have applications in a wide range of markets from agriculture, ceramics, glass, insulation fibreglass, textile fibreglass, smelting fluxes and various other specialty applications.

Expansion

An expansion study continues to evaluate a potential expansion of the Tincalayu refined borates operation from its current production capacity of 30,000 tpa to 100-120,000 tpa borax decahydrate equivalent and a 40,000 tpa boric acid plant. It was anticipated that the potential expansion will

significantly increase efficiencies in the production of refined borates at Tincalayu and contribute to providing a step-change improvement in unit costs.

Then… Surprise!

In late December of 2022, Allkem (the merged entity created by combining with Galaxy Resources) surprised many when it announced that it had sold Borax Argentina S.A. to Golden Wattle Springs Pty Ltd and had acquired the María Victoria lithium tenement from Minera Santa Rita S.R.L (MSR). The transaction consisted of:

- Allkem transferring to Golden Wattle (a group associated with MSR) all of the issued shares in the two Borax holding companies and US$14mn cash for employee and rehabilitation liabilities
- MSR selling to an Allkem subsidiary 100% ownership of the Maria Victoria Tenement, which covers approximately 1,800 ha and is located in the northern part of the Salar de Olaroz, approximately 10km from Allkem's Olaroz Lithium Facility in the Jujuy Province

According to our sources, MSR is an entity owned by the Haddad family of Salta, a locally powerful economic grouping.

Was this Allkem waving the white flag on borates? Or was it a case of moving on now that it wanted to be seen as all-lithium, all the time?

Another of the Borax facilities can be seen in our photo below:

In any case, operations seem to be moving ahead full steam at the existing operations. Whether the Haddad family will pursue the expansion plan remains to be seen.

5E Advanced Materials

Opacity as Policy

Key Metrics	
Price (USD)	$ 1.24
12mth high -low	$1.03 to $6.18
Price (AUD)	$ 0.20
12mth high -low	$0.165 to $ 0.915
Market Cap (USD mn)	$64.74
Market Cap (AUD mn)	$104.41
Shares Outstanding (mns)	52.206

- ➕ The company has an easily mineable deposit located in the Mojave desert, site of several other major mines (e.g. Mountain Pass)
- ➕ California is already home to one of the world's largest Borates mines, which is operated by RTZ
- ➕ The project has come to the attention of the US government and in February of 2022 Fort Cady project was designated to be "Critical Infrastructure" by the Cybersecurity and Infrastructure Security Agency
- ➕ After a number of setbacks, the project is now entering small-scale production
- ➕ The company has strong political support amongst Californian members of the US Congress
- ✖ Having fallen from mighty heights of market cap the company seems to have decided that when it comes to information to public markets, less is more
- ✖ The company long felt it could sell the "big picture" without getting down to nitty-gritty details and this has now come back to haunt it as it has fallen off big investors' radars
- ✖ The environment for funding sizeable project builds remains tough but the company's financial and building travails mean it has had to scale back ambitions and curtail its timetable for the various planned phases

How are the Mighty Fallen

The price of 5E Advanced Materials, Inc. (Nasdaq: FEAM | ASX:5EA) has been absolutely crushed over the last 18 months, despite being potentially both a Boron producer and a Lithium producer. From a debut price on the NASDAQ around $50 per share it has slid, almost unremittingly, down to a current level around $1.20 per share. To put that in perspective, it was at a capitalisation of around US$2bn and

is down to around $65mn nowadays.

The company asserts that its mining asset is the largest-known new conventional Boron deposit globally. Despite this claim to fame it styles itself as an industrial company, and when not, as a chemical company, clearly hoping to avoid being branded a miner, particularly in California.

In fact, some digging reveals that, in April of 2022, American Pacific Borates Limited (ASX:ABR) rebranded, with a new name and parent company in 5E Advanced Materials (ASX:5EA). Indeed, this was a second rebranding as the company originally had been American Pacific Borates & Lithium, with the Lithium dropped out earlier (just in time to avoid the Lithium Boom, Mark 3). Sigh…..

