

# Fundamental Research Corp.

Investment Analysis for Intelligent Investors

January 6, 2020

## Voyageur Pharmaceuticals Ltd. (TSXV: VM) – Initiating Coverage: Junior Resource Company Building a Fully Integrated Pharmaceutical Company

Sector/Industry: Junior Resource / Healthcare

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### Market Data (as of January 6, 2020)

|               |                   |
|---------------|-------------------|
| Current Price | C\$0.075          |
| Fair Value    | C\$0.39           |
| Rating*       | BUY               |
| Risk*         | 5                 |
| 52 Week Range | C\$0.05 – C\$0.12 |
| Shares O/S    | 67,625,638        |
| Market Cap    | C\$5.07 mm        |
| Current Yield | N/A               |
| P/E (forward) | N/A               |
| P/B           | 3.0x              |
| YoY Return    | -25.0%            |
| YoY TSXV      | -1.5%             |

\*see back of report for rating and risk definitions.

\* All figures in C\$ unless otherwise specified.



### Investment Highlights

- Voyageur Pharmaceuticals Ltd. (“company”, “VM”), holder of three barium projects in B.C., including one with a resource estimate, and iodine properties in Utah, has a Joint Venture (“JV”) with privately held Chief Medical Supplies Ltd. (a Canadian pharmaceutical manufacturing and distribution company) to manufacture and market contrast agents (made with barium and/or iodine compounds) used for radiology digital imaging in the healthcare industry.
- Contrast agents are administered to a patient prior to using an imaging technology (such as X-ray / MRI / CT scan) to increase an image’s contrast by delineating body structures in which the contrast agent is localized.
- **“From the Earth to the Bottle”** - There is currently no contrast agent manufacturer in the world that owns and controls its active pharmaceutical ingredient (“API”) - the main ingredient feedstock. VM’s JV intends to be the first vertically-integrated contrast agent supplier, mining its own barium and iodine. Management estimates that their JV will have a significant ingredient cost advantage over its competitors if they are able to produce barium and iodine from their own projects.
- The JV is expected to commence marketing and sales of its first set of products across Canada, upon receipt of Health Canada approvals by Q1-2020. Barite and iodine for the products will be sourced from third-parties until one of VM’s API projects is advanced to production.
- The resource estimate on VM’s barite project in B.C. is estimated to have potential to supply barite for 30+ years.
- **We are initiating coverage on VM with a BUY rating and a fair value estimate of \$0.39 per share.**

### Risks

- An economic study has been initiated and is yet to be completed on the Frances Creek property. Metallurgical tests to date are preliminary in nature. Pharmaceutical lab testing is ongoing.
- There is no guarantee the company will have the cost advantage it estimates.
- ImagingX’ operations are in early stages; there is no guarantee of receipt of Health Canada approvals.
- The contrast agents’ market is dominated by large players with an established customer-base, and sizeable marketing budgets.
- Access to capital and potential share dilution.

### Key Financial Data (FYE - Nov 30)

| (C\$)             | 2018        | 2019 (9M)   |
|-------------------|-------------|-------------|
| Cash              | \$146,916   | \$82,651    |
| Working Capital   | -\$336,233  | -\$494,305  |
| Total Assets      | \$1,266,468 | \$1,344,796 |
| Net Income (Loss) | -\$555,860  | -\$464,885  |
| EPS               | -\$0.01     | -\$0.01     |

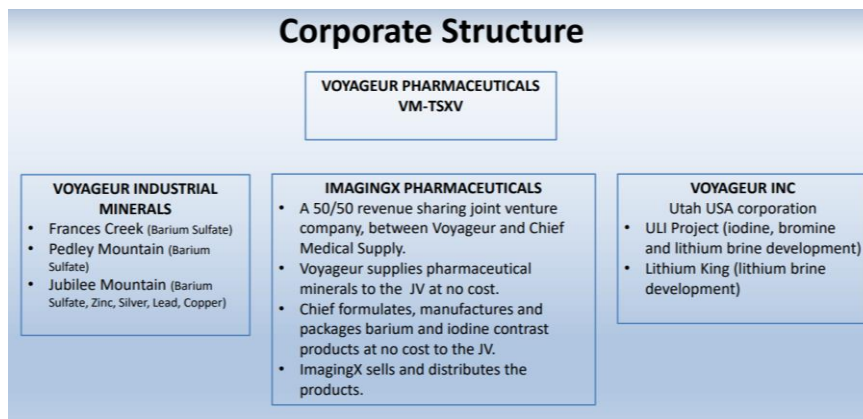
- We estimate that the working capital is currently positive as the company raised \$0.50 million and converted \$0.29 million of current liabilities to equity, subsequent to the end of Q3-FY2019.

**Overview**

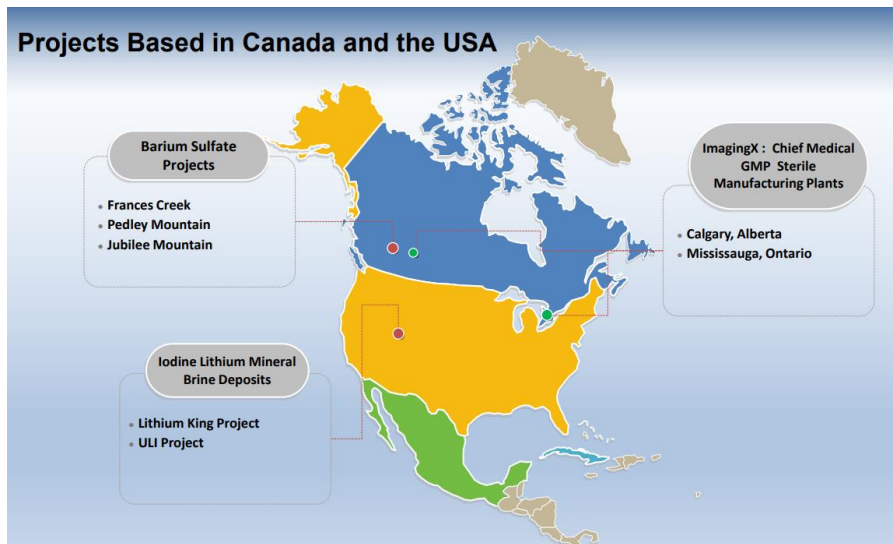
The company, based in Calgary, Alberta, was formed in 2012 as Voyageur Industrial Minerals Ltd. by CEO, Brent Willis and COO, Brad Willis (brothers / “founders”). Voyageur went public in 2017 through a reverse takeover of TSXV Exchange listed Golden Sun Capital Inc., and changed its name to Voyageur Minerals Ltd. The company recently **completed another name change to Voyageur Pharmaceuticals Ltd.** to reflect its core focus of product manufacturing and sales. At the time of going public, VM held three barite mineral properties in B.C., and two iodine, lithium and bromine properties in the state of Utah. The B.C. properties were transferred from founders’ Tiger Ridge Resources Ltd in 2013. Tiger, formed in 1995, was a barite exploration and production company. Tiger had produced barite from 1998 to 2005 from one of the three B.C. claims transferred to VM, and had operated a Chinese barite export firm, exporting approximately 10,000 tonnes per month of barite into Canada and the U.S. **We believe that both founders’ 30+ year track record in barite mining, exploration and marketing will be vital for VM going forward.**

The company’s decision to target the pharmaceutical market was prompted from preliminary tests conducted on its Frances Creek barite project, which showed high density, low contaminants’, and other features suitable for the use of barite in radiographic contrasts – a market with potential to generate attractive margins, especially for companies that are vertically-integrated, and operate the entire supply chain. **VM’s strategy is defined best by its management’s tagline of “From the Earth to the Bottle”** – which basically involves mining its own minerals, processing those minerals into active pharmaceutical ingredients / API (primary ingredient) and manufacturing and distributing GMP (Good Manufacturing Practices) compliant sterile products to end-customers in the digital imaging / radiographic healthcare space to form a fully integrated pharmaceutical company. By eliminating middlemen in the supply chain, there is an opportunity to lower costs and generate attractive margins. **Note that there is currently no contrast agent manufacturer in the world that owns and controls its API minerals.**

The company’s corporate structure is presented in the below chart.



