NI 43-101 TECHNICAL REPORT

ON THE

PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT BRITISH-COLUMBIA, CANADA

Latitude 50°44'20'' N, Longitude 116°25'26'' W

Prepared for:

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Disclaimer:

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1 SUMMARY

SGS Canada Inc. (“SGS”) was contracted by Voyageur Pharmaceuticals Ltd. (“Voyageur”) to complete a preliminary Economic Assessment (PEA) for the Frances Creek Barite Deposit (“Frances Creek deposit”) within the Frances Creek Property (the “Property”), located in British Columbia, Canada, including an update of the Mineral Resource Estimate.

The authors have prepared this report strictly in the role of independent qualified persons and our staff was not consulted as to the design of the data collection and analysis program.

The authors were contracted to review the project in 2020, years after the primary drilling program and did not witness the program execution; however, Voyageur representatives were open and forthcoming with documentation and datasets and at no time did the authors suspect the withholding of information. The authors are of the opinion that the data is sufficient and reasonable for an assessment of the project at this stage of exploration. None of the information provided has been specified as being confidential and not to be disclosed in this report.

1.1 Property Description and Ownership

The Voyageur Pharmaceuticals Ltd. Frances Creek barite project (also referred as the ‘’Frances Creek project’’ or the ‘’project’’) is located in the south-east portion of the province of British Columbia, in the Canadian Rocky Mountains, approximately 28 kilometres (straight line) northwest of the town of Radium Hot Springs. Hot Springs is located 144 km (straight line) SW of Calgary, AB. and 530 km (straight line) NE of Vancouver, B.C. The project area is located approximately at 50°44' 20" N 116°25' 26" W, NAD 83 UTM zone 11.

The Property is 100% owned by Voyageur Pharmaceuticals Ltd. The company also owns two additional barite properties, as can be seen on Figure 4-1.

1.1.1 Mineral Tenures, Surface Rights and Royalties

The Voyageur Pharmaceuticals Ltd. Frances Creek barite project area composed of three mining claims covering 838.6369 Ha. The Frances Creek Project Area is comprised of three mineral claims; the Frances Creek, Frances Creek2 and Frances Creek South claims. The claims are all joined together and comprise 838.6369 Ha in size, as shown on Figure 4-2. Individual areas of each property and the center points of the claim blocks using UTM coordinates: UTM Zone 11 – 540,855E 5,620,320N.

A listing of the individual claims is shown in Table 4-1. All registration fees for the claims are current.

Voyageur "went public" as a junior mining explorer focusing on industrial minerals projects, on the TSXV exchange in 4Q – 2016 (TSX-V:VM). Voyageur owns the claims, having acquired them from the former operator, Tiger Ridge Resources Ltd. (Tiger Ridge), a private company. Two of the principals of Voyageur are also principals of Tiger Ridge.

Tiger Ridge has retained a 3.5% net royalty on the milled barite sales price (includes a buy out clause), and a 3.5% net smelter return on any base or precious metals produced. (P.C. - B. Willis, 2018).

Mining claims in B.C. have no royalty to the government on production, nor are there any special mining taxes which must be paid.

1.1.2 Permits and the Environment

At the time of this writing, exploration and mining permits are in place on the Frances Creek Permit details.

The permit (MX-5-519 Mine# 1630108) is currently in year five of a 5-year Multi-Year Area-Based Permit authorizing exploration activities. Voyageur plans to reapply for a new 5-year permit.

1.2 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

Access from Calgary to Radium Hot Springs is 151 km westward on the Trans-Canada Highway to Hwy 93 turnoff, then southwards on Hwy 93 for 94 km to Radium Hot Springs. The entire distance is on paved all weather highways; accessible by 2-wheel drive vehicles except during winter storm conditions.

With respect to future underground mining operations, the lower elevations of this property can be accessed year-round when logging is operational. However, snow clearance would be required in the winter months when there is no logging activity. The upper elevations of the property will probably be inaccessible from November through mid - May.

Elevations in the region surrounding the properties range from ~ 800 m at Radium Hot Springs, to + 3900 m, on the mountain tops. Elevations at the properties range from ~ 1270 m to ~ 2400 m. The Frances Creek barite deposit is easily accessed from the Frances creek logging road. The deposit is within 100 m of the road and has ample area to set up mining and processing equipment. This road connects with the west side road and ore can be easily transported from the site.

Due to the large amounts of snow received each year, the Project Area has abundant water resources which can support either drilling or mine development. Several large perennial streams drain the near vicinity of each of the three properties. In the lower elevations of each of the three properties, there is ample room available to construct mine site facilities such as tailings ponds, jig plants, etc. should an economic mineral occurrence be delineated by future drilling operations.

1.3 History

The Frances Creek Barite Property was a virgin discovery, discovered by prospector Arthur Louie in 1989. No previous base metals or barite occurrences had been reported from the property. Mr. Louie optioned his claims to Mountain Minerals, Ltd. from 1990 - 1992. A small adit (now caved) was driven into the vein at the 1335 m level and minor drilling (helicopter borne) was undertaken on the upper outcrop areas of the vein. Mountain Minerals dropped the option in 1992.

During 2003, Tiger Ridge optioned the property from Mr. Louie. Tiger Ridge drilled the property in 2003 and 2005. The option was fully paid out in 2005 and the claims were then owned 100% by Tiger Ridge; the claims were converted into a single claim in 2007.

In 2012 Tiger Ridge leased the claim to Voyageur, for a future royalty (see Section 4.2). The claim is currently owned 100% by Voyageur. Between 2005 and 2016, the only exploration activity which occurred at the property was limited channel sampling. In Q3 of 2016, a 17 tonnes trench sample was excavated in the lower elevations of the property.

In 2Q and 3Q of 2017, a 1229.8 m - 25 holes drilling program took place at the property and the results of both Voyageur's outcrop sampling and both the historic and the 2017 drilling programs at the Frances Creek.

There have been no formal resource or reserve estimates prepared for the Frances Creek Property prior to this report. The Frances Creek Property has no past production history of any consequence.

1.4 Geology and Mineralization

The Frances Creek Property is located within the Omineca Geologic Belt, of British Columbia. The property is located at the eastern margin of the Belt, adjacent to the boundary of the Omineca and the Foreland Belt.

The Belts are separated from each other by a physiographic feature known as the Rocky Mountain Trench. The Trench is not shown on Figure 7-1, but it is located at the boundary of the two belts. The Trench is tens of km in width by approximately 1500 km in length and most of its length is coincident with the boundary of the Foreland-Omineca Belts, thus it would be difficult to show in Figure 7-1.

Except for the Foreland Belt, the belts shown in Figure 7-1 were scraped off the subducting Pacific Plate and affixed to the overriding North American Plate at the western edge of the North American continent, by a process known as accretion. Each belt of rocks represents a separate period of accretion.

The Foreland Belt formed by SW to NE compressive forces (also related to plate tectonic movement); it was not accreted on to the edge of the continent. This happened from about 100 - 50 million years ago and was accompanied by large scale over thrusting of the sediments above the basement crystalline rocks. The Rocky Mountain Trench was the youngest feature to form (about 60 - 50 million years ago). Modern earthquakes located along the trench may indicate that the orogenic forces that built the trench may be somewhat still active.

Barite mineralization at the Frances Creek Property occurs as a complex breccia vein which strikes NW and dips SW at about 40 degrees at the lower A Zone and 60 degrees at the upper B Zone (Figure 7-5). At the B Zone, drilling has shown that the breccia vein has a strike continuity of 150 m and an average dip continuity of 50 m (indicated) to 75 m (inferred) down the dip from outcrop. At the A Zone, drilling shows that the breccia has a strike continuity of 100 m, and an average dip continuity of 40 m (indicated) to 60 m (inferred) down the dip from outcrop. The 230 m zone between the A and B Zones has yet to be tested by drilling.

The breccia vein occurs in the upper plate of the Forster Creek Thrust Fault, in the SW portion of the Frances Creek Claim, and is sub parallel to the trace of the thrust which outcrops ~ 200 m to the NE. The breccia vein material fills a small fault which was probably caused by tensional forces related to thrust emplacement. The Barite Thrust (Figure 7-5) appears to act as an especially favorable host zone for barite mineralization emplacement Barite mineralization is also found as fracture fillings, in the other minor structures at the property however.

1.5 Deposit Type

Voyageur's Frances Creek Property can be loosely classified as "Carbonate Hosted Barite - replacement deposits. This is a rather catch-all term meaning that they are barite deposits hosted in carbonate (in this case dolomite) rock units. They can be further sub classified as "Irish Type MVT (Mississippi Valley Type) Pb-Zn-Ag-Ba rich" replacement deposits. However, on Frances Creek there are no metals associated with the property. More specifically, Voyageur's Frances Creek Property is sub classified using the B.C. Geological Survey system as Fracture Controlled.

1.6 Exploration

Voyageur became a public company in 1Q – 2017. Once funds were secured from the issue, Voyageur was able to initiate exploration work on the Frances Creek property. Prior to the 2017 drill program, almost, all exploration work undertaken on the property was by predecessor companies.

Prior to Voyageur's acquisition of the property, it was operated by Tiger Ridge, the immediate predecessor in title. Prior to that, the property was operated by Mountain Minerals, an industrial minerals exploration company (early 1990's).

The Frances Creek Property was operated by Mountain Minerals, Inc. from 1990 - 1992. Work undertaken by Mountain Minerals on the property in 1990 consisted of:

- Geological Mapping - 1/5000 scale
- Soils Geochemical Survey - lines - 50 m, samples - 25 m, 184 samples
- Exploration Trenching & Sampling - 4 total
- Work undertaken in 1992 on the property consisted of diamond Drilling - 304 m - 11 holes

Mountain Minerals work was reviewed by Tiger Ridge and was fundamental to their optioning the property. The knowledge base represented by Mountain Minerals work was instrumental in formulating Tiger Ridge's extensive drilling campaigns between 2000 and 2005. The soils geochemical survey was used to site several of Tiger Ridge's drill holes.

The soils geochemical survey was completed using industry wide procedures and parameters (these are still in use today). A baseline (800 m) which transected the long axis of the deposit was surveyed and marked in the field. Cross lines were turned off at 80 m intervals. Soils samples were collected from the B horizon along lines that were spaced 50 m apart. Sample interval was 25 m; a total of 184 samples were collected. The samples were bagged and shipped to International Plasma Laboratory in Vancouver for analysis by ICP. Barium was the only element analyzed for.

Tiger Ridge's 2002 - 2005 exploration work at the Frances Creek Property consisted of limited outcrop mapping and sampling, a geophysical survey, and drilling. Drilling parameters and results will be discussed in Section 10.

Voyageur conducted outcrop sampling and sampling of previously drilled core at the Frances Creek property in 2014. In 2015, Voyageur conducted an outcrop sampling campaign at the Frances Creek property. In 2016, Voyageur collected and partially processed a trench sample from the Frances Creek property.

The 2016 sampling program was supervised by Voyageur’s exploration team and consisted of collection of a bulk sample of 17 tonnes of barite breccia from the Frances Vein. The 17 tonnes sample was trucked to an off-site location and washed and crushed, then trucked to a second off-site location where it was ground to – 325 mesh. The powdered sample was drummed and was then shipped to ST Equipment and Technology in Needham, MA, USA, where it was tested in February 2017.

A total of 36 representative samples were collected from the 20 barrels shipment. Average barite purity of the bulk sample was 17.46% $BaSO_4$, Specific Gravity (SG) was not analyzed. Using the Barite Purity Curve, the SG of the bulk sample can be estimated at ~ 2.95.

The sample was shipped to ST Equipment and Technology in Needham, MA, USA, where a 5 tonnes sample was tested. ST Equipment has an electro-static separation machine that sorts mixed material by differing electrical properties. The objective of the test was to separate the powdered barite from the intermixed dolomite by using a dry method. Use of dry methods to clean the barite verses using a water-based jig method (proven technology) would eliminate the need for a tailings pond at the future mill, and hopefully improve recovery of barite.

There were three trench samples taken from breccia vein with samples #1 & #2 taken from the A Zone barite and sample #3 taken from the lower B Zone barite zone (Figure 9-3).

1.7 Drilling

Previous drilling was undertaken by both Mountain Minerals (1992) and Tiger Ridge (2003 – 2005) at the Frances Creek Property. The Mountain Minerals drilling at Frances Creek was apparently drilled down the dip of the vein and is not representative (P.C., Brad Willis, 2014). In addition, assay results from the 1992 campaign cannot be verified by lab certificates. Consequently, the data from the 1992 program could not be used in the resource model and thus was not used for this report.

Tiger Ridge drilled this property in 2003 and 2005, a total of 29 core holes were drilled from four separate platforms. Holes were drilled with a Diamec 251 diesel powered hydraulic wireline core drilling rig; core size was BQ - Wireline. A total of 1950.25 meters of core was collected during the two campaigns. Holes were drilled as arrays of drill fans, from prepared stations situated along a switch backing access road located about 30M to the SW of the outcrop of the vein.

The core from these holes was logged by the Voyageur's Exploration Manager, who was Tiger Ridge's exploration manager at the time. The core was logged for lithologic and structural data, but it was not assayed for SG (specific gravity). Detailed core examination resulted in visual estimates of percentage barite for prospective mining horizons.

Since Tiger Ridge was a private company, it did not have stringent resource reporting requirements such as Voyageur has. Consequently, there was no lab analyses performed on the drill core.

The 2017 holes were mostly collared in Zone B, as the barite breccia vein is thicker there. However, six of the 25 holes were collared in Zone A. A total of 1229.8 m of core was drilled during the campaign. In addition to the 25 holes that were drilled, three channel samples, totaling 13.9 m length were cut from backhoe trenches constructed across prominent zones where the barite breccia vein outcropped.

Zones were encountered within the vein with as little as 8.9% $BaSO_4$ over 8.9 m of core length and as high as 77.65% $BaSO_4$ over 2.9 m of core or 66.90% $BaSO_4$ over 17.2 m which were recovered during the 2017 drill program. The weighted average of all drill intercepts (2003 – 2005 – 2017) for the B Zone is 11.09m @ 41.2% $BaSO_4$ / 3.25 SG (calculated as for the resource estimation). The weighted average for the A Zone drill intercepts is 2.80 m @ 49.2% $BaSO_4$ / 3.40 SG.

The calculated true widths and assay results from the 2017 drill holes across the A, the B1 and the B2 Zones are as shown in Table 10-7.

1.8 Sample Preparation, Analyses, and Security

Loring Labs, an independent commercial analytical laboratory, was used as the laboratory for the samples taken for the 2014 and 2015 outcrop sampling campaigns, as well as for the samples taken during the 2017 drill campaign. Loring is an ISO 9001 certified lab. Three of the samples taken during the 2015 campaign were sent to SGS labs in Lakefield, ON, which is also an ISO 9001 certified lab. Both labs enjoy superb reputations for analytical accuracy and repeatability in the Canadian mining industry.