The company makes the lofty claim "to be positioned to become a vertically-integrated global leader in BORON+ advanced materials with a focus on enabling decarbonization. BORON+ products target critical, high value applications within electric transportation, clean energy, food and domestic security".

It goes on to say that its advanced materials business is underpinned by its "low cost, light environmental touch" Boron resource in Southern California, which has been designated as Critical Infrastructure by the U.S. government. The company's marketing spiel has been that 5E's resource quality, domestic supply source, and downstream processing capabilities provide a competitive advantage given customer product specifications, scarcity of resource, and reliance on "unstable", international supply. The latter is a somewhat disingenuous claim considering that the US controls 30% of global supply and that Turkey is far from unstable as a supply source.

The Asset – Hiding One's Light Under a Bushel?

Finding some details on the actual project at 5E is somewhat akin to pulling teeth out of a shark. The website does not have a project page, while the business page refers to an unnamed project in Southern California. Clearly one can find out if one wants, but the management seem to be projecting, *a la Tesla*, that one should fall in love with the concept, not be bothered with the minutiae. That is all well and good, as long as the concept is in favour but when it is not, then one has to scrabble about for a figleaf that is nowhere to be found.

This is a boric acid project that was described in 2019 as being "the world's largest-known borate deposit, with an estimated mineral resource of 120.4 mn tonnes".

The mystery project is located in the Mojave Desert region of San Bernardino County, California, approximately 200km north-east of Los Angeles (and around 80kms from RTZ's operations). The site encompasses an area of 1.39km² and is situated approximately 50km east of Barstow.

More delving reveals that the project may be called the Pisgah Crater, and at least if management think

they don't need to name the project, we were tempted to name it the "Pisgah Crater". However, under torture it was revealed that the site is sometimes known as Fort Cady.

The Pisgah Crater

The Pisgah Crater is a young volcanic cinder cone rising above a lava plain in the Mojave Desert. The volcanic peak is around 4 kms south of U.S. Route 66 and of Interstate 40, and west of the town of Ludlow. The volcano had a historic elevation of 2,638 feet (804 m) but has been reduced to 2,545 feet (776 m) due to mining.

Above can be seen an aerial view of site and works, with the Pisgah Crater in the background top right

The Mount Pisgah Volcanic Cinders Mine was a quarry that produced pumice for commercial use, the primary end product being railroad ballast for the Santa Fe Railroad. In the process of mining the top of the mountain has been removed. The mountain is still occasionally quarried for various cinder products.

Project geology

The Fort Cady deposit lies in the Hector Basin in the central Mojave region.

Boron is believed to have been sourced from thermal waters that flowed from hot springs in the region during times of active volcanism. These hot springs vented into the Hector Basin that contained a large

desert lake.

Borates were precipitated as the thermal waters entered the lake and cooled or as the lake waters evaporated and became saturated with boron. Colemanite being the least soluble mineral, would evaporate on the receding margins of the lake. The evaporite-rich sequence forms a consistent zone in which the borate-rich colemanite zone transgresses higher in the section relative to stratigraphic marker beds.

The project area has uniform exposures of fine-grained lacustrine sediments and tuffs with younger alluvium occurring in washes and overlying the older lacustrine sediments.

The entire mineralised zone, irrespective of grade cut-off and minor barren interbeds, ranges up to 130m in thickness. Borate mineralisation occurs in the form of colemanite and is found in thinly laminated silt, clay, and gypsum beds.

The Resource

The Fort Cady project has proven reserves of 27mn tonnes, grading 6.7% B_2O_3, 11.91% H_3BO_3, and 379ppm Li as of December 2018. The probable reserves are estimated at 13.8mn tonnes, grading 6.40% B2O3, 11.36% H_3BO_3, and 343ppm Li.