Source: Company



Source: Company

In November 2018, the company formed a **50/50 net revenue sharing JV** (revenue less regulatory, marketing and sales costs) with Chief Medical Supplies Ltd. (“CMS”), named ImagingX Pharmaceuticals. CMS, headquartered in Calgary, Alberta, is a pharmaceutical manufacturing and distribution company, and primarily offers hemodialysis products to pharmacies and hospitals across Canada. CMS has two manufacturing facilities – a 81,000 sq. ft. plant in Calgary, and a 163,000 sq. ft. plant in Mississauga, Ontario, offering them the ability to distribute products across North America. Management indicated that the combined budget to build facilities with similar capacity is over \$150 million. They have both drug and medical device establishment licenses from Health Canada, and comply with the Canadian Food and Drug Act. **According to CMS, their two facilities combined have a bottling capacity of 760,000 bottles per day.** CMS’s Research Director, Dr. Merle Olsen, joined VM’s board in October 2019.

Chief Medical Bottle Line in Mississauga Ontario, 500 per minute



Source: CMS / VM

**Business  
Model**

**Business Plan**

The JV's business plan is to manufacture and distribute human and animal radiographic contrast agents, with an initial focus on iodine and barium based products. VM is responsible to provide the API minerals, while CMS manufactures and bottles the end-products. Both entities will provide their products / services at no cost to the JV. We believe that a 50/50 revenue share arrangement implies that the entities' costs are likely to be equal as well. **Each company maintains full control and ownership of their respective assets.** Voyageur is responsible for funding exploration / development / CAPEX of its resource projects and manufacturing API minerals, while CMS has the equipment and bottling lines in place to manufacture all products.

**The JV is basically looking to repeat the success of EZ-E-M Canada, which used to operate a fully integrated barite contrast product line.** They produced barite from the Brookfield mine in Nova Scotia, upgraded the barite into United States Pharmacopeia (USP) standard barium sulfate at their onsite API plant, and manufactured contrast agents from its own manufacturing facility in Quebec. The Brookfield mine has since been depleted of resources, and is estimated to have produced approximately 125 Kt of 97.5%+purity barite between the early 1980s and 2010. **Bracco Diagnostics acquired EZ-E-M in 2008 for US\$240 million.** Bracco supplies almost 100% of the barium contrast agents in North America, and currently imports 100% of its barite needs from foreign suppliers. According to VM, preliminary tests indicate that their Frances Creek project has far superior high purity mineralization compared to the Brookfield mine. Owning the only pharmaceutical grade barite project outside of China will allow the JV to become a competitive pharmaceutical contrast company. The company is also expecting to produce its own iodine API (iopamidol), with a goal to build the first and potentially only iopamidol production facility in North America. By operating the entire supply chain, management believes their operating margins may be 30% - 50% higher than companies that are currently operating in the contrast agent space. Note that these companies purchase the required iodine and barite for their end-products.

**Iodine and Barite Supply**

Until VM is able to produce pharmaceutical grade barite from its own properties, the JV will source barite and iodine API from third parties. The first barite shipment, from a Chinese supplier, considered to be the only entity worldwide which is producing FDA / Health Canada approved natural pharmaceutical grade barite, was delivered to the JV in February 2019. **Through this approach, management intends to prove the JV's ability to manufacture contrast products and establish a customer base prior to building an API quarry and API processing facility.** VM is currently advancing its flagship barium project (Frances Creek) to a PEA. Time to production is likely to be 18 months. According to management, Frances Creek's current resource estimate implies enough barite supply for 30 years at 2,000 tonnes of barite per year.

Note that Bracco and other manufacturers of barium contrast agents also purchase synthetic barium sulphate / barite ("blancfix"), which are typically priced higher than natural barite. VM estimates that they will be able to produce USP barium sulfate for approximately

US\$450 / t versus competitors' cost to purchase barite at over US\$3,800 / t. Note that an economic study has yet to be completed on VM's properties, so we believe their cost estimate is very preliminary and speculative. The cost to process oil-field grade barite (low-grade) is approximately \$150 / t, therefore, management believes their cost estimate of US\$450 / t for USP barite is conservative.

In addition to the barite properties in B.C., VM also holds iodine prospective land in Paradox basin in Utah. Historic fluid analysis has returned high values of up to 595 ppm iodine. There is a large oil field with hundreds of wells indicating the presence of a water resource in the surrounding area. VM intends to move to iodine exploration and potentially repeat its business plan related to barite contrast agents.

**Distribution**

The JV will initially target Canada, and is currently awaiting approval on its first five products from Health Canada. Primary targets will be diagnostic imaging clinics and hospitals, and products will be sold to wholesale distributors. The JV will subsequently seek approvals to enter the U.S. (FDA approval), Europe, and the rest of the world, primarily in countries with government run health care systems and private clinics. Outside North America and Europe, the JV has identified 20+ countries as target markets.

Management's projected timeline is shown below. They expect to commence marketing and sales in Canada by Q1-2020, upon receipt of Health Canada approvals. The company will be applying for U.S. and European approvals this year. Sales and marketing of iodine based agents is expected to commence in 2021.

**Management Timeline**

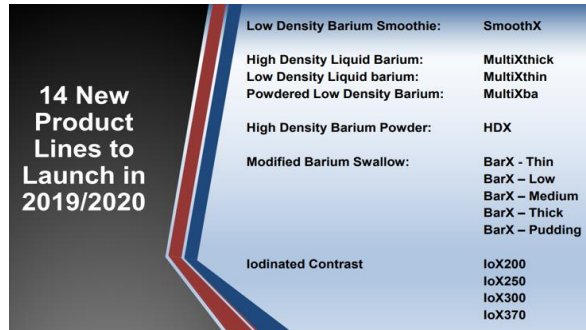


Source: Company

ImagingX is currently preparing to submit additional barium products and an iodine product, as well it is in the process of developing multiple other barium and iodine products

**Barite Market**

as shown below:



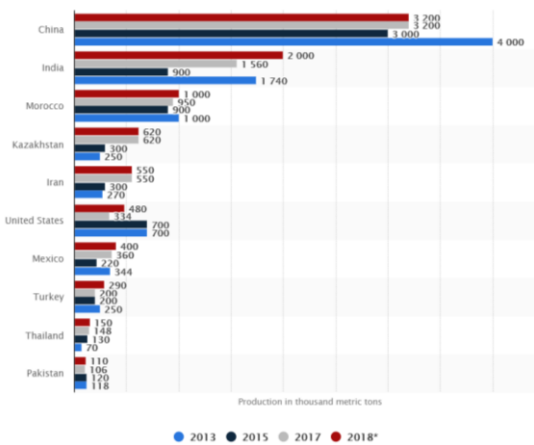
Source: Company

Barite or barium sulfate’s (BaSO<sub>4</sub>) key strengths are high density (4.5 specific gravity), chemical inertness, relative softness, low abrasivity, non-corrosive, and non-toxic features. Approximately **70% of the demand comes from its use as a weighting agent for drilling fluids in oil and gas exploration** (approximately 1,500 tonnes of barite is used for a 5,000 m hole), while approximately 15% is used in chemical applications (such as electronics, glass, ceramics and medical markets), and the remaining 15% is used as fillers in rubber, paint, etc.