Samples were analyzed for Specific Gravity by the Le Chatelier bottle method, the official API recognized method for determination of SG for Barite. Samples were analyzed for Barium by gravimetric analysis using a fusion platinum crucible. Once the ppm value for Ba was obtained, % $BaSO_4$ was determined by a mathematical calculation (it was assumed that all the available SO_4 combined with the Ba to form Barite). Mercury content was determined by ASTM method D - 6722, which is a total mercury by direct combustion analysis.

Cadmium, lead, copper, silver and calcium analyses, as well as 39 other elements were determined by multi acid digestion - ICP methods. Soluble calcium was determined by the standard API test method to dissolve calcium and then by ICP to determine the amount of calcium dissolved.

The brightness – whiteness testing was done at SGS labs in Lakefield, ON., which is one of the only labs in Canada that does this type of work. The testing is a photovoltaic color analysis technique which measures the reflectance of light coming off of a powdered barite specimen. Several different readings are taken for each sample. Of these, the Hunter L value is the main brightness / whiteness number relied upon by the filler manufacturing industry to determine if a particular barite product makes specification. A Hunter L value of 94.0 or higher is usually required to make specification. The three samples tested from Frances Creek were all above 94.0, averaging at 94.37.

Each rock chip and core sample was prepared by:

- logging the sample into the Laboratory's tracking system (assigning the sample a unique bar code number)
- drying and weighing the sample
- fine crushing the sample to > 70% passing 2 mm
- splitting off a 250 g subsample
- pulverizing the sub sample to > 85% passing 75 microns

Loring Labs and SGS Labs are both certified laboratories. Loring is certified through the ISO 9001:2008 standard and SGS through the ISO/IEC standard. To obtain these certifications, a rigorous in-house system to prevent cross contamination between samples is in place. Elements of the system include the use of barren wash material between sample preparation batches and where necessary between highly mineralized samples, through cleaning of all glassware and the tracking of samples with high mineral values. To ensure quality control and quality assurance, the lab employs, on a routine basis, a program that uses blanks, duplicates and standards.

For the 2017 drilling in particular, SGS was able to find 31 duplicate Barite grades. Some duplicates are Gravimetric duplicates for gravimetric originals (26) and the other are some ICP duplicates for some gravimetric originals (5). Given that the 2017 campaign consists of only 87 assays, the amount of duplicates of 31 corresponds to 35% and that is much above the requirements. There are 7 duplicates with grades between 0 and 50% $BaSO_4$ (shown in Figure 11-1). There are 24 duplicates with grades between 70 and 100% $BaSO_4$ (shown in Figure 11-2). There are no duplicates of material in the 50 to 70% $BaSO_4$ range. All duplicates fit well within the +/- 10% margin of error except one with the original $BaSO_4$ being 48.1% and the second duplicate being exactly 1%. This result appears like a typo error in the certificate as this sample is expected to be above 1% $BaSO_4$.

In 2018, Henkle and Associates did a verification for the 2018 technical NI 43-101 report of the project.

ALS – Chemex Labs, of Reno, Nevada, USA was used as an umpire lab, to check Loring's work. Henkle and Associates sent a total of 14 samples to ALS for check testing. The samples submitted to ALS were pulps of the originals. This means that the crushing, splitting, grinding and other preparatory work prior to analysis was done at Loring Labs. Only the actual analysis work was done at the ALS umpire lab.

The authors are of the opinion that the samples taken are adequate for the purpose of this report which is to provide an independent assessment of Voyageur's Frances Creek Property, as well as an indication of the possible industrial grade quality of the barite from the Frances Creek Property. Sampling, sample prep and analyses techniques meet or exceed CIM standards. Security precautions as to sample integrity meet the standards of the industry.

1.9 Data Verification

As part of their verification process, the authors reviewed all geological data and databases, past public and technical reports, and reviewed procedures and protocols as practiced by the Frances Creek field and technical team. The Voyageur technical team provided all relevant data, explanations and interpretations.

In addition, as described below, the SGS team conducted its own site visit to better evaluate the veracity of the data. Yann Camus personally inspected the Property on October 27, 2020, accompanied by Sabry A. Abdel Sabour, Ph.D., Eng. Mining engineer and Mr. Brad Willis, P.Eng. and COO of Voyageur Pharmaceuticals Ltd.

SGS conducted verification of the laboratories analytical certificates and validation of the Project digital database supplied by Voyageur for errors or discrepancies. All the digital assay records were checked against the laboratory assay certificates. Verifications were carried out on drill hole locations (i.e. collar coordinates), down hole surveys, lithology, SG, trench data, and topography information. All errors found in the database were fixed and before using the data for any resource estimation procedures.

The authors of this report had access to all available core, data and could visit all the site without limit. It is the authors' opinion, that the project data is adequate for the purposes of this report and can be used for the resource estimation.

1.10 Mineral Processing and Metallurgical Testing

1.10.1 2018 Metallurgical Testing (Henkle, 2020)

In June and July of 2018, Voyageur initiated a laboratory metallurgical testing program for the Frances Creek Prospect. The purpose of the test program was to simulate the acid wash process, to see if the mineralized Frances Creek barites could be upgraded by relatively low-cost acid wash techniques. Additional acid testing is planned for the near future. The additional testing will be used to determine the optimal acid types and treatments to produce the most beneficial metallurgical results.

Loring Labs recovered splits from 18 previously assayed core samples from storage. The splits were pulverized and then prepared for assay. Prior to assay, the samples underwent a simulated acid wash. After the acid wash, the samples were assayed by ICP analysis for the Whole Rock and ICP 30 assays and by gravimetric analysis for the $BaSO_4$% assay. The techniques use are listed below:

1. 10% HCl Leach – 20.0 of reserved sample from previous assays were submerged in 10% HCl solution and brought to a boil on hotplate for approx. 30 minutes. All samples were then filtered and washed out with hot distilled water to remove all remaining HCl and allowed to dry in low temp oven to remove moisture only.
2. Post-leach sample then underwent digestion via fusion digestion – 0.2 g sample mixed evenly with lithium metaborate and incinerated at 900 C (turning sample into a fused molten button), dissolved into solution in 5% nitric acid. Solution was then submitted to ICP-OES for Whole Rock and ICP 30 element packages. Silica % was characterized separately via a gravimetric method, and Loss on Ignition was done by burning off the solid sample at 900 C.

   Fusion digestion method was used for post-leach samples since it allows for better recovery in strontium.

   It is worth noting that near-total digestion method was used originally for pre-leach samples. This is done by digesting 0.5 g of the solid sample overnight in HF, and then working it up with Aqua Regia, and then submitted to ICP for ICP 30 Element.
3. $BaSO_4$ % was characterized by gravimetric method for both pre- and post-leach samples. There was no change in methodology used.

The 10% HCL leach was a reasonable lab scale test to simulate an industrial scale acid leach. The post leach assays give a reasonable picture of the effectiveness of the leach process when compared to the original assay results from the 2017 drill program testing. The results of the test are shown in Table 13-1, Table 13-2, Table 13-3, and Table 13-4.

The acid leach (simulated acid wash) testing was successful, in that it showed that $BaSO_4$ % increased (0.7% Avg) slightly, due to dissolution of Fe_2O_3, $CaCO_3$ and other acid soluble components. It also showed a marked decrease in Fe_2O_3 from an average of 0.31% to an average of 0.01%, which is well below the limit for all the higher end markets. Likewise, $CaCO_3$ % was reduced to an average of 2.3% (too high for the paint grade market limit of 0.5%), to less than 0.5% for all 18 samples.

It was impossible to compare before and after results for $SrSO_4$%, as the digestion method was not the same for the two assay runs. What the analyses did show though was that for the acid treated samples, $SrSO_4$% will meet paint grade specifications of < 3.5%. The average of 2.395% $SrSO_4$ for the 18 samples is just below the 2.5% cutoff for pharmaceutical grade barite. Half of the samples returned assays above and half below the cutoff. This means that the Blanc Fixe (AKA – Black Ash Process) precipitation technique will probably have to be used to produce a consistent product for the pharmaceutical market.

Gravity separation testing (jigging and tabling) is planned for the next phase of the project, Strontium assaying of the concentrates produced by this testing should be part of the test. It is possible that the crystalline barite may lose strontium during the gravity concentration process. This is because the SG of pure $BaSO_4$ is 4.5, while the SG of pure $SrSO_4$ is 4.0 (11% lower).

It was impossible to compare before and after results for Heavy metals, as the digestion method was not the same for the two assay runs.

In conclusion, the lab scale metallurgical testing program indicated that conventionally milled barite concentrates from Frances Creek should be able to be sold into the paint grade markets using only acid washing as an advanced metallurgical processing technique. The more expensive Blanc Fixe precipitation technique should not be necessary to access these markets.

Blanc Fixe techniques (AKA – Black Ash Process) will probably be required in order to produce pharmaceutical grade barite from the Frances Creek prospect however.

The acid tests reported on above are initial tests. Voyageur is in the process of testing multiple types of acids with various strengths. Upon completion of all acid testing, more advanced conclusions can be arrived at as to the methodology of using acid to high grade the barite concentrates for paint, filler and pharmaceutical markets.

1.10.2 2021 SGS Test on Beneficiation of Barite Ore from the Frances Creek Deposit

Bench-scale tests including gravity separation, acid washing, fine grinding, and solid-liquid separation were conducted on a composite representative of a high-grade barite sample from the Frances Creek deposit, as part of an economic evaluation of the deposit's potential for production of purified synthetic barite. Twenty-three TOMRA mineral sorting products were crushed to pass nominal 6 mesh (3.36 mm) and assayed for barium, strontium, whole rock, ICP-MS, and mercury. From these results, in consultation with the client, nine products were selected and blended to form a high-grade barite master composite. The "Master Comp" sample was crushed to pass nominal 10 mesh (1.7 mm), subsampled for chemical analyses, and split into 10 kg test charges. The full suite of chemical analyses of the Master Comp is presented in Table 13-8.

The testing flowsheet initially included: screening into three size fractions, with the finest fraction exiting as tailings; gravity upgrading then primary acid washing of the two remaining fractions; homogenization of the acid-washed fractions; and micronizing of two fractions (D_{50} 9-11 µm and D_{50} 1-2 µm), followed by secondary acid-washing, then solid-liquid separation testing of each fraction. However, the flowsheet was adapted to that described in Figure 13-2 following to the generation of excess fines in the initial acid-washing stage. This flowsheet was optimized using bench-scale equipment.

In preparation for gravity upgrading, the Master Comp was screened into three size fractions (+500 µm, -500/+75 µm, and -75 µm) which were then assayed. Barite grades were similar across all fractions (86.9%, 90.7%, and 89.1% barite in the +500 µm, -500/+75 µm, and -75 µm fractions, respectively) showing that barite does not preferentially report to a specific size fraction.

The coarse +500 µm fraction was upgraded using a Wilfley Table, collecting two initial concentrates, a middlings product, and a tailings product. The middlings product was repassed over the table producing additional concentrate, middlings, and tailings products. Products were assayed and recombined to form a high-grade sample (95.6% $BaSO_4$), a mid-grade sample (93.3% $BaSO_4$), and a final tailings product (48.6%

$BaSO_4$). The +500 µm high-grade and mid-grade samples were then submitted for primary acid washing for tests.

The finer -500/+75 µm fraction was also upgraded using a Wilfley Table, with the first pass producing one concentrate and one tailings product. The tailings product was repassed over the Wilfley Table, from which additional concentrate, middlings, and tailings products were collected. A high-grade (96.9% $BaSO_4$) sample and a low-grade (85.9% $BaSO_4$) sample were formed by compositing the gravity upgrading products and each was submitted as feed for acid washing tests.

Two acid-washed samples were submitted for HIGMill® fine grinding testwork: a +500 µm Mid-Grade Residue and -500/+75 µm High-Grade residue. The samples were ground in a laboratory rod mill and sized. The tests targeted P_{50} of ~1-2 µm and used RIMAX Zirpro Ceramic media with a diameter of 100% 1-2 mm and specific gravity of 3.90. A signature plot was produced for each of the two samples and results are summarized in Table 1-1. Further testing is required for grinding efficiency improvement.

Table 1-1: Summary of HIGmill® Signature Plot Results

Stage	Parameter	Sample	
		+500 µm Mid-Grade L2 Residue	**-500/+75 µm High-Grade L1A Residue**
Feed	F_{80} (µm)	89.1	58.8
	% Passing 10 µm	17.5	16.9
Product	P_{50} (µm)	1.6	1.8
	Specific Energy Requirement (kWh/t)	69.2	86.6

Acid washing was conducted at two points in the flowsheet using the same conditions for all tests: 20% w/w solids, 10% w/w hydrochloric acid solution, 90°C, and 24 hours duration. The primary acid washing tests showed more weight loss (6.6 - 15.7%) than the secondary stage (-0.5 - 7.9%) showing that most product impurities (primarily calcium and magnesium) were removed in the first acid washing stage. The secondary acid washing stage served as a polishing stage, where iron accounted for most of the removed impurity. The final products of secondary acid washing were bright white in colour.

The final acid-washed products were submitted to SGS Life Sciences for barite product purity analyses using the USP reference standards. All products passed all USP requirements giving final product purities of 99.8% and 100.3% $BaSO_4$ for the coarser high- and mid-grade samples, respectively, and 99.0% and 97.8% $BaSO_4$ for the finer high- and low-grade samples, respectively. A summary of the results is presented in Table 1-2.