Measured Resource	Tonnage (MST)	B_2O_3 (wt%)	H_3BO_3 (wt%)	Lithium (ppm)	B_2O_3 (MST)	H_3BO_3 (MST)	LCE (MST)
Total Measured Resource	30.95	4.81	8.55	357	1.49	2.65	0.059
Total Indicated Resource	43.35	4.09	7.27	355	1.77	3.15	0.082
Total Measured & Indicated Resource	**74.31**	**4.15**	**7.37**	**356**	**3.26**	**5.80**	**0.141**
Total Inferred Resource	96.90	4.75	8.43	321	4.60	8.17	0.166

*Using a 2% B_2O_3 cut-off grade and no Lithium cut-off grade.

The contained minerals in the resource are:

Contained Tons		
	H_3BO_3 (MST)	LCE (MST)
Measured	2,646,840	58,901
Indicated	3,151,461	81,854
Inferred	8,172,461	165,752
Total	**13,970,761**	**306,508**

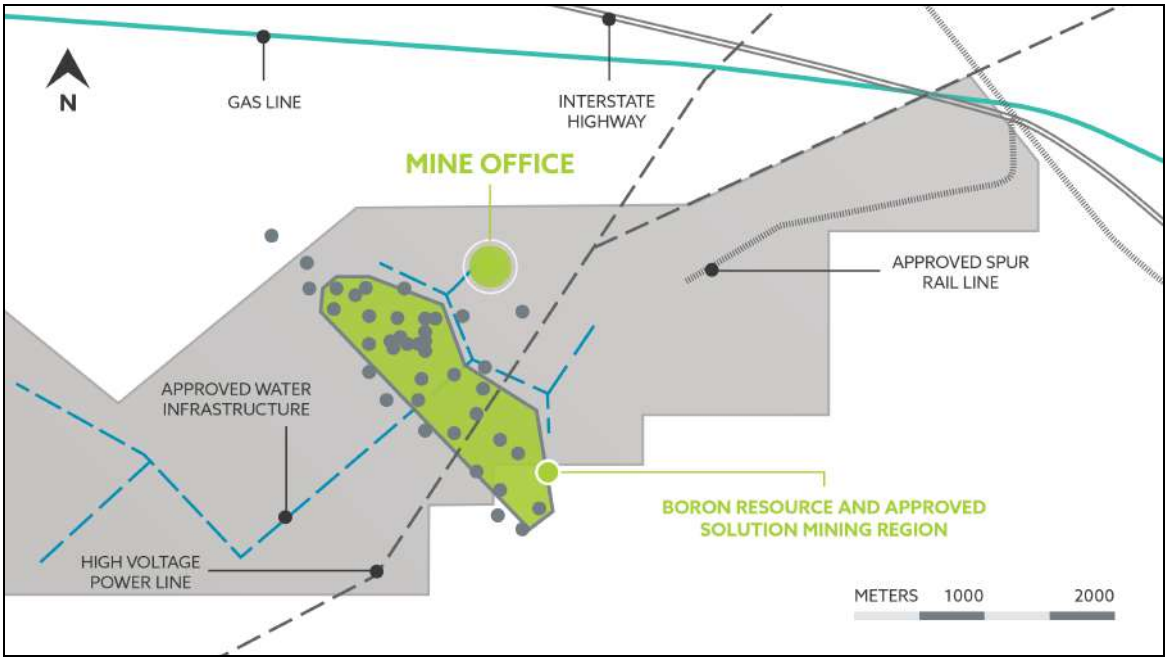
Even the resource page in the corporate presentation does not mention the name of the project. This is

entirely novel in our experience.

Mining & Processing

The project, at least in 2019, was to be developed in three phases with an estimated investment of US$526mn. Phase One was expected to be operational by 4Q20 (but this clearly did not happen), while phases two and three were expected to be operational by 2Q23 and 2Q25, respectively. (ditto on these being behind schedule).

The project will employ *in situ* solution mining method for recovering boric acid. A push-and-pull method will be employed initially until the wells naturally connect, after which separate injection and recovery wells will be used.



A hydrochloric acid solution will be injected into the ore body, 425m below the surface through the wells. The solution will leach the colemanite ore to form a pregnant leach solution (PLS), which will be extracted through reverse pumping.