According to Zion Market Research, the global barite market was valued at US\$1.41 billion in 2017 (approximately 9.5 Mt of annual production at US\$150 per tonne), and is expected to grow at 4% p.a. to reach US\$1.85 billion by 2024.

In 2018, global annual barite production was approximately 9.5 million tonnes (“Mt”) – with the top three players being **China (accounting for 34%), India (21%) and Morocco (11%)**. The U.S. produced approximately 0.5 Mt, or 5% of the global production. Most of the production came from Nevada and Georgia, and were used in drilling fluids for oil and gas wells. **Canada does not have any significant barite production.**

**Global Barite Production**

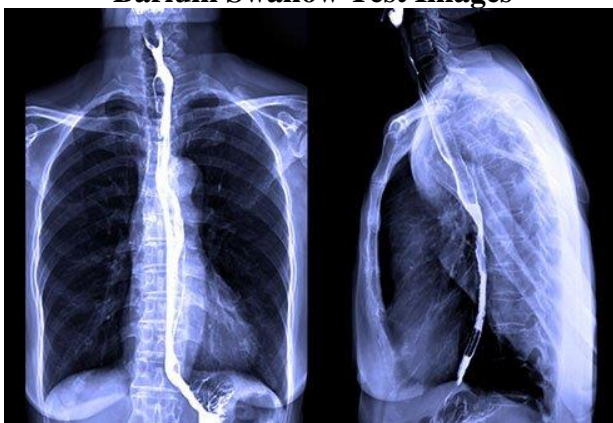


Source: Statista

According to the U.S. Geological Survey, the global reserves of barite are estimated at 320 Mt, with the top three players being Kazakhstan (85 Mt), India (51 Mt), and China (36 Mt).

**Due to barite's high specific gravity, leading to opaqueness to radiation, and insolubility in water and acid, it is useful in contrast agents for diagnostic imaging.** Contrast agents are substances such as iodine or barium compounds, administered to a patient prior to using imaging technology (such as X-ray, computed tomography / CT, magnetic resonance imaging / MRI, and ultrasound) to increase an image's contrast by delineating body structures in which the contrast agent is localized.

### Barium Swallow Test Images



Source: eMedicine Health

Contrast agents are typically injected into veins or arteries, or, in the case of barite contrast agents, consumed orally or rectally. Iodine compounds dominate the market due to their wide range of applications. **Barite is only used in studies related to the digestive tract, while iopamidol (iodine based agent) is used to diagnose disorders of the brain, nervous system, blood vessels, joints, and heart.**

Unlike applications in the oil and gas sector and other key sectors, pharmaceutical and medical applications demand **exceptional purity (over 97.5% BaSO<sub>4</sub>) and low levels of heavy metals and other impurities (under 0.001%)**. General specifications are listed below:

#### General Specifications for Pharma-Grade Barite

|                           |                     |
|---------------------------|---------------------|
| BaSO <sub>4</sub> content | 97.5% min           |
| Heavy metals (as Pb)      | 0.001% max          |
| Sulphides                 | <0.1 ppm            |
| Arsenic                   | <0.1 ppm            |
| Particle size             | 90% -20 μm          |
| Colour                    | white or near white |
| Odour                     | odourless           |

Source: Frances Creek Technical Report

**Although there are barite deposits in China that are capable of meeting the above specifications, very few deposits worldwide have such capabilities.** Most deposits in North America are associated with heavy metals. As mentioned earlier, Nova Scotia's

*Iodine Market*

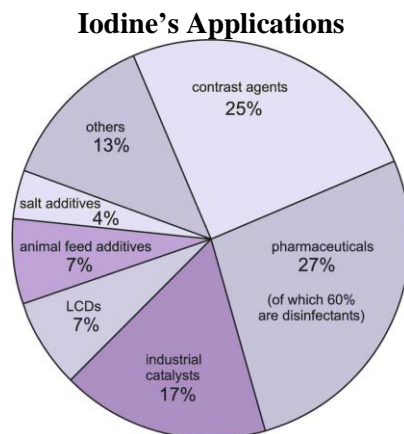
Brookfield was one of the rare barite deposits that met the specification of pharmaceutical and medical applications. Preliminary tests on VM’s Frances Creek indicate its potential to be one.

**Pricing**

Barite **pricing has been relatively stable** in the recent past; prices in the U.S. have ranged between US\$179 and US\$194 per tonne since 2014. Note that most of the barite supply went towards drilling fluids. The price per tonne for industrial and paint grade barite products is in the US\$450 per tonne range to US\$20,000 per tonne. Pharmaceutical grade barite trades at US\$3,800 (large orders) and US\$7,500 per tonne (smaller orders) FOB Chinese port. In early 2019, VM purchased 2 tonnes for US\$3,800 per tonne.

**Iodine**

As mentioned earlier, iodine dominates the contrast market due to its wide range of applications. Approximately 25% of iodine produced worldwide is used in contrast agents, as shown in the chart below.

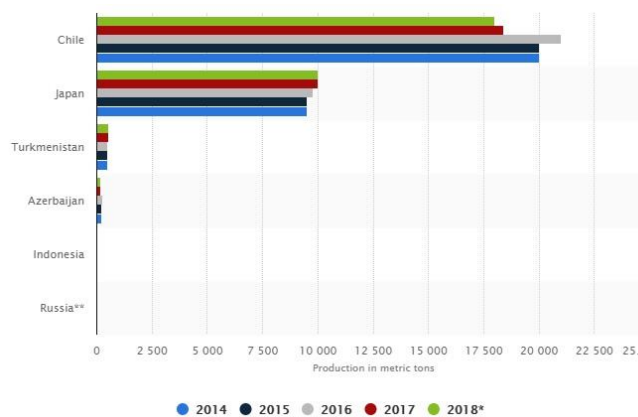


Source: <http://www.essentialchemicalindustry.org>

In 2018, global annual iodine production is estimated to have been 29,000 tonnes – with the top two players being **Chile (accounting for 62%)** and **Japan (35%)**. In the U.S., iodine is produced from brines by three companies operating in Oklahoma. However, their combined production data remain undisclosed. Iofina, the second largest producer in the U.S., produced 589 tonnes in 2018.