Table 1-2: Summary of Product Purity Analyses

Test	Method	Parameter / Specification	Final Leach Product Results			
			L5 +500 µm High-Grade	**L6 +500 µm Mid-Grade**	**L7 -500/+75 µm High-Grade**	**L4 -500/+ 75 µm Low-Grade**
Elemental Impurity Screening by ICP-MS	USP <232>	V (ppm)	0.2535	0.2184	0.2927	0.2663
		Cr (ppm)	0.5485	0.6971	1.4731	1.0256
		Co (ppm)	0.0321	0.0830	0.0765	0.0173
		Ni (ppm)	0.0215	0.0507	0.0391	0.0122
		Cu (ppm)	1.8094	1.5937	1.8916	0.7963
		As (ppm)	0.1652	0.3495	1.0708	0.0943
		Se (ppm)	0.1370	0	0.074	0.0112
		Mo (ppm)	0	0.2923	0.0128	0
		Ru (ppm)	0.0002	0.0003	0.0013	0.0004
		Rh (ppm)	0.0007	0.0011	0.0009	0.0007
		Pd (ppm)	0.0020	0.0048	0.0053	0.0033
		Cd (ppm)	0.0003	0	0.0003	0.0003
		Os (ppm)	0.0015	0.0033	0.0011	0.0013
		Ir (ppm)	0	0	0	0
		Pt (ppm)	0.0011	0.0021	0.0016	0.0012
		Hg (ppm)	0.0096	0.0563	0.0068	0.0204
		Th (ppm)	0.0005	0.0027	0.0014	0.0008
		Pb (ppm)	0.0737	0.1804	0.2337	0.0396
		Li (ppm)	0	0.0250	0.0252	0.7177
		Sn (ppm)	0	0	0	0
		Ag (ppb)	0.0004	0.0101	0.0045	0.0014
		Sb (ppm)	0	0	0	0
		Ba (ppm)	n/a	n/a	n/a	n/a
		Au (ppm)	0.4386	0.5472	0.4101	0.4868
Identification A	USP <191>	Tests for Sulphate	Pass	Pass	Pass	Pass
Identification B	USP <191>	Tests for Barium	Pass	Pass	Pass	Pass
pH	USP <791>	3.5 - 10.0	Pass	Pass	Pass	Pass
Limit of Sulphides	USP	NMT 0.5 µg/g	Pass	Pass	Pass	Pass
Limit of acid-soluble substances	USP	NMT 0.3%	Pass	Pass	Pass	Pass
Limit of soluble barium salts	USP	NMT 0.001%	Pass	Pass	Pass	Pass
Assay	**USP**	**97.5 - 100.5%**	**99.8% Pass**	**100.3% Pass**	**99.0% Pass**	**97.8% Pass**

Slurry from tests L6 (+500 µm Mid-Grade) and L7 (-500/+75 µm High-Grade) were combined to form one sample for solid-liquid separation testing. Testing included feed sizing and characterization, flocculant scoping, static settling tests, dynamic thickening tests, and both vacuum and pressure filtration tests. The solid-liquid separation test composite sizing was d_{80} of 14.4 µm and d_{50} of 9.15 µm with a specific gravity of 4.50. A high molecular weight slightly cationic polyacrylamide flocculant was used in the test program. Liquor clarity was hazy even using a large thickener unit area and flocculant dosage. The sample was amenable to vacuum filtration, resulting in a sticky cake texture and moisture content ranging from 31.5% to 34.2%. Pressure filtration was also favourable, resulting in a lower solids throughput than vacuum filtration but a lower cake moisture content ranging from 13.2% to 15.6% with a generally dry-to-touch texture.

1.11 Mineral Resource Estimate

SGS' objective was to do a database validation and mineral resource estimate on the deposit. SGS Geological Services (SGS) carried a capping study on $BaSO_4$. The reviewed mineral resource estimate was developed by SGS using the SGS Genesis software resource estimation software.

Completion of the current Mineral Resource Estimate involved the assessment of a drill hole database, which included all data for drilling, a three-dimensional (3D) grade-controlled wireframe model, a pit design, review of the classification of the mineral resource estimate (Measured, Indicated and Inferred) and review of available written reports.

The final database contains 57 drill holes and 3 channels totalling 3,106.12 m. The length of the channels ranges from 2.5 to 8.4 m and the drill holes range from 18.29 to 122.53 m in length. There are 169 assays varying from 0.15 to 18.3 m in length and from 0.22 to 99.09 %$BaSO_4$. Finally, there are 100 lithology intervals.

The lidar topographical surface for the Project is very detailed and was verified as being very reliable. The collars elevation for the drill holes were compared to this surface with some differences for some drill holes.

All samples were composited to 2.5 m "calculated lengths" composites. This method of compositing makes composites as close to 2.5 m as possible but do not leave a "remainder". A minimum of 0.25 m was considered. The actual shortest composite is of 1.52 m, the longest is of 3.33 m.

The density of the material is highly variable given that the country rock is about 2.8 but the $BaSO_4$ is about 4.4. The assays in the database contain both the $BaSO_4$ grade and the Specific Gravity (SG). As a way to verify the data and establish the relationship between the grade and the SG, SGS plotted the data for the different years of the drilling and cam up with the Figure 14-6. SGS estimates that the 2017 data is the most reliable to establish the relationship between the grade and the SG. Also, the established relationship is very close to a "theoretical" relationship from a two-phased material. The relationship found and used for the resource estimation is therefore:

$$SG = 2.828 + 0.0000009404*(BaSO_4)^3 - 0.000030963*(BaSO_4)^2 + 0.010623107*BaSO_4$$

This formula implies that a barren rock would have a SG of 2.828 and a 100% $BaSO_4$ rock would have a SG of 4.52. This is reasonable for the resource estimation.

For this project, the overburden was set at a density of 2 and the waste rock at 2.828.

Since density is directly linked to the $BaSO_4$ values, a formula was used for the density in the blocks after having estimated the grade:

Block size used 5 x 5 x 5m. Block fractions were used so the blocks have a "percent block" variable between 0 and 1 to account for incomplete blocks partly inside the mineralized volumes. Any block touching the mineralized volumes were estimated. The block model has a rotation of 60 degrees counter clockwise to conform to the shape and orientation of the orebodies.

The chosen size of blocs considers the open pit mining method with some benches of that size.

Inverse Distance squared (IDS) was used to estimate the block model (BM) grades. SGS carried out a grade limited interpolation on the deposit mineralised envelope and BM using the same parameters for the 3 estimation passes: minimum number of samples: 3, maximum number of samples: 5, maximum number of samples per drill hole: 2. There were 3 successive estimation passes : pass 1 with a search ellipsoid of

20 x 20 x 5m, pass 2 with a search ellipsoid of 40 x 40 x 10m; and pass 3 with a search ellipsoid of 80 x 80 x 30m). A regular search pattern was used instead of octants. Hard boundaries were used for all 3 solids.

SGS used an inferred and indicated categories for this deposit. The problems found in the database are the reason for not estimating any as measured at this stage. While the laboratory certificates are available for the database and therefore the grade is well established for the most part, there are a few possible imprecisions on the location and orientation of the drill holes and is hard to validate with available data. Also, the drilling pads are still in the field but the identified collars are not available in the field to confirm the exact location and orientation of the collars.

The Mineral Resource Estimate presented in this Technical Report was prepared and disclosed in compliance with all current disclosure requirements for mineral resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the current Mineral Resource Estimate into Indicated and Inferred is consistent with current 2014 CIM Definition Standards - For Mineral Resources and Mineral Reserves, including the critical requirement that all mineral resources "have reasonable prospects for eventual economic extraction".

Table 1-3 describes the Frances Creek mineral deposit resources at the base case estimated economical cut-off grade (COG).

Table 1-3: Frances Creek Deposit Mineral Resource Estimate, Base Case at a COG of 10 % $BaSO_4$, Effective Date January 11, 2022

Classification	Zone	Tonnes	% BaSO4	Density	Tonnes of BaSO4
Indicated	A	17,500	34.7	3.20	6,100
	B (B1+B2)	197,300	35.2	3.21	69,500
	Total	**214,800**	**35.2**	**3.21**	**75,600**
Inferred	A	4,700	35.8	3.21	1,700
	B (B1+B2)	129,500	33.8	3.19	43,700
	Total	**134,200**	**33.9**	**3.19**	**45,400**

(1) Effective date for the new resources is January 11, 2022.

(2) The independent QP for this resources estimate is Yann Camus, P.Eng., SGS Geological Services Inc.

(3) The base case is reported at a cut-off grade of 10 % $BaSO_4$.

(4) Open pit mineral resources are reported at a base case cut-off grade of 10 % $BaSO_4$ within a conceptual pit shell. Cut-off grades are based on a barite price, barite mining and processing recovery and mining and processing cost.

(5) The resources are presented in-situ and without dilution.

(6) Block fraction was applied to the mineral resources.

(7) Mineral resources that are not mineral reserves do not have demonstrated economic viability. The quantity and grade of reported Inferred Resources in this Mineral Resource Estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured. However, based on the current knowledge of the deposits, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

(8) This Resource Estimate has been prepared in accordance with CIM definition (2014).

(9) The density used for each block is based on grade and the following formula:

$$2.828+(0.0000009404*(BaSO_4)^3) - (0.000030963*(BaSO_4)^2) + (0.010623107* BaSO_4)$$

(10) A variable $BaSO_4$ capping grade was used by removing 10% of the grade on assay with lengths >5 m and resulting in an overall reduction of 5% of the barite content.

(11) Total may not add due to rounding.

1.12 Mining Methods

The proposed mining method is conventional open- pit truck and loader mining. Mineralized rock and waste would be ripped with a dozer, loaded by a loader into off-highway articulated dump trucks and hauled to the crushing, grinding, and sizing plant, ROM stockpile and waste rock dumps.

The initial 9-year pit was built around the Upper A zone falling within defined wire frame or mineralized shell. To guide the author to create the pit design, the drill points were loaded into the open pit design software.

The resource model identifies two distinct zones, classed as Upper and Lower. The initial 9-year pit was designed to keep all the mining to the upper portion only. It was decided to mine this area first due to the highest drilling density and in order to minimize the visual impact of the mining. Additionally, all the mineralized barite processing facilities will be located at the foot of the mountain and the waste material at nearby gulley, so this will minimize haul distances early in the life of the mine.

The pit slope has been designed at 52° wall angle. The main haul road is designed at a width of 10 m., which provides sufficient width for one-way haul traffic, ditch and a safety berm. The maximum grade of the haul roads is 10%.

Due to the consistency of $BaSO_4$ grades throughout the mineralized zone, it is the qualified person's opinion that traditional economic analyses of the pit limit are not meaningful as every block in the model has similar values. The overburden removal required is minimal.

There is a high efficacy of visual distinction between material constituting ore and waste for the entire mineralized zones within the defined wireframe or shell and waste can be mined separately without grade control through block mining practices.

The preliminary pit design is shown in Figure 1-1. A more detailed pit design will be done in future studies.

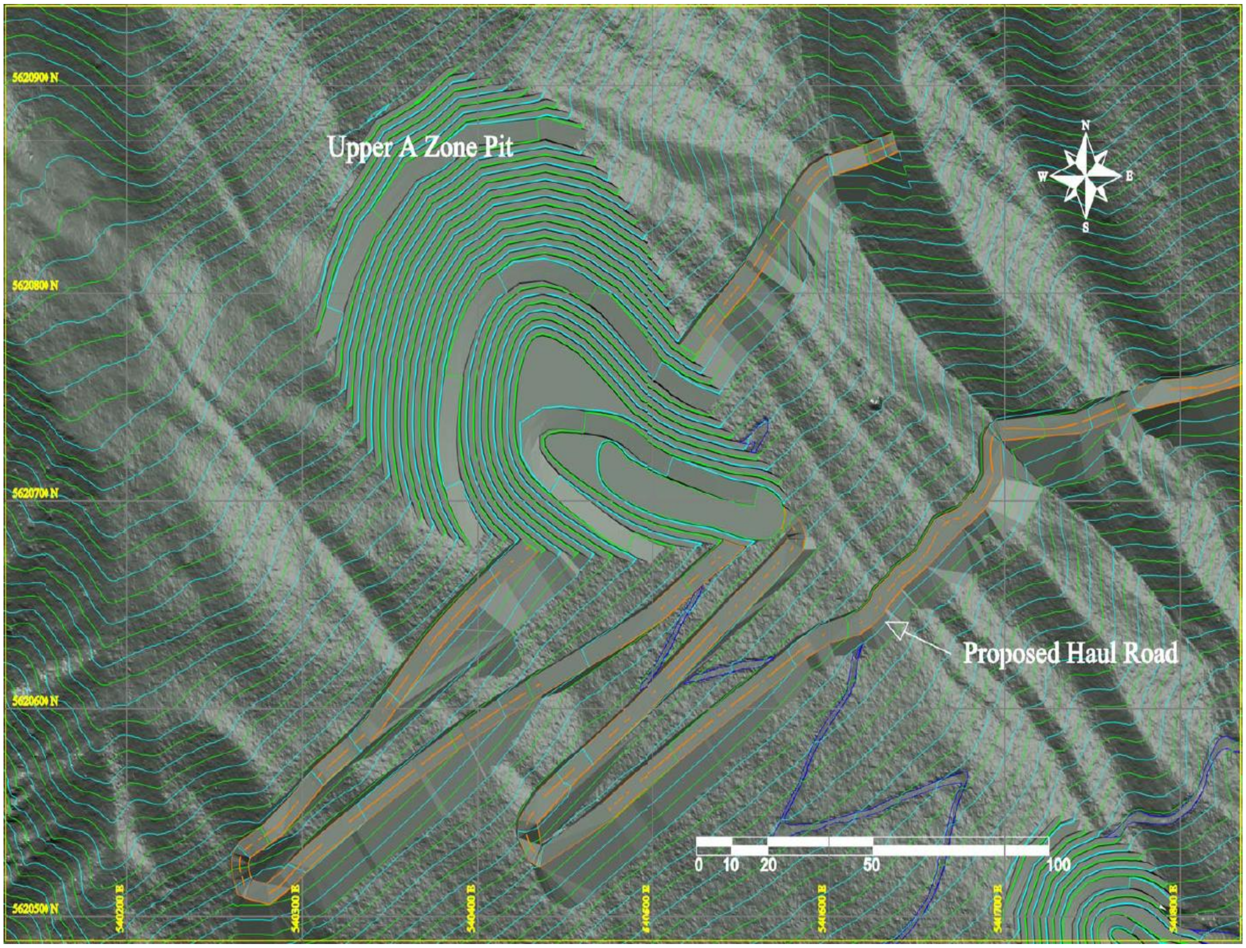


Figure 1-1: Preliminary Pit Design

1.13 Recovery Methods

The crushed and sorted mine ore that has been reduced in size to less than 2 mm will be delivered to the process plant and stockpiled. The dry crushed ore will be ground in a primary mill to a size less than 1.7 mm, and then conveyed to the gravity separation area. The ore will then be screened and separated into oversize, middling and undersize fractions. Water will be added to each fraction to form a slurry.

Oversize and middling slurries will be fed to vibrating gravity separation tables, and the undersize slurry will be sent to tailings disposal. Concentrate slurries from the oversize and middling gravity separation tables will be combined and then thickened from 30% to 50% solids. The thickened concentrate slurry will be fed to the secondary grinding area, and ground to an average particle size of 10 microns. Tailings from the gravity separation tables will be sent to tailings disposal.

The finely ground concentrate will then be fed to an acid wash/leach area where it will be combined with a heated 10% hydrochloric acid solution for removal of impurities. The slurry containing insoluble barium sulphate solids will then be fed to a filter press area where the filter cake will be collected and then fed to the concentrate dryer area. The dried barium sulphate concentrate will be stored in a bin, and then packaged for shipment.

Tailings disposal will consist of solids separation from the slurries by vacuum belt filter, placement of dewatered filter cake in a tailings storage facility and return of filtrate to the concentrating process.

1.14 Project Infrastructures

Infrastructure to support mining and processing activities (i.e., office, temporary shop, wash car, security / first aid and generator house & haul road (main ramp) currently do not exist on site. A detailed description of Voyageur plans in respect of project infrastructure is outlined in Section 18.