The PLS will be processed and filtered to remove insoluble impurities by passing it through a solvent extraction circuit, followed by washing and stripping circuit. The final stripped liquor is filtered and directed to the crystallisation circuit.

The crystalliser will produce slurry containing 28% liquid boric acid by weight, which is directed to the dewatering circuit. The boric acid liquor will be filtered, concentrated, and crystallised by evaporation.

The crystallised boric acid will be dried and bagged as a final product.

Infrastructure details

The site is accessible from the I-40 Hector turn-off and Route 66. A pipeline will be constructed to connect the processing plant to the existing Pacific Gas and Electric Company (PG&E) mainline for supplying natural gas for the project.

Power will be sourced from an 8MW steam turbine generator, while water will be supplied from two existing water wells in the area. Four new wells are proposed to supply 100 gallons per minute of process water required for the operations.

Getting on the US Government's Radar

In February of 2022, the Fort Cady Integrated Boron Facility was designated as Critical Infrastructure by the Cybersecurity and Infrastructure Security Agency (CISA) with letters of support from members of the U.S. Congress and California State Legislature. CISA, as a U.S. federal agency and operational component under the Department of Homeland Security, is tasked with understanding, managing, and reducing risk to the nation's cyber and physical infrastructure. In this function, CISA, in cooperation with other government and industry partners, is responsible for protecting and strengthening the nation's Critical Infrastructure against current and future threats in the interest of national security, including supply chains of strategic and critical materials and their respective projects.

Price Assumptions

We discovered the pricing assumptions for the economics of the project:

Year	2026	2030	2040	2055
Boric acid price per short ton	$ 1,726	$ 2,130	$ 3,010	$ 4,620
CAGR [1]		5.40%	4.05%	3.45%

As can be noted there is some pretty aggressive price growth factored in.

	Life of Mine Price Assumptions [1]			
	Measured and Indicated		Measured, Indicated and Inferred	
	Average	Range	Average	Range
Boric acid price per short ton	$ 2,401	$1,685 - $3,054	$ 3,120	$1,685 - $4,759

Misstep with Contractor

In April 2022, the company signed a contract with Matrix Service Inc. to lead the construction efforts in building the Small-Scale Boron Facility (SSBF) in Newberry Springs, California. As part of the contract to

fulfill its scope of work, Matrix agreed to provide all construction project management, procurement services, and construction work through mechanical completion. After repeated cost escalation and schedule misses, 5E determined that Matrix could no longer deliver on the agreed-upon scopes of work as defined by the contract, and thus 5E made the decision to demobilize Matrix from the project site.

Then in mid-July, 5E filed a complaint with the United States District Court for the Central District of California against Matrix alleging numerous breaches of its contractual obligations to 5E, which lead to cost and schedule overruns.

The plant is pictured above as at the 28th of June, around the time the contractor was terminated.

Kickstarting Operations

After the travails of 2023, 5E launched itself into 2024 with an announcement on the first business day of the year that it had officially begun mining operations at the company's "5E Boron Americas Complex" with the startup of the wellfield injection process. Under its EPA UIC permit it could begin extracting minerals at Fort Cady.

The company announced that it expected to begin lab production in the short-term and production of boric acid and lithium carbonate from the small-scale facility by the end of the 1Q24. This initial production will be used for customer qualification as the 5E seeks to obtain bankable offtake agreements and future sales to support FEL 2 engineering as the focuses on moving to commercial scale

operations.

Then a couple of weeks later the company announced the selection of Fluor Corporation as its engineering, procurement, and construction (EPC) services provider. The initial scope of Fluor will be to lead FEL-2 which will directly feed into the upgrading of the extant S-K 1300 technical document into a Pre-Feasibility Study upon completion.

The unit will have capacity for 2,000 short tons per year, scalable to 9,000 tons per year in 2024.

Financial Travails?