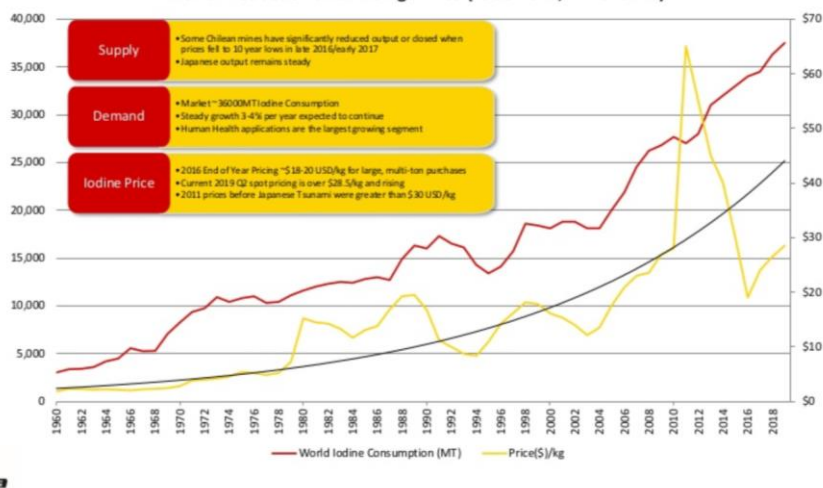


### Global Iodine Production



Source: Statista

### World Production and Average Price (1960-2018, + Trendline)

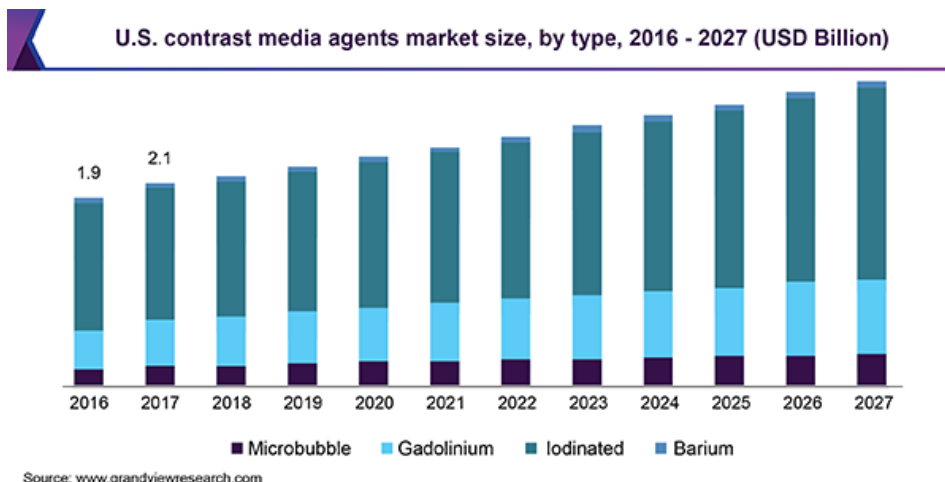


The above chart from Iofina shows iodine consumption since 1960. The current price of iodine is approximately US\$25 / kg.

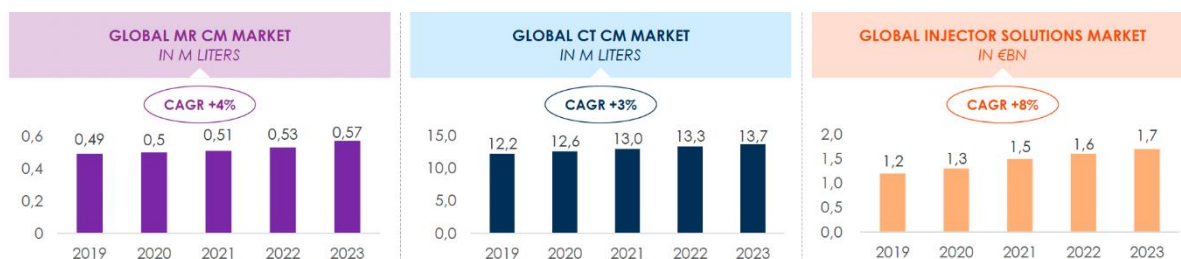
### Contrast Agent Market

#### Market Size

Zion Market estimates the global imaging market to growth from US\$34 billion in 2018, to US\$48.6 billion by 2025, reflecting 5.2% p.a. growth. According to ResearchGate, over 70 million radiology tests are performed globally using contrast agents. **Grand View Research estimates the global contrast agent’s market to grow from US\$4.89 billion in 2017, to US\$6.93 billion by 2027, reflecting 3.5% p.a. growth.** The contrast media agent market in the U.S. is estimated to have been US\$2.1 billion in 2017, with over 60% of the market accounted by iodine, and under 5% by barium based agents.

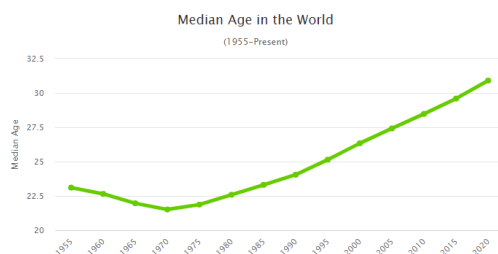


The following charts shows the expected increase in consumption of contrast media.



Source: Guerbet

Growth is primarily driven by rising prevalence of chronic diseases and median age of the population (as shown in the charts below).



Source: www.worldometers.info

**Percentage of Population Aged over 65 Years**

| Region                           | 2019       | 2030        | 2050        | 2100        |
|----------------------------------|------------|-------------|-------------|-------------|
| <b>World</b>                     | <b>9.1</b> | <b>11.7</b> | <b>15.9</b> | <b>22.6</b> |
| Sub-Saharan Africa               | 3.0        | 3.3         | 4.8         | 13.0        |
| Northern Africa and Western Asia | 5.7        | 7.6         | 12.7        | 22.4        |
| Central and Southern Asia        | 6.0        | 8.0         | 13.1        | 25.7        |
| Eastern and South-Eastern Asia   | 11.2       | 15.8        | 23.7        | 30.4        |
| Latin America and the Caribbean  | 8.7        | 12.0        | 19.0        | 31.3        |
| Australia/New Zealand            | 15.9       | 19.5        | 22.9        | 28.6        |
| Oceania*                         | 4.2        | 5.3         | 7.7         | 15.4        |
| Europe and Northern America      | 18.0       | 22.1        | 26.1        | 29.3        |

Source: United Nations

### Oligopoly

The contrast market is dominated by players such as Bayer (XTRA: BAYN), GE Healthcare, Guerbet (ENXTPA: GBT), Lantheus Medical Imaging (NASDAQ: LNTH), Sanochemia (XTRA: SAC), and Bracco Diagnostics. Bracco dominates the North American barite related contrast agents market. The iodine based agents' market is dominated by Bracco and GE. Bracco sources barite API from China, while the iodine contrast agents' manufacturers purchase iodine from Chile / Japan and manufacture their own iopamidol for

*ImagingX' Products*

use in their contrast media agents.

Although ImagingX' business plan, if successful, will offer them a stable long-term supply of feedstock, and a cost advantage over competitors, breaking into a sector that is dominated by large players with an already existing large customer-base, and sizeable marketing budgets, will be challenging. However, we believe, VM management's background in barite, and CMS's track record and manufacturing / distribution / sales capabilities, will be a major advantage for ImagingX.

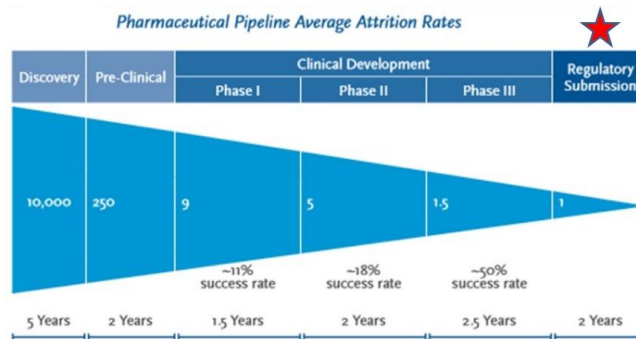
ImagingX has submitted its first five products for registration with Health Canada – first in August 2019, second in October 2019, third in November 2019, and fourth / fifth in December 2019. Brief notes on the products are listed below:

1. **SmoothX barium sulfate oral suspension** used in CT scans of the abdomen to view the gastrointestinal tract.
2. **HDXBa** is a high density dry barium powder, that can be mixed with water to create a barite suspension prior to X-ray procedures to view the gastrointestinal tract.
3. **MultiXBa** is a low density dry barium powder, also for use in X-ray procedures.
4. **MultiXthin** is a low density pre-mixed two liter jug of oral suspension
5. **MultiXthick** is a high density pre-mixed two liter jug of oral suspension.