1.15 Market Studies and Contracts

In the 2014 report, Voyageur contemplated exploring for and operating all three of their properties to produce drilling grade barite for the oil industry in the Western Canadian Basin.

The lab testing program undertaken for the 2014 Technical Report showed that the barite occurrences at the Frances Creek property were very high density and low in contaminants. The barite fraction of the breccia vein was nearly pure barite; very likely industrial grade. Industrial Grade barite (pharmaceutical grade, chemical grade and paint grade) has a much smaller market than drilling grade barite, but it also commands a significantly higher price.

The October 2020 price for pharmaceutical barite FOB Qingdoa China is ~ US$ 4,760/tonne for large orders (CAD$5,950/tonne) (prices supplied by Voyageur Pharmaceuticals Ltd.).

The current market for industrial grade barite in the US is ~ 400,000 tonnes - mostly sourced from China. Reportedly, there are quality problems with much of the imported barite, and most US and Canadian end users would be amenable to purchasing a high-quality product from a North American mine (PC - B. Willis, 2018).

1.16 Environmental Studies, Permitting and Social or Community Impact

Voyageur currently has a permit to conduct exploration activities for the Frances Creek Property delivered by Ministry of Energy and Mines of British-Columbia. The permit (MX-5-519 Mine# 1630108) is currently in year five of a 5-year Multi-Year Area-Based Permit. Voyageur plans to reapply for a new 5-year permit. See section 4.3 for detailed information. There are no other permits required until Voyageur will apply for an industrial mineral quarry mining permit. After completion of the bulk sample, Voyageur will have to complete an industrial mineral quarry application and then an environmental and social impact study will be required.

A Preliminary Field Reconnaissance Report have been carried out in 2018 by Tipi Mountain Eco-Cultural Services Ltd. (TMECS) for the Frances Creek barite exploration project. On May 17th, 2018, a non-permit archaeological assessment was completed on the Frances Creek property. TMECS recommended that no additional inspections, investigations or archaeological resource management work are required for the proposed exploration areas, provided that development plans are not altered to extend beyond the areas assessed under their study.

In June 2017, Voyageur sent a total of six samples to Maxxam Analytics for acid drainage testing. A total of four samples (AC#1 to AC#4) composed of dry coarse rock were analyzed for Acid Base Accounting (ABA) testing, for Aqua Regia Metals testing, and MEND SFE testing. The results did not show a potential for acid rock drainage for theses samples.

1.17 Capital and Operating Costs

Table 1-4 shows a summary of initial capital expenditures for the project.

Table 1-4: Summary of Initial Capital Expenditures

Description	Capital
Mining and On-Site Processing	3.82M
Process plant	13.18M
Process Plant Infrastructure	5.36M
Bottling Facility	2.96M
Subtotal Direct Costs	25.3M
Indirects	1.85M
Engineering and project management	3.70M
Provisions and Owners' costs	1.31M
Contingency	4.26M
Subtotal Indirect Costs	11.2M
Grand Total Project Capital	36.4M

- Mining operating costs average $4.28 per tonne for all tonnes.
- Processing costs including on-site Allgaiers processing and off-site processing including haulage costs amount to $357 per tonne of 93% Barium Sulphate.
- Total G&A costs amount to $169 per processed tonne.

1.18 Economic Analysis

Project economics were generated based on market penetration assumptions for the pharmaceutical products that Voyageur Pharmaceuticals is planning on producing. Final contrast media pricing is current as of November 2021. Note that this preliminary economic assessment is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the preliminary economic assessment will be realized.

Market penetrations of the pharmaceutical products for the North American and European markets are assessed at 30%. Industrial sales of Barium Sulphate (98.3%) are assessed at 100% sales, and the remaining material is expected to be sold as drilling products at 91% Barite.

Table 1-5: Parameter and Economic Results (After Tax)

Parameter	
USD: CAD Exchange Rate	0.80
Discount Rate	8%
Pharmaceutical Sales (Life of Project)	$1,022 Million
Bulk Sales (Life of Project)	$326 Million
Drilling Mud Sales (Life of Project)	$14 Million

Economic Results (After Tax)	
Cash Flow (Life of Project)	$626M
NPV @ 8% (CAD $M)	$344M
IRR	137%
Payback Period	11 Months

1.19 Conclusions and Recommendations

1.19.1 Mining Methods and Infrastructures:

We recommend the following for the mining methods and Infrastructures:

1. A large flat surface for mine offices, mineralized barite processing, parking, auxiliary equipment, etc. has already been constructed by a timber company to aid in timber harvest which coincided with the project claim boundaries. An as-built survey is required to establish the area for the above-mentioned infrastructures.
2. In support to the next phase of work for the PFS study, geotechnical work is to be undertaken to refine the pit slope design and hydrological work be undertaken to characterize the surface and ground water regimes as they pertain to ground stability and pit pumping requirements.
3. In the next level of study, water resources shall be identified such as the perennial streams that drain within the property to be able to quantify and design a water collection facility for domestic and processing water use.
4. Access roads to the property are already constructed, but they will require some delayed maintenance attention prior to initiation for mining activity. The needed road upgrade shall be identified in a map format to be able to provide the capital cost for road required upgrade to government standards.

It is recommended that Voyageur take this project to the next stage of development by undertaking the 2-phase work program discussed further.

A full LIDAR survey of the project area should be completed at a level of detail sufficient for future pre-feasibility or feasibility studies.

A drill program should be conducted to determine the geotechnical and hydrogeological conditions at the deposit site for use in future studies and permitting activities. A few twin drillholes should be done on both mineralized zones to confirm the grade and purity of the barite. Emphasis should be on the QAQC and smaller samples to help assess the small-scale variability of the deposit.

1.19.2 Bulk Sampling

A 10,000 tonne Bulk Sample of mineralized material should be collected and used to confirm the applicability of on-site densimetric sorting. This sample should be collected as soon as permits allow Lab testing to support this activity should be by a USP certified lab.
Metallurgical Testing – This part of the program can be designed to be supplemental to the two sampling projects mentioned above. The entire metallurgical circuit – crushing, screening, jigging, tabling and grinding, needs to be tested and thoroughly understood. The goal of this activity is to fully understand the metallurgy of the mineralization at the prospect.

The final product from the metallurgical tests above should also be processed at a contract facility, and final pharmaceutical products generated. These final products should be used to assess and develop a final marketing study to be used at pre-feasibility and feasibility study stages.

1.19.3 Proposed Budget

The budget estimate for a 2 Phase work plan was prepared as part of this report, in order to move the Frances Creek Prospect towards production. A synopsis of the work plan / budget proposed for the next phase of the project follows:

Table 1-6: Phase 1 – Work Plan and Budget

PROPOSED WORK – PHASE 1	ESTIMATED COST
Continued Exploration	
LIDAR Survey	$ 50,000
Hydrogeology / Geotechnical / Twin Drilling	$ 400,000
Subtotal	$ 400,000
Bulk Sampling and Pre-Feasibility Study	
10,000 Tonne Bulk Sample	$ 400,000
Metallurgical Testing	$ 100,000
Pre-Feasibility Study and Lab Work	$ 500,000
Subtotal	$ 1,000,000
Total - PHASE 1 – Exploration and Pre-Feasibility	$ 1,450,000

Table 1-7: Phase 2 – Work Plan and Budget

PROPOSED WORK – PHASE 2	ESTIMATED COST
Product Development - Pharmaceutical	
Barium Contrast Formulation	$ 50,000
FDA / Health Canada Application	$1,500,000
Product Marketing	$ 75,000
Total – PHASE 2 – Product Development	$ 1,625,000

Both Phase 1 and Phase 2 are proposed by the authors for the next stage of the project. Both authors of this report acknowledge that the project is still at a relatively early stage. However, both authors believe that it is appropriate to move the project into the pre – feasibility and product development stage once funding is accomplished. The total funds required for Phases 1 and 2 is CAD $ 3,075,000.

2 INTRODUCTION

SGS Canada Inc. ("SGS") was contracted by Voyageur Pharmaceuticals Ltd. ("Voyageur") to complete a Preliminary Economic Assessment (PEA) for the Frances Creek Barite Deposit ("Frances Creek deposit") within the Frances Creek Property (the "Property"), located in British Columbia, Canada, and to prepare a technical report written in support of the Mineral Resource Estimate. The reporting of the Mineral Resource Estimate complies with all disclosure requirements for Mineral Resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the updated Mineral Resource is consistent with current CIM Definition Standards - For Mineral Resources and Mineral Reserves (2014).

This report was prepared for Voyageur Pharmaceuticals Ltd. (formerly Voyageur Minerals Ltd.). Voyageur Pharmaceuticals Ltd. (Voyageur) is a publicly listed exploration company on the TSX Venture Exchange. In 2017, Voyageur commenced a diamond core NQ drilling program on the Frances Creek Property to explore the known barite along the B zone and A zone. The purpose of the drilling was to delineate a resource of barite near surface. Operations began in late June and ended in mid-October of 2017. A total of 1229.8 m of core drilling was completed. The main focus of drilling was on the high-grade barite zone named the B zone located between elev. 1480 m and 1600 m at the property.

During drilling, all of the core was logged onsite by Bradley Willis P.Eng. and Katelynne Brown consulting geologist. William R. Henkle, P. Geol., visited the Frances Creek project site approximately ½ way through the 2017 drilling program. During the visit, William R. Henkle reviewed mapping, drilling, and sampling protocols and also re-logged two drill holes.

The authors of this report are Independent Qualified Persons as defined in section 1.5 of National Instrument 43-101.

2.1 Terms of References

The present report is being prepared according to National Instrument 43-101 guidelines for mineral deposit disclosure and describes historic works, mineralization types and mineral potential of the project. Recommendations are presented for further exploration works.

This technical report will be used by Voyageur Pharmaceuticals Ltd. in fulfillment of their continuing disclosure requirements under Canadian securities laws, including National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101"). This technical report is written in support of a Preliminary Economic Assessment (PEA) completed for Voyageur Pharmaceuticals Ltd.

Voyageur Pharmaceuticals Ltd. may use this Technical Report to satisfy disclosure and filing requirements of Canadian securities regulators. The effective date of the Technical Report is of January 11, 2022.

2.2 Sources of Information

The results shown in this report are based on numerous sources of data provided both by Voyageur, and its predecessor in title to the claims, Tiger Ridge. These include the logs and accompanying assay reports of 22 core holes drilled from 2003 and 2005 at the Frances Creek property, as well as assay results of production run samples taken at Tiger Ridge's mill between 1999 and 2003. This data was acquired between 1998 and 2005, by Tiger Ridge, the previous operator of the projects. The assay work for the 2003 and 2005 Frances Creek core holes however, was undertaken in August and September, 2014, as part of the baseline work for an earlier Technical Report. The assay work for this report was conducted at the same lab as for the earlier reports. The analyses were conducted at Loring Laboratories in Calgary, AB., an ISO 9001 certified laboratory.

Other archival data which originated with Tiger Ridge includes geologic and engineering maps, numerous rock and soils geochemical assays, etc. which cover the Project Area.

2.3 Site Visit

Yann Camus ("Camus") personally inspected the Property on October 27, 2020, accompanied by Sabry A. Abdel Sabour, Ph.D., Eng. Mining engineer. Camus examined several core holes, and accompanying drill logs and assay certificates. Assays were examined against drill core mineralized zones. Camus inspected the offices, core logging facilities/sampling procedures and core security. See section 12.1 for the details about the site visit.

No independent sampling has been done since barite was evident, visible to the eye in the field and in the core.

2.4 Currency, Units, Abbreviations and Definitions

Units of measurement used in this report conform to the SI (metric) system. All currency in this report is CAN dollars (CAN$) unless otherwise noted. The coordinate system used in this report is NAD83 / UTM Zone 11, Northern Hemisphere.

Table 2-1: List of Abbreviations

%	Percent sign
°	Degree
°C	Degree Celsius
°F	Degree Fahrenheit
cm	Centimeters
g	Grams
Ga	Billion years
COG	Cut-off Grade
g/t	Gram per metric tonne
ha	Hectares
ICP-MS	Inductively coupled plasma mass spectrometry
ICP-OES	Inductively coupled plasma optical emission spectrometry
kg	Kilograms
km	Kilometers
µm	Micrometers
m	Meters
Ma	Million years
MRE	Mineral Resource Estimation
mm	Millimeters
N, S, E, W	North, South, East, West
NAD	North America Datum
NQ	Drill core size (47.6 mm in diameter)
NTS	National Topographic System
ppb	Parts per billion
ppm	Parts per million
SG	Specific Gravity
SGS	SGS Canada Inc. Geological Services
SGS Lakefield	SGS Minerals Services Lakefield Facility
tonne or t	Metric tonne
t/m^3	Tonne per cubic meter
UTM	Universal Transverse Mercator

3 RELIANCE ON OTHER EXPERTS

The authors prepared this report strictly in the role of an independent qualified persons and our staff was not consulted as to the design of the data collection and analysis program.

The authors were contracted to review the project in 2020, years after the primary drilling program and did not witness the program execution; however, Voyageur representatives were open and forthcoming with documentation and datasets and at no time did the authors suspect the withholding of information. The authors are of the opinion that the data is sufficient and reasonable for an assessment of the project at this stage of exploration. None of the information provided has been specified as being confidential and not to be disclosed in this report.

This report is based on the information provided by Voyageur and previous exploration consultants (including Henkle and Associates), both verbal and documented, and on the writer's personal evaluation at Voyageur's project site. The authors have reviewed and confirmed the accuracy and fair representation of all technical information provided by Voyageur including geological notes, surface maps, geophysical data etc., (Willis, B. P.C. and Voyageur, Exploration Files (various dates)).

Based on what has been reviewed of the 2017 drilling and analytical records and discussions with those in attendance of the 2014 analytical work, the authors are satisfied that the exploration programs conducted at the Frances Creek Property of Voyageur followed CIMM best practices for the exploration and evaluation of mineral occurrences.

Other experts used in this study include a PEA level assessment of geotechnical conditions by GCI Geotech Consulting, and Dash Consulting, LLC and GSN Dreamworks Inc for market penetration and pharmaceutical projections. Voyageur management staff for section 19 Environmental, Permitting and Social.

AVL Labs provided capital and operating costs for the handling and bottling of pharmaceutical products.

3.1 Ownership and Permitting Data

Based on the fact that significant drilling programs took place as recently as Q2 – Q3, 2017 and that the permits are both still active and have been expanded at the Frances Creek property, SGS believes there are no significant environmental liabilities attached to the Frances Creek Property. However, SGS has not contacted British Columbia mine permitting authorities to determine if there are any known environmental liabilities associated with the properties; we take Mr. Willis at his word with respect to these issues (P.C. - B. Willis, 2021).