On the 9th of November of 2023 the company announced that it was advancing discussions with its main lender and other parties to achieve a funding solution for its debt burden. In order to restructure its convertible note and strengthen its balance sheet, the company entered into a standstill agreement with BEP Special Situations IV, LLC, its primary lender and the holder of the senior secured convertible notes.

This situation dated back to August 2022, when 5E secured a US$60mn private placement of senior secured notes convertible into common stock of 5E from US-based institutional investment manager, Bluescape Energy Partners. Under the terms of the private placement, 5E was to maintain a minimum cash balance of US$10mn. With respect to its ongoing financing and commercial initiatives, the company signalled to the market that it required a time extension to achieve an appropriate funding solution.

In early November of 2023, 5E announced its fiscal first quarter 2024 financial results (10Q for September quarter) and a cash balance of US$11.8mn. In February of 2024, it announced in its 10Q filing that its cash balance at the end of December of 2023 was $2.045mn (down from $20mn a year before).

The standstill agreement provided 5E with a time extension to advance discussions with several parties to achieve funding for its next phase of growth as it works judiciously to finalize its permit obligations. Under the standstill agreement, 5E was allowed to go below its current cash covenant until the 1st of December 2023, but then on December 3rd, it was announced that the standstill agreement had been extended.

Finally, on the 6th of December, 5E agreed a funding package with its main lender and a group of new investors for:

- New investors committing up to US$25mn under the transaction and the terms of the 5E's existing senior secured convertible notes which were to be amended to reduce the conversion rate, extend the maturity date by one year and increase the paid-in-kind interest rate to 10%
- Bluescape Special Situations IV, LLC provided an option to invest an additional US$10mn under

the transaction

- The new investors would acquire 50% of the outstanding principal amount of the convertible notes from the lender
- The lender agreed to reduce the minimum required cash covenant in the notes to zero until the 28th of June 2024. The upon the closing of the transaction, the notes would be amended to provide for a minimum required cash covenant of US$7.5mn beginning from the 28th of June 2024

Thus, 5E lived to fight another day.

Then a Financing

At the very end of January, the company announced that it had closed its previously announced second tranche of equity financing. The second closing included US$7.75mn in new equity capital from 5ECAP, LLC. The company had previously closed on US$10mn on January 18th. That tranche was split equally between Ascend Global Investment Fund SPC and 5ECAP, LLC.

In the interest of being opaque, the company neither announced the price at which the shares were issued nor the price. Many thanks.

Funds raised from these transactions were to be deployed to continue initial production of boric acid and lithium carbonate and to complete the final stages of the processing plant.

Commentary

Say what one might about mining promoters but they do largely tend to know their art, but when a promoter tries to dress a mining project up as something else then that strategy may fleetingly deliver a $2bn market cap but unfortunately the guy standing at the top of the hole (in Mark Twain's definition) will eventually be found out.

The price went into a severe decline in 2021 after studies showed the financial metrics on the three-stage rollout of the Fort Cady mine project were in fact marginal, with a meaningful EBITDA only delivered on the completion of phase 1C. The corporate fig leaf was "blowing in the wind" of the Mojave Desert.

This triggered a meltdown which in turn led to a financial crisis and then to development delays and ultimately a whole rethink, with the project finally getting on the road in a much reduced (or dare we say, diminished) form.

This is an almost classic example of a reality check and it has left the company scrambling to reposition

itself with a universe of investors that can stomach the much smaller market cap of current times.

Some lessons still do not seem to have been learnt. Firstly, the strategy was originally “don’t mention the project name and then investors will focus on the concept, not the minutiae of a mining project”. Now this has switched to an attitude that ”if one undertakes a financing and doesn’t mention how many shares were issued, and at what price, then investors will not ask sticky questions”.

The recent investor call made some assertions about EtiMaden and RTZ’s strategies that blithely ignored the profitability of this mineral for both entities and flew in the face of 5E’s own projections of the supply/demand balance and the potential for higher prices.

We might be tempted to afford this stock a rating if it wasn’t for these ongoing examples of disingenuousness. Time to shape up, guys…

Important disclosures

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