Source: Company

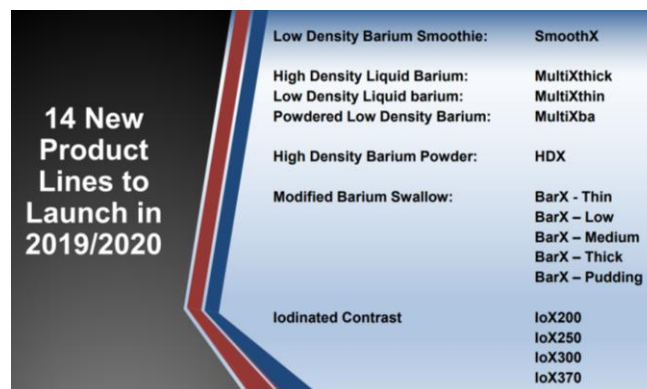
As ImagingX intends to manufacture generic contrast agents, they do not have to follow the typical lengthy regulatory process. **In the chart below, ImagingX is at the “Regulatory Submission” stage.**



Source: Company

Upon receipt of Health Canada registration (expected by Q1-2020), ImagingX will commence marketing and sales of its products across Canada. As mentioned earlier, the company will be applying for U.S. and European approvals in 2020.

VM is currently preparing to submit additional barium products and an iodine product, as well it is in the process of developing multiple other barium and iodine products as shown below:



Source: Company

**Project Portfolio**

In Canada, barite deposits of economic significance are confined largely to Newfoundland, Nova Scotia, Ontario and B.C. Although historic production has come from these provinces, there is currently no significant production of barite other than a small oilfield grade mine located on the northern B.C. / Yukon border.

VM holds a 100% interest in three barite deposits - Frances Creek, Pedley Mountain and Jubilee Mountain, in B.C., Canada. The projects are located within a 70 km radius from Radium, B.C.

### Location of VM's Projects in B.C.



Source: Company

#### Ownership

The projects were transferred to VM in 2013 from VM founders' Tiger Ridge Resources. Tiger Ridge retains a 3.5% gross sales royalty on barite sales. The properties are also subject to a \$2 per tonne finished barite royalty to a third party.

Tiger Ridge produced approximately 40,000 tonnes of oilfield grade barite from the Jubilee Mountain Prospect between 1998 and 2005.

#### Location

The Frances Creek property, which is the most advanced in the three property portfolio, is located 41 km North West of the town of Radium Hot Springs, which is located 144 km (by air) southwest of Calgary, AB. and 530 km (by air) northeast of Vancouver, B.C. There are all-weather paved highways from Calgary to Radium Hot Springs. Access to the property from Radium Hot Springs is via unpaved logging roads. The topography of the property is steep and rugged, and a switchback road accesses all areas of the barite zone. The identified deposit is located beside a main forestry road. Power will come from diesel generators; however, note that power requirements will be relatively low as operations will be a simple quarry and crushing / gravity separation operation. Although there is abundant water supply on site, the project will require limited supply as the company will likely use dry separation.

#### History

The Frances Creek property was discovered in 1989. The property was subject to drilling by Mountain Minerals (1992) and Tiger Ridge (2003 – 2005). The property was relatively inactive from 2005 to 2016. VM subsequently drilled 25 holes / 1,231 m in 2017, which resulted in a maiden resource estimate in 2018.

#### Geology and Resource

Barite mineralization at the Frances Creek Property occurs as a complex breccia vein. Mineralization has been identified over two zones – zone A (85 m strike / depth of 35 to 55 m) and zone B (150 m strike / depth of 60 to 95 m). The 300 m zone on strike between the

A and B zones has yet to be drill tested and is covered by overburden. A maiden NI 43-101 resource estimate completed in 2018, showed the property to hold **166 Kt at 37.75% BaSO<sub>4</sub> indicated, and 196 Kt at 35.40% BaSO<sub>4</sub> inferred.**

| INDICATED          | MILL       | BARITE    |
|--------------------|------------|-----------|
|                    | TONNES     | TONNES    |
| A - ZONE           | 36,567.40  | 13,215.20 |
| B - ZONE           | 129,642.80 | 49,529.80 |
| A + B              | 166,210.20 | 62,745.00 |
| %BaSO <sub>4</sub> | 37.75      |           |

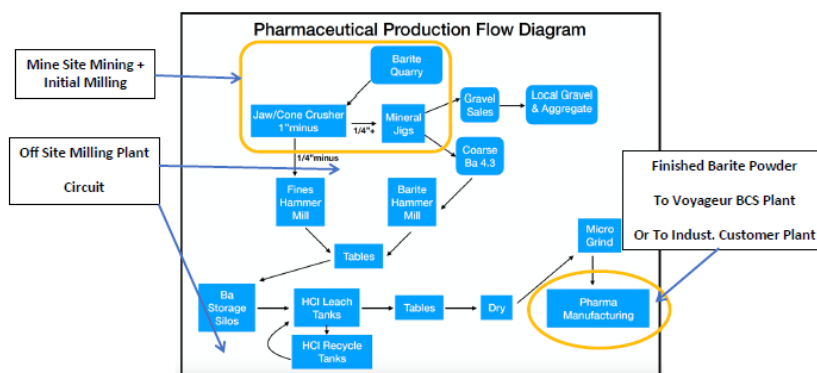
| INFERRED           | MILL       | BARITE    |
|--------------------|------------|-----------|
|                    | TONNES     | TONNES    |
| A - ZONE           | 42,872.60  | 14,159.40 |
| B - ZONE           | 152,705.50 | 55,070.40 |
| A + B              | 195,578.10 | 69,229.80 |
| %BaSO <sub>4</sub> | 35.40      |           |

Source: Technical Report

The Frances Creek breccia vein, which hosts the barite mineralization, is a two-component breccia vein, including 63% carbonate and argillaceous country rock, and 37% crystalline barite. **Selective sampling of crystalline barite indicated high purity (95%+ BaSO<sub>4</sub>) and high specific gravity (4.3+).** These are indications that conventional milling, followed by acid washing can produce pharmaceutical grade barite. Another major advantage of Frances Creek is that there are no other metals associated with the property, unlike most barite deposits in North America, which have base metals occurrences.

**2017 Sampling**

| Hole Number | Crystalline Barite Zone Sampled | %BaSO <sub>4</sub> | Specific Gravity |
|-------------|---------------------------------|--------------------|------------------|
| FC17-5      | 23.7m-24.9m                     | 97.76%             | 4.36             |
| FC17-7      | 25.6m-25.8m                     | 97.74%             | 4.46             |
| FC17-7      | 32.4m-32.9m                     | 99.12%             | 4.50             |
| FC17-7      | 51.5m-53.4m                     | 96.41%             | 4.44             |
| FC17-8      | 24.5m-24.9m                     | 97.02%             | 4.47             |
| FC17-8      | 41.2m-43.8m                     | 97.81%             | 4.39             |
| FC17-9      | 16.9m-24.3m                     | 97.58%             | 4.46             |
| FC17-10     | 19.9m-33.5m                     | 96.87%             | 4.36             |
| FC17-11     | 33.0m-41.9m                     | 97.26%             | 4.40             |
| FC17-12     | 32.0m-48.6m                     | 96.89%             | 4.40             |
| FC17-15     | 29.7m-32.8m                     | 95.32%             | 4.33             |



Source: Technical Report

Note that these results are preliminary in nature, and the company needs to conduct additional detailed tests to confirm the above. **VM is currently completing pharmaceutical lab testing on Frances Creek’s barites and results are pending.**

**The company is currently working with SGS Canada on a preliminary economic assessment (“PEA”) on the project, to be completed by Q2-2020.** On December 18, 2019, the company announced that SGS’ studies on a two-tonne sample from the project, successfully gravity separated a concentrate with a grade of 98.6% barium sulfate. This is very encouraging as the grade is higher than the required grade of 97.5% for USP pharmaceutical grade barium sulfate. A key advantage of their process is that a tailings pond will not be required on the quarry site, implying potential for lower operating costs and footprint. Final results will be available in January 2020. In January, SGS and VM will also commence engineering and planning of a barite quarry, and development of a proprietary barium API process.