SGS is aware (from review of on line BC governmental data), that Voyageur owns the mining claims in good standing and has been told, that Voyageur has obtained an independent, legal opinion as to the prior ownership of the concessions and their registration with the appropriate governmental authorities (P.C. - B. Willis, 2018).

This limited disclaimer only applies to Item 1 and also section 4.2 of this report.

4 PROPERTY DESCRIPTION AND LOCATION

The following description of Property Description and Location has been extracted from previous technical report.

The Property area is located in the south-east portion of the province of British Columbia, in the Canadian Rocky Mountains, approximately 28 kilometres (straight line) northwest of the town of Radium Hot Springs. Hot Springs is located 144 km (straight line) SW of Calgary, AB. and 530 km (straight line) NE of Vancouver, B.C. The Property is 100% owned by Voyageur Pharmaceuticals Ltd. The company also owns two additional barite properties, as can be seen on Figure 4-1.

Figure 4-1: Property Location Map

4.1 Property Description, Ownership and Royalty

The Voyageur Frances Creek Barite Property is composed of three contiguous mineral claims. The property is 838.63 hectares (composite) in size, as shown on Figure 4-2. Using degrees of Latitude and Longitude, the centre of the claim block which comprises the property is located at 50°44' 20" N 116°25' 26" W, NAD 83 UTM zone 11. All registration fees for the claims are current.

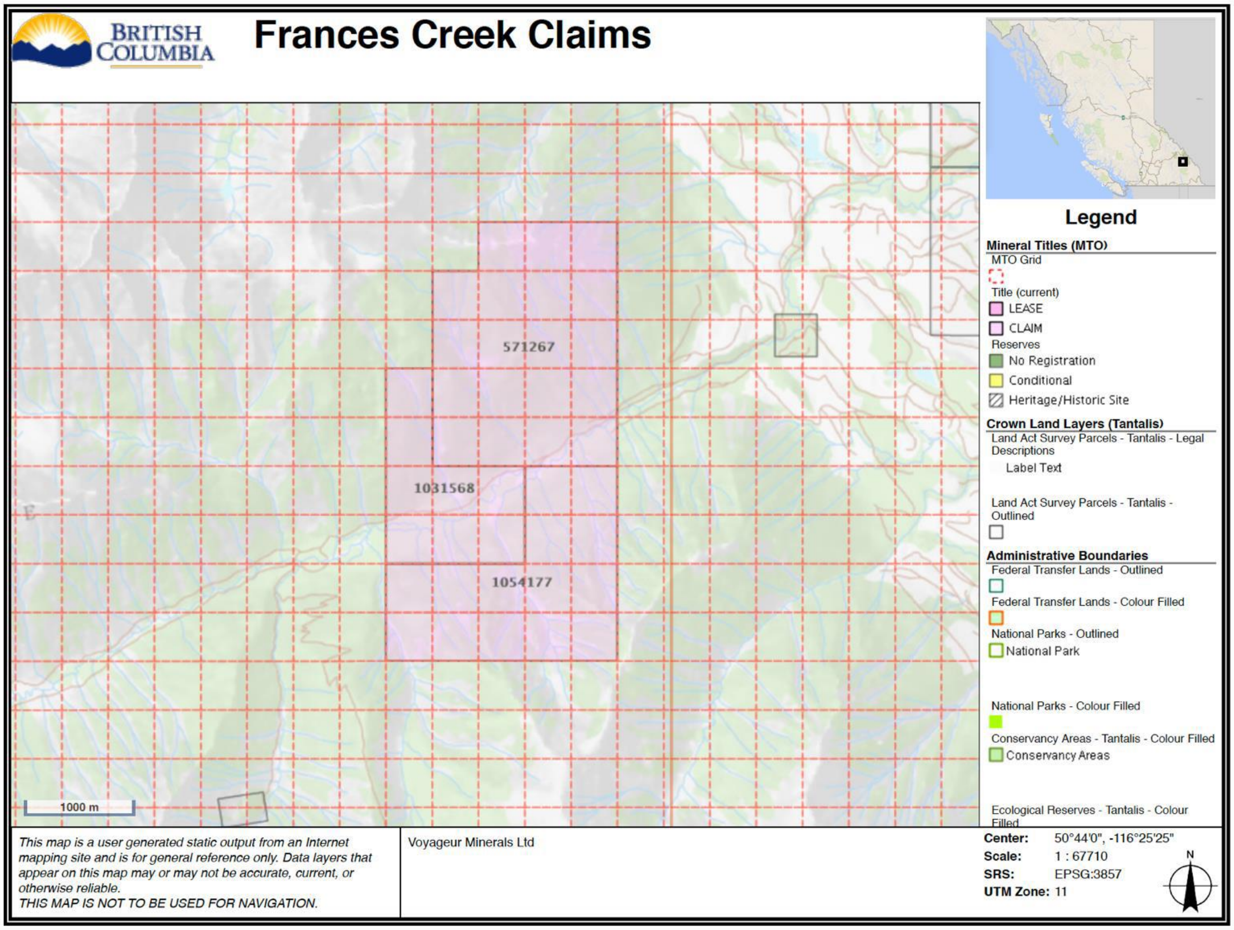


Figure 4-2: Property Land Tenure Map

Table 4-1: Property Claim Data

Title Number	Claim Name	Owner	Issue Date	Expiration Date	Area (ha)
571267	FRANCES CREEK	278693 (100%)	2007/DEC/04	2027/NOV/15	388.5473
1054177	FRANCES CREEK SOUTH	278693 (100%)	2017/AUG/21	2028/AUG/21	286.4331
1031568	FRANCES CREEK2	278693 (100%)	2014/OCT/14	2027/NOV/15	163.6565

4.1.1 Ownership History and Royalties

The claims listed above which make up the three property areas are 100% owned by Voyageur. Title to the claims was transferred from Tiger Ridge to Voyageur on September 16, 2013 (P.C. - B. Willis, 2018).

Tiger Ridge has retained a 3.5% net royalty on the milled barite sales price, and a 3.5% net smelter return on any base or precious metals produced from the properties (P.C. - B. Willis, 2018).

Mining claims in B.C. have no royalty to the government on production, nor are there any special mining taxes which must be paid.

4.2 Underlying Agreements

Claims are granted on a discovery priority basis, on government owned land, by the B.C. Ministry of Energy and Mines, for exploration, exploitation, beneficiation, auxiliary services and transportation. A mining claim grants its holder the right to explore and exploit minerals within its area and the key characteristics include:

- Claims are exclusive, freely transferable and mortgageable
- Location is based on a UTM grid system of min 21 ha to max of 21,000 ha.
- Granted on a first-come, first-served basis
- Indefinite term but with restrictions with respect to annual payments or assessment work requirements to maintain title to the claim

Section 8 of the B.C. Mineral Tenure Act Regulation describes registering exploration and development for a claim. The value of exploration and development required to maintain a mineral claim for one year is $5.00 per hectare during each of the first and second anniversary years, $10.00 per hectare for each of the third and fourth anniversary years, $15.00 per hectare for each of the fifth and sixth anniversary years and $20.00 per hectare for subsequent anniversary years. Payment Instead of Exploration and Development; the cost is double the work requirement, $40.00 per hectare. For mineral it is also double the work requirement, $10.00 per hectare for anniversary years 1 and 2, $20.00 per hectare for anniversary years 3 and 4, $30.00 per hectare for anniversary years 5 and 6; and $40.00 per hectare for subsequent anniversary years.

SGS has restricted our review of the Mineral Rights held by Voyageur to checking the individual license boundaries on plans to those depicted on the Mining Claims. No legal review of the validity of the process went through to obtain the Mining Claims.

4.3 Permits and Environmental Liabilities

At the time of this writing, exploration and mining permits are in place on the Frances Creek Permit details.

The permit (MX-5-519 Mine# 1630108) is currently in year five of a 5-year Multi-Year Area-Based Permit. Voyageur plans to reapply for a new 5-year permit.

4.3.1 Multi-Year Area-Based Permitting

The Mines Act (section 10(3)) provides the Chief Inspector of Mines (and delegated inspectors) with the authority to set the length of term for permits issued under section 10. Multi-Year Area-Based (MYAB) permitting is the practice of authorizing exploration activities, typically for up to five years within identified activity area(s) underlain by the mineral or coal tenure area of the project. Proponents have the flexibility to execute exploration programs over the entire area and through the life cycle of the authorization as field results and market conditions dictate.

Inspectors authorize annual activities on the site by reviewing and accepting a MYAB Work Program Annual Update that outlines planned activities for the coming year and an Annual Summary of Exploration Activities (ASEA) that outlines the activities conducted over the previous year.

The use of MYAB permitting remains at the discretion of the inspector based on the nature of the proposed work, including the geographic or geologic conditions of the work area, the inspectors experience with the proponent and wildlife or other values on the land base. Applicants should work closely with inspectors to determine whether MYAB permitting makes sense for their specific situation.

Initial permitting for the prospect is in the form of a 5 year multi-year permit, which allows for all exploration work. A bulk sample of up to 10,000 tonnes production can be applied for additionally as well as an exploration drift. These are additional applications that fall under the MYAB permit. Upon completion of the bulk sample a full mining permit will be applied for. These take approximately one year each to obtain and require a second permitting campaign. Figure 4-3 is a map of the MYAB permit area at the prospect.

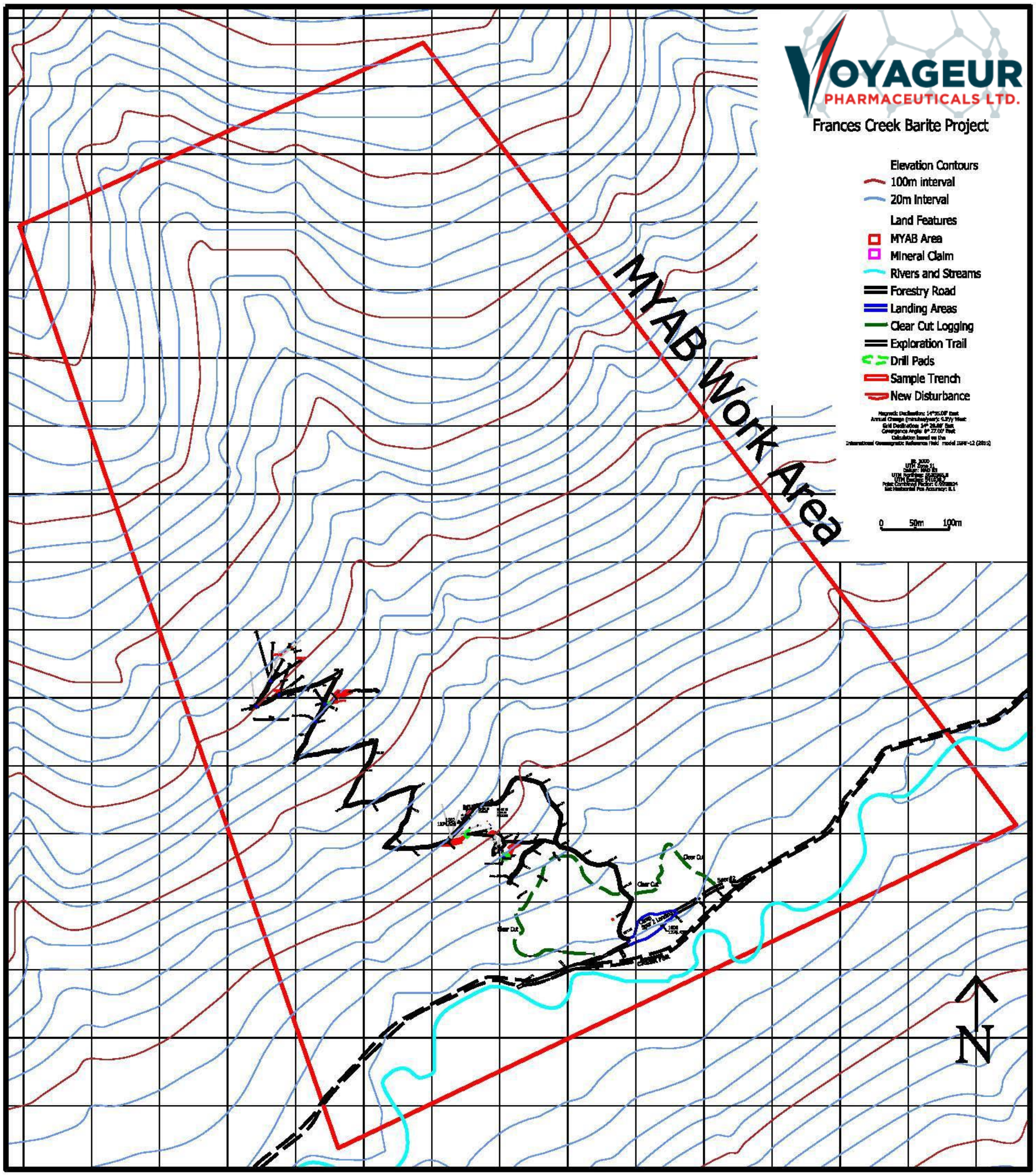


Figure 4-3: MYAB Permit Area – Frances Creek Property

At the present time, the authors are not aware of any environmental liabilities at either of the prospects that may either preclude or slow down the permitting process.

4.4 Other Significant Factors and Risks

Some risks are discussed in the interpretation and conclusions item of this report. No other significant factors and risks are identified.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The following section has been extracted from previous technical report.

5.1 Accessibility

Voyageur's Frances Creek barite property is located in the Columbia Mountains physiographic province of British Columbia. The property is located within a 50 km radius of the town of Radium Hot Springs, B.C. Radium Hot Springs is located 144 km (straight line) SW of Calgary, AB. and 530 km (straight line) NE of Vancouver, B.C. (Figure 4-1).

Access from Calgary to Radium Hot Springs is 151 km westward on the Trans-Canada Highway to Hwy 93 turnoff, then southwards on Hwy 93 for 94 km to Radium Hot Springs. The entire distance is on paved all weather highways; accessible by 2-wheel drive vehicles except during winter storm conditions.

Access to the Frances Creek property from Radium Hot Springs is via unpaved logging roads. First, travel 9 km west on the "Horsethief Creek Road"; then 25 km north-northwest on the "Westside Road"; then, turn west-southwest for 1.8 km on the "Lead Queen - Frances Road"; then turn west on the Frances Creek Forestry road and travel 6 km to the site (travel time ~ 45 min.). To this point, the roads, which are traveled regularly by logging trucks, can be navigated by a 2-wheel drive vehicle during non-snow/non-mud conditions (4-wheel drive is recommended however).

The outcrop zone of the Frances Creek barite deposit is found from elevation 1332 m to 1600 m along an erosional spur which is located on the SE face of Horeb Mountain. Access to the outcrop zone is via a steep switchback road constructed by a backhoe. This road was upgraded in Q-2, 2017 to allow access for a drill rig. The road is now accessible either by a 4X4 pickup truck or preferably, by a quad off terrain vehicle.

With respect to future underground mining operations, the lower elevations of this property can be accessed year-round when logging is operational. However, snow clearance would be required in the winter months when there is no logging activity. The upper elevations of the property will probably be inaccessible from November through mid-May.

Table 5-1: Physical Access Details

Property	From	To	Dist.	Direction	Via	Time	Elev. (m)
Creek	Radium HS	Lead Queen Rd	34 km	NW	gravel	25 min	800 - 1050
	LQ & Fr Ck Road	Fr Ck Access Rd	7.8 km	WSW	gravel	20 min	1050 - 1300

5.2 Topography and Physiography

Elevations in the region surrounding the properties range from ~ 800 m at Radium Hot Springs, to + 3900 m, on the mountain tops. Elevations at the properties range from ~ 1270 m to ~ 2400 m. The Frances Creek barite deposit is easily accessed from the Frances creek logging road. The deposit is within 100m of the road and has ample area to set up mining and processing equipment. This road connects with the west side road and material can be easily transported from the site. Table 5-1 shows access information to the property in tabular format.

The Project Area is located in the central region of the Western Cordillera physiographic province of North America. The Sub province in which the property is situated is the Purcell Range of the Columbia

Mountains. The topography of the property can be characterized as steep, rugged, forest covered mountains, drained by a small intermittent stream.

Frances Creek to which the property drains is part of the Columbia River drainage basin. The Columbia eventually drains south into the US, and empties into the Pacific Ocean at Astoria, Oregon.

5.3 Climate

Climatologists assign a continental climate (inland) to the Southern Canadian Cordillera, in which Voyageur's Frances Creek Property, (the Project Area) is located. The climate in the Project Area is classified under the Koppen climate classification system as "Dfc" or a "cold, snowy forest climate with no distinct dry season and short, cool summers" (Gadd, 2009).

Elevations within the Project Area range from ~ 900 m at Radium Hot Springs to + 1600 m. This is a mountainous region, so weather conditions are altitude dependent. Higher elevations experience cooler temperatures and more rain and snow, than do lower elevations.

Continental climates are marked by a wide range of temperature variation over the year, 36° to 40° C variation between summer highs and winter lows are normal. Data from Environment Canada show that Radium HS (elevation 899 m) receives 424 mm precipitation yearly with 111 cm as snow; while Wapata Lake (elevation 1646 m) receives 884 mm precipitation yearly with 479 cm as snow (Gadd, 2009). Snow accumulations of 3 - 6 m in the higher portions of the three properties should be expected.

Snow season is normally from early November to early May. Voyageur's properties will be seasonal operations for exploration.

5.4 Local Resources and Infrastructure

Over many years, the timber industry has constructed an existing network of well-maintained haul roads in the Project Area. Access roads to the property are already constructed, but they will require some delayed maintenance attention prior to initiation of drilling or mining activity. A large logging landing was recently constructed at the lower entrance to the property. This provides a sizeable flat area suitable for mine and mill buildings (as yet unconstructed). This landing area was constructed by the timber company – it’s presence will result in a modest reduction in the capex for the project.

Haulage on mine owned/maintained roads will vary from approximately 1/2 km, and then logging roads and paved highways will be used for haulage. The nearest barite mill is located in Lethbridge, AB, some 225 straight line km SE of the Project Area.

Due to the large amounts of snow received each year, the Project Area has abundant water resources which can support either drilling or mine development. Several large perennial streams drain the near vicinity of each of the three properties. In the lower elevations of each of the three properties, there is ample room available to construct mine site facilities such as tailings ponds, jig plants, etc. should an economic mineral occurrence be delineated by future drilling operations.

6 HISTORY

The following section has been extracted from previous technical report.

Barite has been produced in British Columbia since 1940. Prospectors and geologists have been searching for barite in British Columbia since at least the mid 1930's. This persistent prospecting activity has resulted in the discovery of numerous barite occurrences. By 1997, the BC Geological Survey had located and described 188 barite deposits of various size and types throughout the province (Butrenchuk and Hancock, 1997).

6.1 Recent Ownership and Operational History

Most of the barite occurrences/deposits in the province are associated with base metals occurrences, where the barite mineralization (typically 15% - 65% by volume) occurs with the base metals mineralization in the same vein or bed. After World War II, intense oil and gas drilling in the Western Canadian Sedimentary Basin began. Prior to the war, barite was considered a gangue (waste) mineral that was associated with the base metal ores. After the war, barite production as a bi-product and often as a primary product started on a small to medium scale from several base metals mining properties. The American Petroleum Institute (API) created guidelines and specifications for barite in the 1980’s. As a result of these new industry standards, barite could have only 1 ppm mercury (Hg) and only 3 ppm cadmium (Cd) associated with it. This new specification eliminated the majority of vein barite properties in North America.

6.1.1 Frances Creek Property

The Frances Creek Barite Property was a virgin discovery, discovered by prospector Arthur Louie in 1989. No previous base metals or barite occurrences had been reported from the property. Mr. Louie optioned his claims to Mountain Minerals, Ltd. from 1990 - 1992. A small adit (now caved) was driven into the vein at the 1335 m level and minor drilling (helicopter borne) was undertaken on the upper outcrop areas of the vein. Mountain Minerals dropped the option in 1992.

During 2003, Tiger Ridge optioned the property from Mr. Louie. Tiger Ridge drilled the property in 2003 and 2005. The option was fully paid out in 2005 and the claims were then owned 100% by Tiger Ridge; the claims were converted into a single claim in 2007.

In 2012 Tiger Ridge leased the claim to Voyageur, for a future royalty (see section 4.2). The claim is currently owned 100% by Voyageur. Between 2005 and 2016, the only exploration activity which occurred at the property was limited channel sampling. In Q3 of 2016, a 17 tonnes trench sample was excavated in the lower elevations of the property.

In 2Q and 3Q of 2017, a 1229.8m - 25 hole drilling program took place at the property and the results of both Voyageur’s outcrop sampling and both the historic and the 2017 drilling programs at the Frances Creek Property will be discussed in greater detail in Items 9,10, 11, 12 and 14 of this report.

6.2 Historical Resources and Reserves

The maiden resource estimate on this project has been prepared Henkle and Associates in 2018. The current report updated this resource estimation.

6.3 Production

The Frances Creek Property has no past production history of any consequence.

7 GEOLOGICAL SETTING AND MINERALIZATION

The following section has been extracted from previous technical report.

7.1 Regional Geology

Voyageur's Frances Creek barite property is located in the central region of the Western Cordillera physiographic province of North America. Specifically, in the Columbia Mountains physiographic province of British Columbia.

As can be seen in Figure 7-1, the Frances Creek Property is located within the Omineca Geologic Belt, of British Columbia. Each geologic belt (often synonymous with the term "Terrane") contains a separate suite of rocks with a separate geologic history than the adjacent belt. The property is located at the eastern margin of the Belt, adjacent to the boundary of the Omineca and the Foreland Belt.

The Belts are separated from each other by a physiographic feature known as the Rocky Mountain Trench. The Trench is not shown on Figure 7-1, but it is located at the boundary of the two belts. The Trench is tens of km in width by approximately 1500 km in length and most of its length is coincident with the boundary of the Foreland-Omineca Belts, thus it would be difficult to show in Figure 7-1.

Except for the Foreland Belt, the belts shown in Figure 7-1 were scraped off the subducting Pacific Plate and affixed to the overriding North American Plate at the western edge of the North American continent, by a process known as accretion. Each belt of rocks represents a separate period of accretion, the Omineca Belt having been accreted before the Intermontane Belt, and so on. This happened from about 220 - 140 million years ago.

The Foreland Belt formed by SW to NE compressive forces (also related to plate tectonic movement); it was not accreted on to the edge of the continent. This happened from about 100 - 50 million years ago and was accompanied by large scale over thrusting of the sediments above the basement crystalline rocks. The Rocky Mountain Trench was the youngest feature to form (about 60 - 50 million years ago). Modern earthquakes located along the trench may indicate that the orogenic forces that built the trench may be somewhat still active.

The depositional age of the Foreland Belt rocks is considerably younger than the depositional age of the Omineca Belt rocks. The Foreland Belt rocks are known as the "Middle Carbonate Unit"; predominately composed of limestone, dolostone and shale. The Middle Carbonate rocks are Middle Cambrian to Permian in age (513 to 250 million years), (Gad, 2009).

The Omineca Belt Rocks of the western Project Area (Frances Creek property) are known as the "Old Clastic Unit" These rocks are predominately composed of grit stone, slate, hardened till and quartzite, with minor limestone and dolostone. The limestones and dolostones were deposited towards the top (younger portion) of the sequence. The Old Clastic rocks are Neoproterozoic to Early Cambrian in age, from 458 to 513 million years (Gad, 2009).

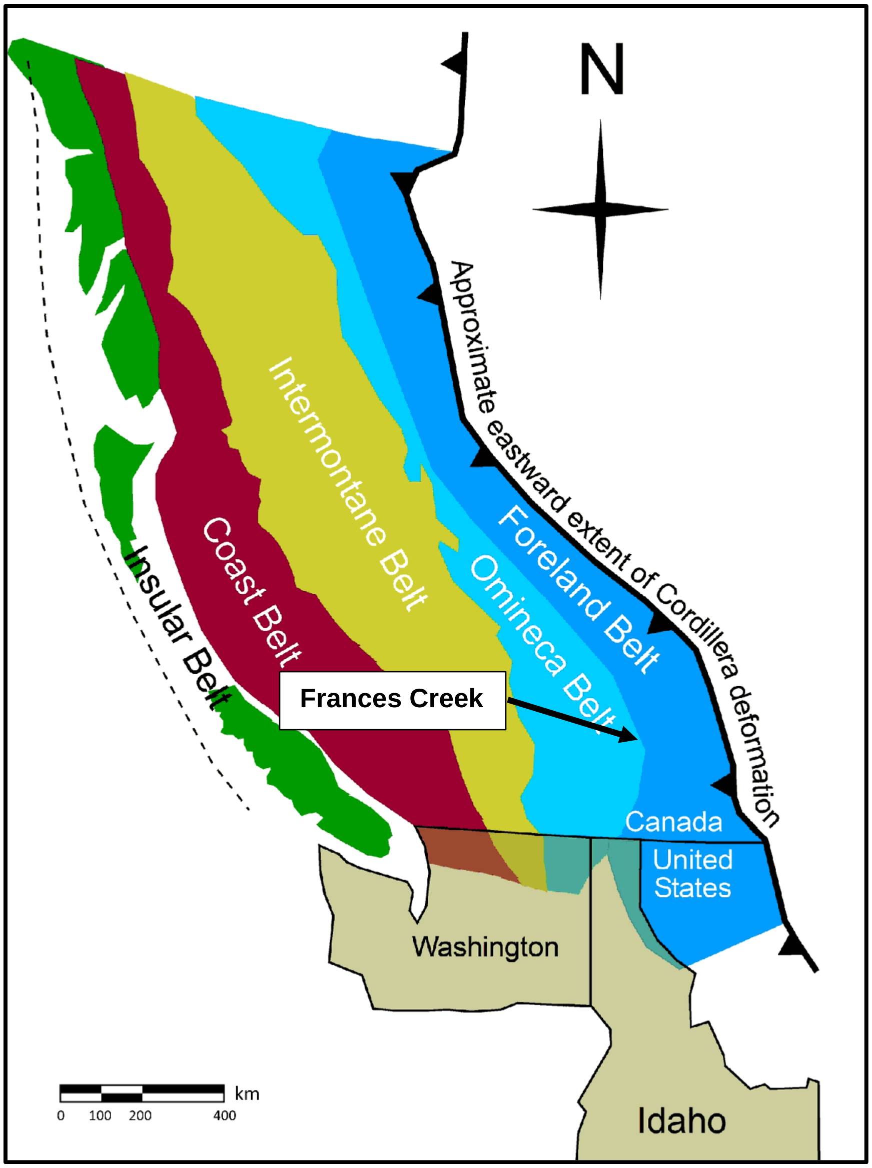


Figure 7-1: Property Location (approx.) vs. Geologic Belts – Western Canadian Cordillera (after Digital Geology of Idaho)

The above statements are generalized in nature, and that there is some mixing of the rock units along the boundary of the Omineca and Foreland Belts. For example, at the Jubilee Mountain Property, units that straddle the Cambrian - Ordovician boundary are found; likewise, the same Cambrian - Ordovician units are found near the Pedley Mountain property. The two properties are located on opposite sides of the Rocky Mountain Trench, the boundary of the two belts.

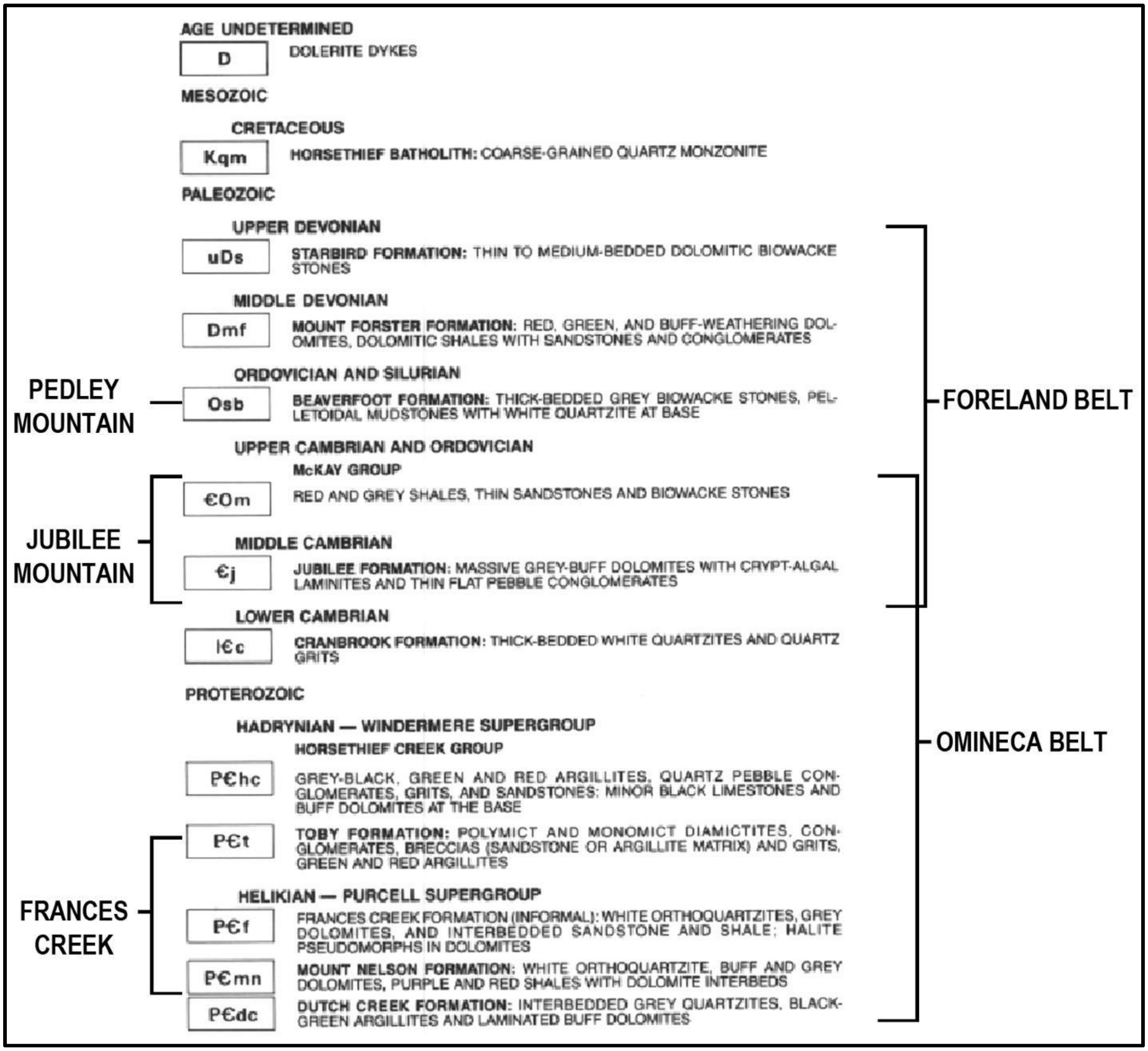


Figure 7-2: Age Relations of Formations – Voyageur Project Area (modified from Pope, 1990)

The dominant structural geologic feature in both the Foreland and the Omineca Belts are thrust faults. The thrusts in the Omineca Belt are somewhat steeper and do not displace the rock units to the east as far as the thrusts do in the Foreland Belt. Some thrust faults in the Foreland Belt have displaced strata in the hanging wall as much as 140 km (Gadd, 2009).