The company has also applied a Notice of Work for a 10,000 tonne bulk sample. This bulk sample will be used for the PEA, as well as for fine tuning the API production plant (estimated CAPEX of C\$12 million). The bulk sample is expected to provide the company with its first three to four years of barium sulfate supply.

*Paradox Basin*

**ULI Project**

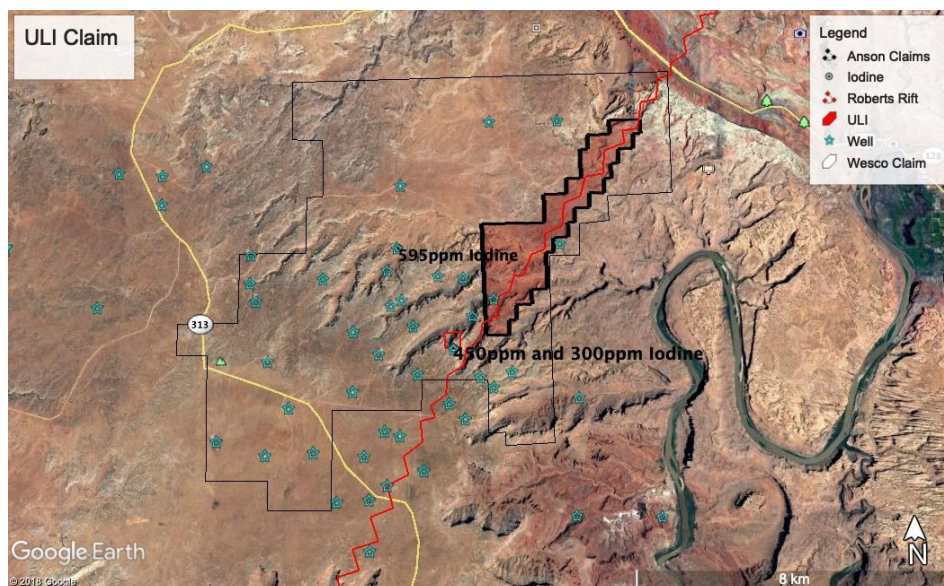
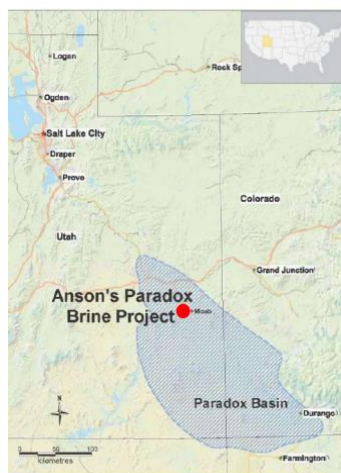
In 2016, the company acquired a 100% interest in 89 claims (720 ha) of brine property located in the Paradox Basin of Utah. Subsequently, in 2017, the company entered into an agreement with Anson Resources Ltd (ASX: ASN / Market capitalization of A\$17 million) wherein Anson may earn up to 70% of the project as follows:

- 10% on signing
- 40% by defining one or more drill holes, issuing a NI 43-101 technical report, and incurring US\$0.67 million in exploration; and
- another 20% by drilling and logging one or more holes, issuing an updated NI 43-101 technical report, and incurring US\$2.33 million in exploration.

VM and Anson are currently in dispute regarding the 40% earn-in. Anson claims they have spent the money to earn 50%, while VM disputes Anson’s claims. Anson also holds another 1,317 claims around VM’s claims (see map below). VM’s management is meeting with Anson in Q1, and expects to resolve the issue.

The project’s location is shown in the map below.

**Location Map**



Source: Anson

The Paradox Salt Basin covers an area of approximately 160 km by 320 km in a northwest-southeast direction across southeastern Utah and southwestern Colorado. It is an evaporite basin, and resources extracted from the basin include oil, gas, uranium, copper, and potash. Intrepid Potash’s (NYSE: IPI) Moab project in Utah, located 5 km from the ULI project, is the longest operating solar solution mining potash operation in the U.S.



Brine from two wells drilled in the 1960s, approximately 1.7 km of the ULI project, returned highly encouraging values of lithium, iodine, bromine, boron and magnesium.

**Brine Concentrations from Wells Adjacent to ULI**

| WELL           | Lithium | Bromine | Boron  | Iodine | Magnesium |
|----------------|---------|---------|--------|--------|-----------|
| Long Cyn. #1   | 500     | 6,100   | NA     | 300    | 21,000    |
| Roberts' Brine | 1,700   | 2,500   | 20,000 | 450    | 43,600    |
| Average        | 1,100   | 4,300   | 20,000 | 375    | 32,300    |

*Source: Henkle and Assoc.*

The two wells were drilled into the Roberts' Rupture, which is considered to be the controlling geologic feature responsible for the high grade brine concentrations and flow rates. Seismic interpretation in the region has indicated that the aquifer is intact at depth and trapped. The average grades of the two wells (1,100 ppm lithium, 375 ppm iodine, etc.) are comparable to the highest grades produced at operating mines worldwide. A report from Henkle and Associates indicated that an iodine concentration of 375 ppm is 125% of the average iodine brine produced in Arkansas.

The Paradox Basin includes a thick series of marine evaporite deposits. Potash is identified in 17 of the 29 evaporite cycles. Iodine is estimated to be present in all cycles that are in close proximity to oil and gas fields. According to management, historic drilling records indicate the presence of high mineral brine flows, and believes that their property holds multiple non-oil highly mineralized salt water zones. However, testing of these zones is limited as previous operators were focused mainly on oil and gas extraction. Management estimates they can build a 30,000 barrel per day iodine blowout plant for approximately US\$3 million, which will be used to extract and concentrate iodine. The concentrated iodine will be subsequently upgraded via a nine step chemical process (proprietary) to create iopamidol. Management has not disclosed additional details of the process, but did mention that they expect a significantly lower cost relative to competitors. We are not in a position to speculate on this.

Cost to produce iodine flake is US\$15-20 per kg; cost to upgrade to iopamidol is estimated at \$30/kg, for a total cost of US\$50/kg. To put things in perspective, iopamidol currently has a market price of US\$120-\$130/kg. **Assuming VM's cost estimates hold, this implies that VM will be in a position to sell its products at a lower price relative to competitors to attract market share.**

**Management & Board**

Management and board members hold 22 million shares, or 33% of the total outstanding shares.

**Share Ownership**

| Name               | Position             | Since | Shares            | % of Total    |
|--------------------|----------------------|-------|-------------------|---------------|
| Brent Willis       | CEO & Director       | 2018  | 7,529,167         | 11.13%        |
| Bradley Willis     | COO & Director       | 2019  | 7,460,167         | 11.03%        |
| Trent Abraham      | Independent Director | 2019  | 1,333,333         | 1.97%         |
| Charles Littlejohn | Independent Director | 2018  | 6,154,353         | 9.10%         |
| Randy Henkle       | Independent Director | 2019  | -                 | -             |
| Dr. Merle Olson    | Independent Director | 2019  | -                 | -             |
| <b>Total</b>       |                      |       | <b>22,477,020</b> | <b>33.24%</b> |

| Significant Investors |            | Shares           | % of Total   |
|-----------------------|------------|------------------|--------------|
| John Rucci            | Former CEO | 6,291,667        | 9.30%        |
| <b>Total</b>          |            | <b>6,291,667</b> | <b>9.30%</b> |

|  |                   |               |
|--|-------------------|---------------|
| <b>Management / Directors and Institutions</b> | <b>28,768,687</b> | <b>42.54%</b> |
|--|-------------------|---------------|

*\*The above table does not include the recent shares issued to Randy Henkle for services provided, and Trent Abraham’s recent share purchase.*

*Source: Company*

Brief biographies of the management team and board members, as provided by the company, follow:

**Brent Willis, B.Sc. Eng - President & CEO**

CEO of Voyageur Minerals Ltd, Brent Willis has over 30 years of experience successfully leading, managing and advancing complex Canadian and international projects in the mining, energy and in R&D industries. Brent lead two mining projects from discovery/exploration through to production/cash flow. A track record of successfully implementing strategies to move companies from start up to cash flow in challenging economic, geographic and politically sensitive environments. Strong people leadership skills involving direct cumulative oversight of over 150 employees. Experienced public speaker for promotion and marketing of corporate projects. Negotiated over \$100 million in contracts involving joint ventures/sales agreements/purchase agreements/community engagement/legal settlements/first nation contracts/Union contracts/option agreements. Lead facilitator resulting in the orchestration of multiple contractual agreements with the Asian business community in China.