7.2 Prospect Scale Geology

7.2.1 Frances Creek Property Geology

The Frances Creek Property is located along the eastern edge of the Omineca Geologic Belt, about 7 km east of the Rocky Mountain Trench Fault. Formations from two major Systems of the Precambrian Eon are found at the property. Both Purcell (Helikian System) and Windemere (Hadrynian System) Supergroup formations outcrop. The Purcell Supergroup rocks range in age from 1600 Ma to 850 Ma; the Windermere Supergroup rocks range in age between 850 Ma - 542 Ma (Wikipedia, 2014).

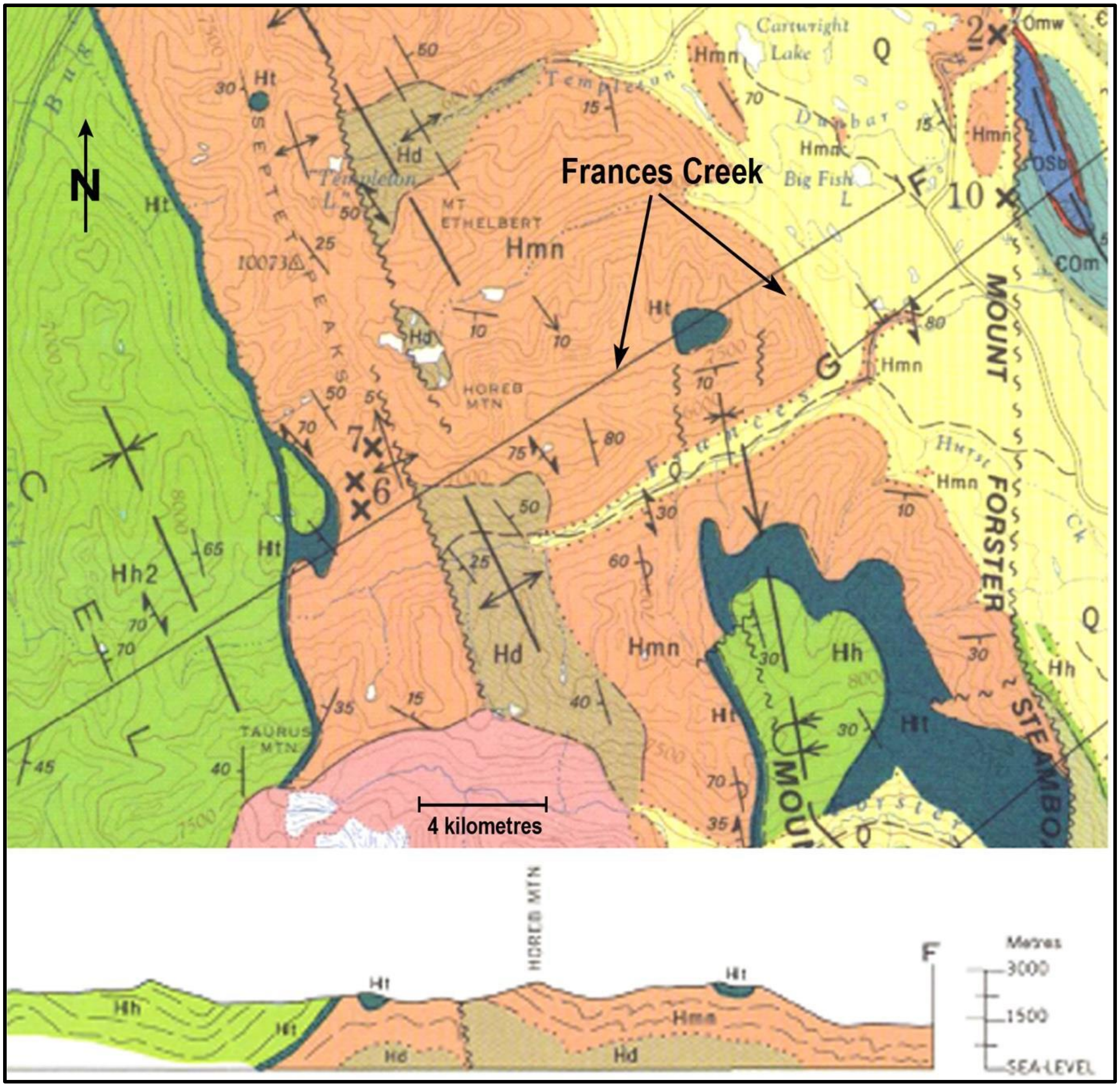


Figure 7-3: Geological Map and Section – Frances Creek Property (after Ressor, 1973)

Rocks of the two systems are separated by an erosional unconformity. The amount of time represented by the unconformity is unknown; however, it is widespread and cuts markedly into the Mt. Nelson rock units in the Project Area (Pope, 1990).

7.2.1.1 Prospect Stratigraphy - Frances Creek

The Mt. Nelson Formation of the Purcell Supergroup of the Helikian System is the oldest rock unit found at the property. The Purcell Supergroup is the equivalent of the Belt Supergroup (American terminology) found to the nearby south. Purcell Supergroup rock units in the Project Area are thought to be + 9.8 km in thickness. The Mt. Nelson Formation which is the youngest formation of the Supergroup is estimated to be about 1.2 km thick, in the Project Area (Ressor, 1973). The Mt. Nelson is predominately dolostone in composition and is a platform carbonate. It is economically significant in that it is the main host rock for barite mineralization at the property.

The Mt. Nelson has been subdivided into six stratigraphic units in the area adjacent to the property (Pope, 1990). Pope measured and described 1520 m of section about 18 km to the south of the property, during the field work for his report. Voyageur's exploration department reports that the upper three units described by Pope (Figure 7-4) are recognizable in drill core (B. Willis, P.C., 2014). These units are; Hmn - 6 - Upper Mt. Nelson Quartzite, Hmn - 5 - Upper Mt. Nelson Dolomite and Hmn - 4 - Purple Sequence.

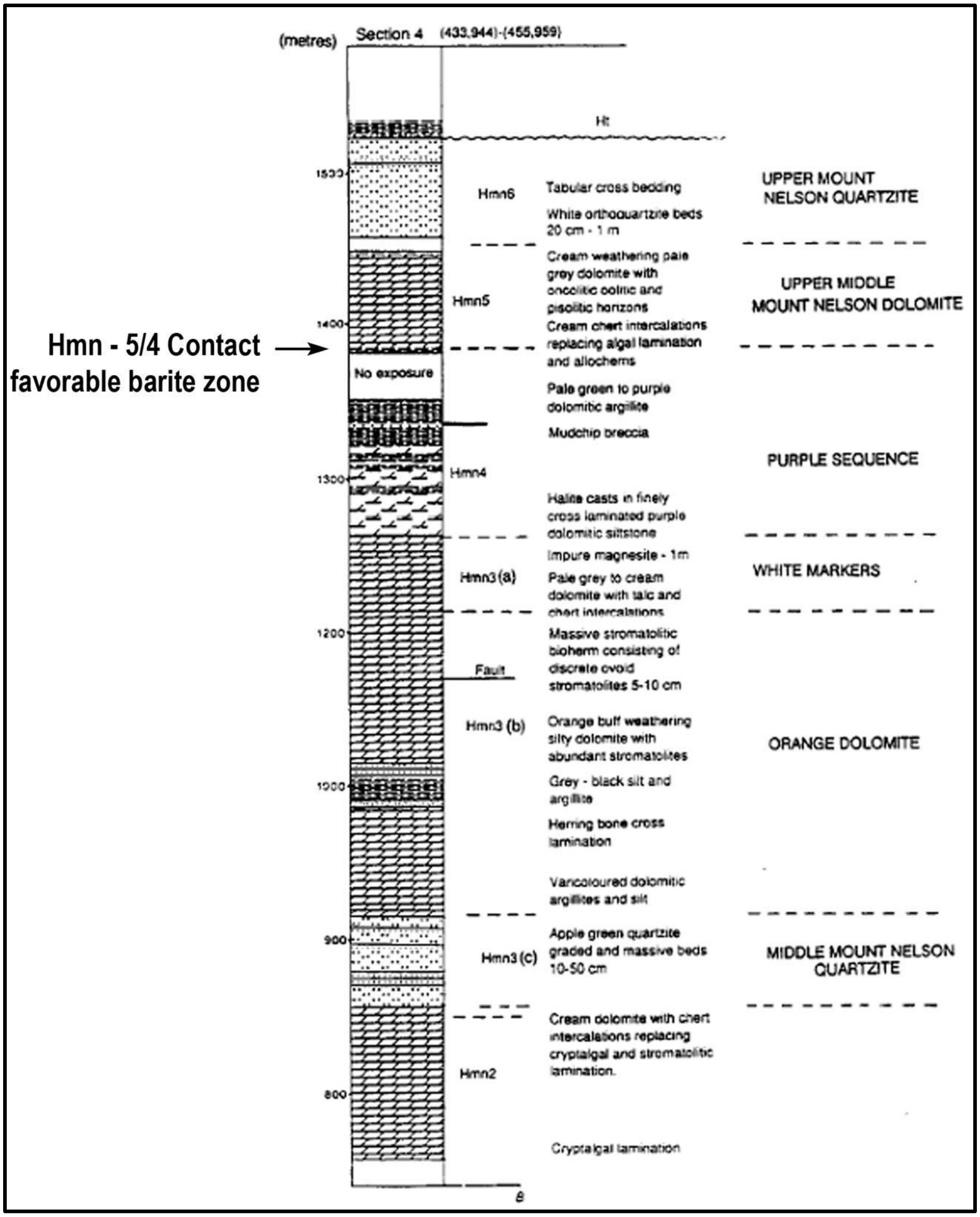


Figure 7-4: Mt. Nelson Fm. Stratigraphy – Frances Creek Property Vicinity (after Pope, 1990)

The Upper Mt. Nelson Quartzite (Hmn - 6) outcrops at/near the upper drilling area (B – Zone), approximate elevation of 1570 m. The Purple Sequence dolomitic argillites (Hmn - 4) outcrop at/near the lower drilling area (A – Zone), approximate elevation of 1335 m. Prior to the 2017 drill season, the contact between units Hmn -5 and Hmn - 4 was thought to be a zone favorable for barite deposition (B. Willis, P.C., 2014).

Review of the 2017 drill program results has resulted in a re-thinking of this concept. The control on mineralization is now thought to be a thrust fault that cuts through the property that strikes at 295 degrees. Along the lower A Zone, the fault is 8 – 10 m wide with large voids within the zone. The barite within the A Zone is hosted within the fault zone and is mostly concentrated along the foot wall contact. The hanging wall is made up of silicious grey to green argillaceous dolomite. The footwall is primarily sort green and brown argillaceous dolomite.

The strata exposed at the upper B Zone is primarily a purple / maroon argillaceous dolomite. There, the hanging wall of the fault is a brown weathered rubbly brecciated dolomite. A beige – brown dolomitic breccia is the dominate rock type in the lower elevations of the B – Zone.

The Toby Formation conglomerates were found in the uppermost elevations above and outside of the property by Reesor in 1973. Outcrops of Toby Formation sandstones were mapped by Mountain Minerals geologist Butrenchuk at much lower elevations (1463 m to 1710 m) and within the property boundaries, in 1990. Voyageur’s geologists have also mapped Toby outcrops at lower elevations within the property (Figure 7-5).

The Toby unconformably overlies the Mt. Nelson dolomites. Ressor's mapping shows a small outcrop of Toby about 1.5 km in a NE - SW orientation and about 1 km in width in a NW - SE direction. Thickness is shown to be ~ 100 m. Butrenchuck's mapping shows the Toby as being in fault contact with the Mt. Nelson Fm. in the SE portion of the property (Butrenchuk, 1990).

The fact that the Toby unconformably overlies the Mt. Nelson in the property area has economic significance. Unconformities are often favorable sites for mineral deposition. The Toby - Mt Nelson unconformity is a disconformity which means there was a period of uplift and erosion (time period unknown) after Mt. Nelson and before Toby depositional time. Karst topography may have formed on the Mt. Nelson surface; cavern systems are especially favorable loci for mineral deposition. The Toby - Mt. Nelson contact should be targeted for further prospecting, during the proposed exploration program.

7.2.1.2 Prospect Structural Geology - Frances Creek

Faulting - Reesor's 1973 regional scale (1:250,000) mapping shows two NNE striking but unnamed faults traversing northwards in the vicinity of the property near the southern boundary along Frances Creek (Figure 7-5). He does not show the faults crossing the creek or outcropping in the hillside to the south of the creek. Pope's 1990 more detailed mapping (1:25,000 scale) shows the Forster Creek Thrust Fault outcropping on the hillside to the south of the creek, the alignment of the trace of the fault suggests that it is dipping steeply to the west.

Unfortunately, Pope's detailed map stops at the south side of Frances Creek; Reesor's regional scale mapping encompassed both sides of the creek. The location of the thrust mapped by Pope is more or less on strike with the easternmost fault mapped by Ressor. A valid assumption would be that the two faults are the same and that the Forster Creek Thrust traverses through the southwestern portion of the claim.