**Brad Willis, P.Eng - COO**

Mr. Willis is a mining engineer and has over 30 years’ experience in the exploration and mining industry. Mr. Willis has created three Canadian exploration companies focusing on barite exploration and mining. He has managed the exploration and discovery of multiple exploration projects in North America. He has coordinated projects from grassroots exploration to underground and surface mine production. Mr. Willis is credited with being the team leader who discovered the barite deposits that are currently owned by Voyageur. He supervised all the prospecting, exploration, drilling and underground mining on these barite properties.

**Gordon Forbes, CA - CFO**

Mr. Forbes was appointed CFO in November 2014. Mr. Forbes spent 30 years with a major accounting firm, and retired as a senior tax partner. Mr. Forbes has since acted as a valued consultant to various public companies. Mr. Forbes obtained his C.A. in 1968.

**Steven R. Livingston - Vice President Finance & Business Development**

Appointed Vice President in 2015. Mr. Livingston brings 20+ years of finance experience in the Canadian Securities and Investment Banking industries. Mr. Livingston participated as lead, co-lead or syndicate member in over 65 transactions worth over \$95 million in retail investor financing's. Mr. Livingston started his finance career at Laurentian Fund Management Inc. in 1989.

**Dr. Merle E. Olson, D.V.M., M.Sc., Co - Founder, Chief Medical Supply Ltd / Director, ImagingX / Independent Director, VM**

Dr. Olson attended the University of Regina receiving a BSc in Chemistry and Biology in 1975. He then attended the University of Western Ontario where he received a Master's degree in Chemistry. Attended the Western College of Veterinary Medicine (WCVM) and following graduation in 1981 practiced in Pincher Creek, Alberta. In 1984 Merle accepted a position at the University of Calgary (U of C). During this period he published over 200 papers, secured 45 patents and mentored 30 graduate students in infectious diseases and pharmaceutical development. In 2004 Dr. Olson retired to found a Veterinary Pharmaceutical Manufacturing Company, Alberta Veterinary Laboratories (AVL). Dr. Olson currently acts as VP of Research and Business development for AVL and Chief Medical Ltd. a human pharmaceutical manufacturer, at their 81,000 sq ft GMP manufacturing plant in Calgary, AB. These companies produce over 80 novel and generic products for veterinarians and humans and employ over 80 pharmaceutical, chemical and engineering scientists. Dr. Olson has produced novel veterinary pharmaceutical products for horses for control of pain, inflammation, parasites and infections. Dr. Olson continues to conduct human and veterinary pharmaceutical product development and is active in the laboratory and conducting clinical trials.

**Charles Littlejohn - Independent Director**

Mr. Littlejohn attended Western University, receiving his BA in science, with a strong background in biochemistry, physiology and geology. His postgraduate work over the next few years was in pharmacology and pathological chemistry, where we performed considerable research on matters of drug toxicology and high blood pressure. He later entered the oil and gas industry and held various positions of responsible charge before entering law school to earn a cum laude doctorate in law. In the early 70's he was a co-founder and director of a mutual fund management company. For the past 28 years he has managed a small, privately held hedge fund and from time to time has also served as an adjunct professor at the Southern California Institute of Law. In recent years he has served as a director of two publicly-traded companies, viz., Sienna Gold, Inc and Peruvian Precious Metals, Inc.

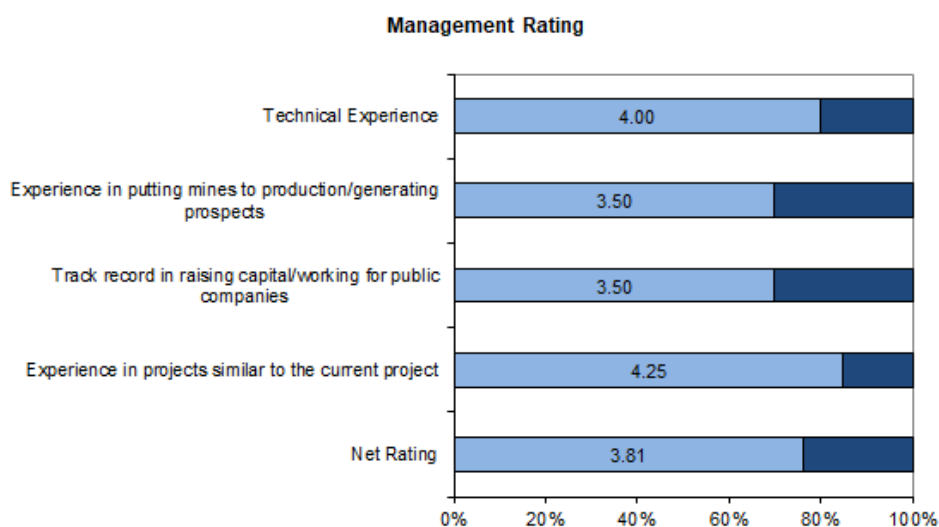
**Trent Abraham - Independent Director (Chairman)**

Mr. Trent Abraham is a proven leader, senior executive, entrepreneur, consultant, and owner with over 31 years of success in energy services, oil & gas, mining, agriculture, blending and manufacturing, chemicals, global procurement and distribution, logistics and freight. Trent is currently the COO and President of Midwestern Mud and SOS Environmental. He also has an advisory role with Emprada Minerals LLC., a global mineral company. Trent has held senior executive positions at Emprada Minerals, Brichem Corporation / Brichem Supply Ltd., Sodium Solutions, Millennium Technologies, Ltd., Sun Coast Materials and Spirit Mountain Environmental.

**Randy Henkle, P.Geo - Independent Director**

Mr. Henkle is a consultant geologist with over 45 years experience in mining and engineering geology and minerals exploration. Randy’s work history includes projects in Western Canada, Western and Eastern US, Mexico and South America. He is a proven prospect generator. His discovery & acquisition track record includes 3 gold-silver mines (two of which are now mined out, with one presently an active producer) and 2 producing chemical/specialty limestone mines. Randy generated and staked both the ULI and Lithium King Lithium brine prospects; both of which were vended into Voyageur. His broad areas of geologic expertise include experience in both industrial minerals, precious and base metals and mineral brine deposits. His business expertise includes leadership, strategic planning, project management and project acquisition. Randy is currently the President & Chief geologist at Henkle and Associates, a boutique geologic consulting firm, in Nevada, USA.

Our net rating on the company’s management team is 3.8 out of 5.0 (see below).



Source: FRC

The company’s board has six members, of which, four are independent. The following table shows our analysis on the strength of the company’s board.

Financials

|  | Poor | Average | Good |
|--|------|---------|------|
| Four out of six directors are independent  |      |         | X    |
| Directors' share ownership   |      |         | X    |
| The Audit committee is composed of three board members, two are independent        |      | X       |      |
| The Compensation committee is composed of three board members, all are independent |      |         | X    |

Source: FRC

At the end of Q3-FY2019 (August 31, 2019), VM had cash and working capital of \$83k and -\$0.49 million, respectively. Working capital was negative primarily due to \$0.51 million in account payables. We estimate the company had a burn rate (G&A) of \$51k per month in the first nine months of FY2019. The following table summarizes the company's liquidity position:

| (in C\$)                       | 2018       | 2019 (9M)  |
|--------------------------------|------------|------------|
| Cash                           | \$146,916  | \$82,651   |
| Working Capital                | -\$336,233 | -\$494,305 |
| Current Ratio                  | 0.41       | 0.27       |
| LT Debt / Assets               | -          | -          |
| Monthly Burn Rate (incl. G&A)  | -\$47,581  | -\$51,063  |
| Project Related                | -\$327,441 | -\$125,545 |
| Cash from Financing Activities | \$844,373  | \$494,968  |

- Subsequent to the end of Q3-FY2019, \$0.29 million of current liabilities were converted to equity.

Source: FRC / Company

Subsequent to the end of Q3-FY2019, VM completed a **\$0.50 million non-brokered private placement** at \$0.075 per unit. Each unit consisted of a common share and one common share purchase warrant (exercise price of \$0.20 per share for two years).

We estimate the company currently has 7.33 million options (weighted average exercise price of \$0.10 per share) and 31.52 million warrants (weighted average exercise price of \$0.16 per share) outstanding. None of the options or warrants are currently in-the-money.

**Valuation & Rating**

We are valuing VM based on the current resource estimate at its Frances Creek barite project. As an economic assessment has yet to be completed on the project, we have used highly conservative assumptions, and have only used 50% of the known indicated resource estimate. We are also using a significantly higher cost estimate of \$1,000 / t versus management’s estimate of \$600 / t. As for the sale price of barium sulfate, we are using US\$3,800 / t, which is the price VM recently paid for its first 2 tonnes. Based on these assumptions, we arrived at a Discounted Cash Flow valuation of \$26 million, or \$0.39 per share.

| DCF Valuation   |   |
|---|---|
| Tonnes per year (barium sulfate)                          | 3 Kt in Year 1 and 5 Kt in Years 2 to 7 |
| Mine Life (years)   | 7                                       |
| Average Product Price (C\$/t) - US\$3,800 x 1.30 C\$/US\$ | \$4,940                                 |
| Operating costs (C\$/t)                                   | \$1,000                                 |
| Capital Cost (C\$M)                                       | \$20                                    |
| Discount rate   | 15%                                     |
| Avg Annual Revenues (\$M)                                 | \$22                                    |
| Avg Annual EBITDA (\$M)                                   | \$17                                    |
| <b>Net Asset Value (C\$)</b>                              | <b>\$26,053,239</b>                     |
| Current Working Capital                                   | \$22,505                                |
| <b>Fair Value of VM</b>                                   | <b>\$26,075,744</b>                     |
| No. of Shares   | 67,625,638                              |
| <b>Fair Value per Share (\$)</b>                          | <b>\$0.39</b>                           |

Source: FRC

Our valuation is highly sensitive to the key inputs presented in the table below.

**Sensitivity to Key Inputs**

|   |          | Discount Rate |        |        |        |        |
|---|----------|---------------|--------|--------|--------|--------|
|   |          | 10.0%         | 12.5%  | 15.0%  | 17.5%  | 20.0%  |
| Throughput (tpy) barium sulfate from years 2 to 7 | \$3,000  | \$0.31        | \$0.25 | \$0.20 | \$0.16 | \$0.12 |
|   | \$4,000  | \$0.43        | \$0.35 | \$0.29 | \$0.24 | \$0.20 |
|   | \$5,000  | \$0.55        | \$0.46 | \$0.39 | \$0.32 | \$0.27 |
|   | \$7,500  | \$0.85        | \$0.72 | \$0.62 | \$0.53 | \$0.45 |
|   | \$10,000 | \$1.15        | \$0.99 | \$0.85 | \$0.74 | \$0.64 |
| Operating Cost (\$/t)                             | \$600    | \$0.63        | \$0.53 | \$0.45 | \$0.38 | \$0.32 |
|   | \$800    | \$0.59        | \$0.49 | \$0.42 | \$0.35 | \$0.29 |
|   | \$1,000  | \$0.55        | \$0.46 | \$0.39 | \$0.32 | \$0.27 |
|   | \$1,200  | \$0.51        | \$0.42 | \$0.35 | \$0.30 | \$0.25 |
|   | \$1,400  | \$0.47        | \$0.39 | \$0.32 | \$0.27 | \$0.22 |

Source: FRC

*Risks*

**We are initiating coverage on VM with a BUY rating and a fair value estimate of \$0.39 per share.** Note that our valuation is very conservative as we have not assumed any upside from the agreement with Chief Medical Supplies, which will potentially allow for the manufacture / sale of barium and iodine contrast agents. We have also not accounted for any upside from the company's iodine projects. We will update our models as the company advances its initiatives, allowing us to gain more visibility on key inputs such as timeline, product pricing, CAPEX, and manufacturing / operating cost.

We believe the company is exposed to the following key risks (not exhaustive):

- Exploration and development risks associated with the company's projects.
- An economic study has yet to be completed on the Frances Creek property. Metallurgical tests to date are preliminary in nature. VM is currently completing pharmaceutical lab testing.
- There is no guarantee the company will have the cost advantage it estimates.
- ImagingX' operations are in early stages; there is no guarantee of receipt of Health Canada approvals.
- The contrast agents' market is dominated by large players with an established customer-base, and sizeable marketing budgets.
- Access to capital and potential share dilution.

**We rate VM shares a risk of 5 (Highly Speculative).**

**Fundamental Research Corp. Equity Rating Scale:**

**Buy** – Annual expected rate of return exceeds 12% or the expected return is commensurate with risk

**Hold** – Annual expected rate of return is between 5% and 12%

**Sell** – Annual expected rate of return is below 5% or the expected return is not commensurate with risk

**Suspended or Rating N/A**— Coverage and ratings suspended until more information can be obtained from the company regarding recent events.

**Fundamental Research Corp. Risk Rating Scale:**

**1 (Low Risk)** - The company operates in an industry where it has a strong position (for example a monopoly, high market share etc.) or operates in a regulated industry. The future outlook is stable or positive for the industry. The company generates positive free cash flow and has a history of profitability. The capital structure is conservative with little or no debt.

**2 (Below Average Risk)** - The company operates in an industry where the fundamentals and outlook are positive. The industry and company are relatively less sensitive to systematic risk than companies with a Risk Rating of 3. The company has a history of profitability and has demonstrated its ability to generate positive free cash flows (though current free cash flow may be negative due to capital investment). The company’s capital structure is conservative with little to modest use of debt.

**3 (Average Risk)** - The company operates in an industry that has average sensitivity to systematic risk. The industry may be cyclical. Profits and cash flow are sensitive to economic factors although the company has demonstrated its ability to generate positive earnings and cash flow. Debt use is in line with industry averages, and coverage ratios are sufficient.

**4 (Speculative)** - The company has little or no history of generating earnings or cash flow. Debt use is higher. These companies may be in start-up mode or in a turnaround situation. These companies should be considered speculative.

**5 (Highly Speculative)** - The company has no history of generating earnings or cash flow. They may operate in a new industry with new, and unproven products. Products may be at the development stage, testing, or seeking regulatory approval. These companies may run into liquidity issues, and may rely on external funding. These stocks are considered highly speculative.

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