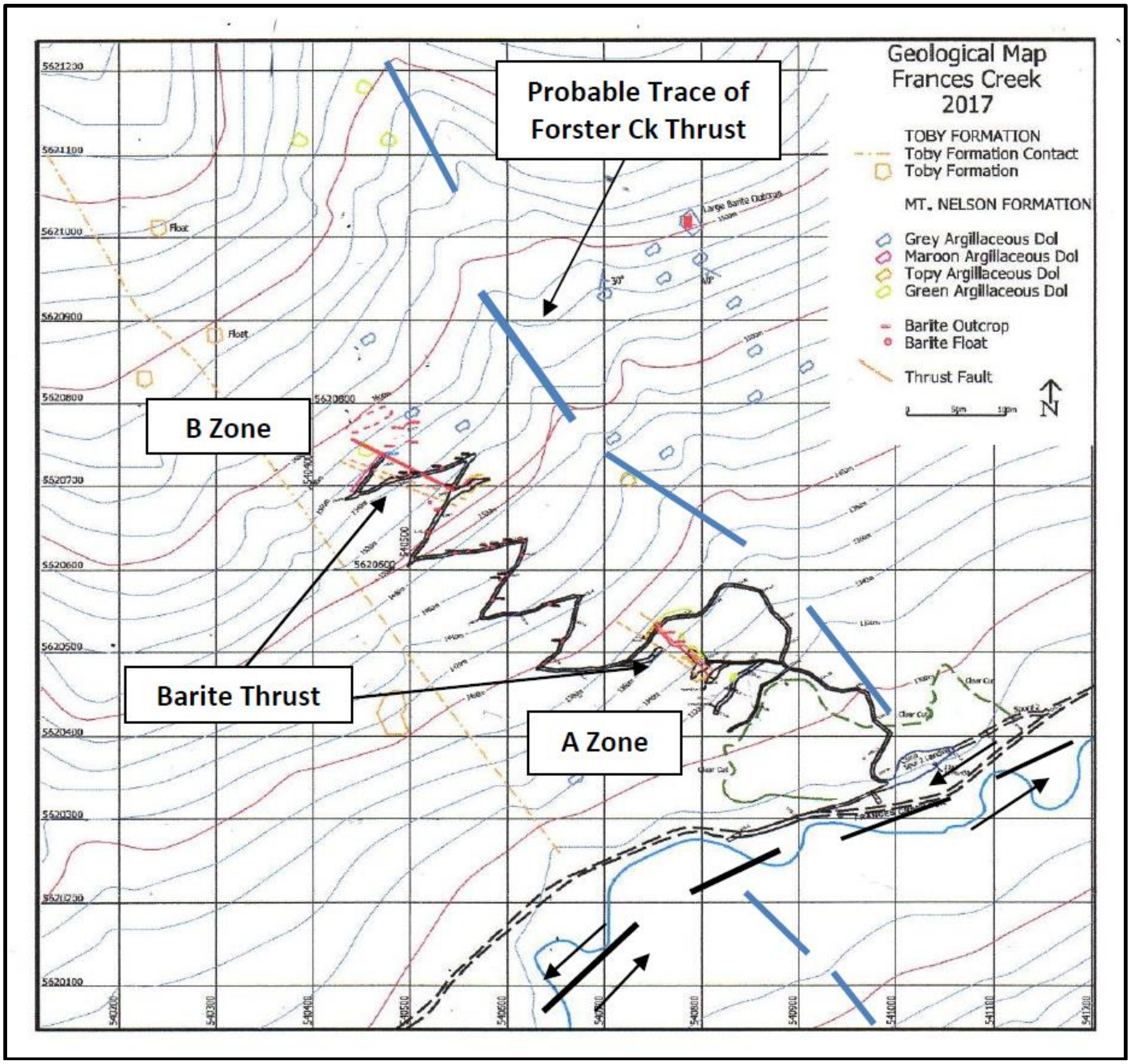


Figure 7-5: Geologic Map – SE Portion – Frances Creek Property (Willis. 2017)

The trace of the thrust as interpreted by William Henkle coincides with a NW trending dry stream valley which is incised about 30 m into the SE face of Horeb Mountain in the SW portion of the Frances Creek Claim. This feature was also interpreted as a fault by Butrenchuk in 1990. The dip of the thrust plane is to the SW at an unknown angle, but, based on topographic relationships, is probably steeper than 55 degrees.

The trace of the Forester Creek Thrust as mapped by Pope intercepts Frances Creek about 0.5 km SW of where the trace of the thrust as mapped by William Henkle and by Voyageur does. This implies the presence of a buried right lateral fault located along the bed of Frances Creek (Figure 7-5).

Butrenchuk mapped an NNW striking fault which places the Toby in contact with the Mt. Nelson, about 350 m west of the Forster Creek Thrust, in 1990. This fault outcrops in the very SW portion of the claim. It was not mapped by Reesor during his regional scale mapping in 1973 (1:250,000) the 1990 mapping was much more detailed (1:5,000); hence it's discovery at that time.

The 2017 drilling program was supervised by Voyageur. Mr. Willis' field mapping and drill hole logging led to the discovery of yet another thrust fault at the property. This is named the Barite Thrust, because it appears to control the barite mineralization at the property. The Barite Thrust has been mapped where it crosses the A Zone from elevation 1300 m to 1380 m and where it crosses the B Zone from elevation 1500 m to 1600 m. It crops out along the drill road cuts and at the drill pad excavations in the two zones. No doubt, it is continuous between the two zones, but the drill road cuts between the two zones are not as deep – so the structure is difficult to discern there.

The Barite Thrust crops out in the A Zone. Outcrop data shows the thrust fault dipping at -60° SW and striking 295°. The barite mineralization is located within the fault zone and this probably indicates that the fault was a conduit for the barite mineralization. Most likely, there are secondary zones along this fault where the fluids precipitated and filled secondary faults and open areas.

Where the Barite Thrust outcrops in the B zone, the main fault structure is striking 295° and is dipping steeply to the SW as indicated by drill hole data. The main barite zone appears to be an off-shoot breccia that is striking 305° and dipping between -70° to -65° S.

Folding - Reesor's mapping also shows the Forster Creek Syncline crossing Frances Creek and dying out to the NW, about halfway up the mountainside. Reesor's mapping shows the syncline crossing Frances Creek and outcropping in the mountain face, just to the west of the Forster Creek Thrust. It can be inferred from Reesor's mapping that the dip of the beds in the mineralized area of the property would be to the SW.

Reesor shows the syncline to be the dominant structural feature south of the creek; traversing about 40 km of territory. Interestingly, Pope who mapped the area to the south of Frances Creek in detail does show the presence of an overturned syncline in this area but it is not a dominant structural feature as shown by Reesor.

Detailed mapping by Tiger Ridge and by Butrenchuk shows that the beds strike to the WNW and dip SW at about 15 degrees in the B Zone mineralized area of the property, as well as in the lower A Zone. No major folds are indicted by the drilling to date. However, more detailed work will probably show that folding at the property is more complex than is presently known.

7.2.1.3 Prospect Mineralization - Frances Creek

Barite mineralization at the Frances Creek Property occurs as a complex breccia vein which strikes NW and dips SW at about 40 degrees at the lower A Zone and 60 degrees at the upper B Zone (Figure 7-5). At the B Zone, drilling has shown that the breccia vein has a strike continuity of 150 m and an average dip continuity of 50 m (indicated) to 75 m (inferred) down the dip from outcrop. At the A Zone, drilling shows that the breccia has a strike continuity of 100 m, and an average dip continuity of 40 m (indicated) to 60 m (inferred) down the dip from outcrop. The 230 m zone between the A and B Zones has yet to be tested by drilling.

The breccia vein occurs in the upper plate of the Forster Creek Thrust Fault, in the SW portion of the Frances Creek Claim, and is sub parallel to the trace of the thrust which outcrops ~ 200 m to the NE. The breccia vein material fills a small fault which was probably caused by tensional forces related to thrust emplacement. The Barite Thrust (Figure 7-5) appears to act as an especially favorable host zone for barite mineralization emplacement Barite mineralization is also found as fracture fillings, in the other minor structures at the property however.

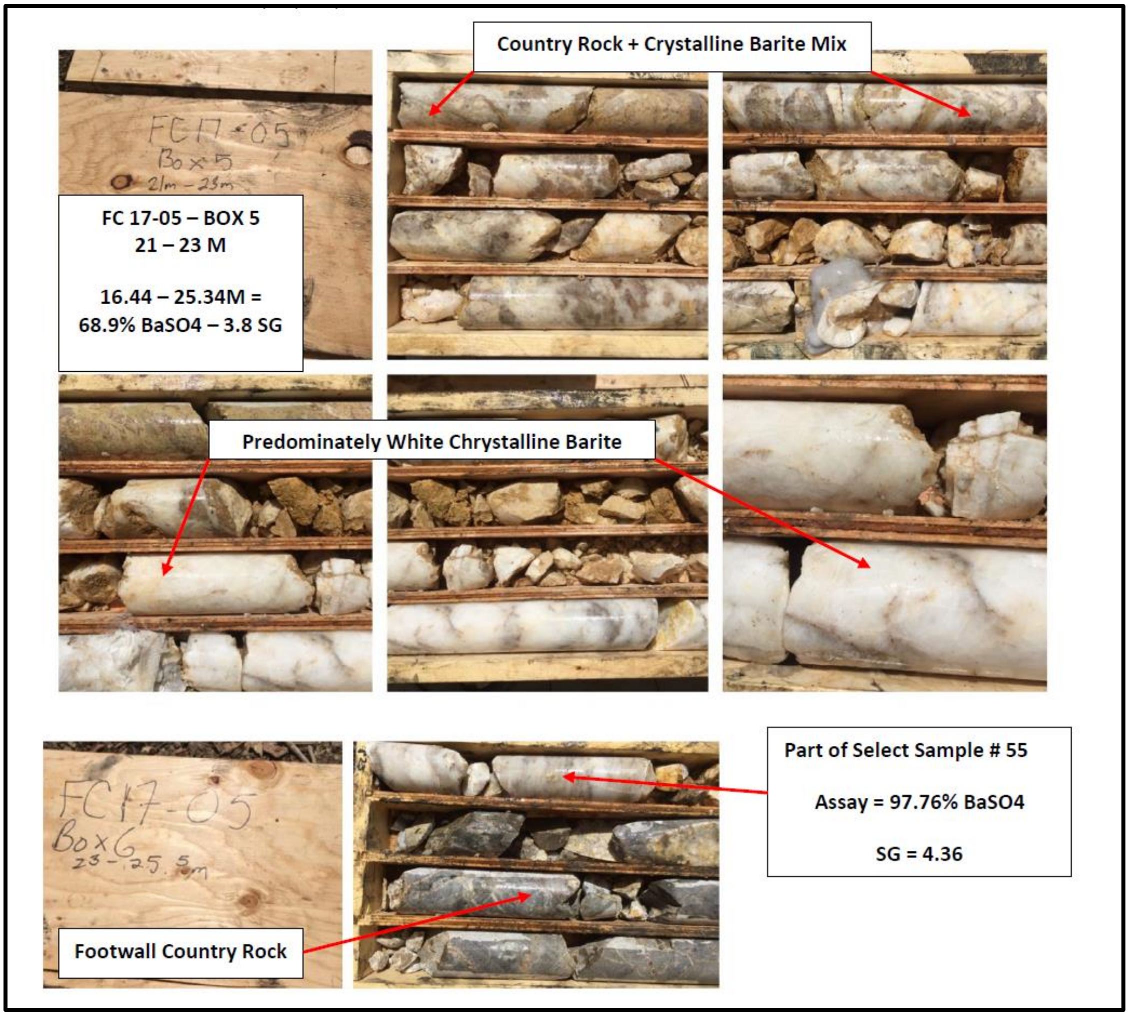


Figure 7-6: Barite Breccia Photos – DH – FC17-05

The breccia vein is composed of mixed percentages of country rock (argillaceous dolomite) and white crystalline barite, which was injected into the Frances Creek Fault Zone (Figure 7-6). Mineralized zones were encountered within the vein with as little as 8.9% $BaSO_4$ over 8.9 m of core length and as high as 86.08% $BaSO_4$ over 5.25 m of core which were recovered during the 2017 drill program. The weighted average of all drill intercepts (2003 – 05 – 17) for the B Zone is 7.95 m @ 40.09% $BaSO_4$ / 3.31 SG. The weighted average for the A Zone drill intercepts is 2.71 m @ 35.85% $BaSO_4$ / 3.29 SG.

7.2.1.3.1 Barite Mineralization Quality

Figure 7-6 shows core photos from drill hole FC17 – 05 and is intended to illustrate the non-homogeneous nature of the vein mineralization. The photos show that Crystalline barite in varying percentage concentrations is consistent though out the breccia zone of the vein. In order to test the purity of the crystalline barite portion of the breccia, a select sampling program was initiated. Eight drill holes were selectively re-sampled. These samples were selected from previously assayed intersections of barite breccia. The pure barite zones within the breccia intercepts were then split from the vein to determine the nature of the purity of the barite.

The true widths and assay results from the sampled zones are as follows:

FC17-5 TW - 8.17 m @ 68.88% $BaSO_4$
FC17-7 TW - 21.29 m @ 28.57% $BaSO_4$
FC17-8 TW - 36.63 m @ 24.83% $BaSO_4$
FC17-9 TW - 36.03 m @ 19.47% $BaSO_4$
FC17-10 TW - 11.86 m @ 60.32% $BaSO_4$
FC17-11 TW - 23.88 m @ 27.05% $BaSO_4$
FC17-12 TW - 18.7 m @ 37.39% $BaSO_4$
FC17-15 TW - 15.22 m @ 37.64% $BaSO_4$

The highlights of the sampling are shown in Table 7-1, below:

Table 7-1: Results of Select Sampling of 2017 Drill Core

Hole Number	Crystalline Barite Zone Sampled	%$BaSO_4$	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

Crystalline barite in varying percentage concentrations is consistent though out the breccia zone of the vein. The sampling shows a very high grade for the crystalline barite. This select sampling of the crystalline barite to date indicates that it is exceptionally pure and is possibly pharmaceutical grade.

8 DEPOSIT TYPES

The following section has been extracted from previous technical report.

Voyageur's Frances Creek Property can be loosely classified as "Carbonate Hosted Barite - replacement deposits. This is a rather catch-all term meaning that they are barite deposits hosted in carbonate (in this case dolomite) rock units. They can be further sub classified as "Irish Type MVT (Mississippi Valley Type) Pb-Zn-Ag-Ba rich" replacement deposits. However, on Frances Creek there are no metals associated with the property.

These deposits are further described as "Irish Type carbonate-hosted deposits are strata bound, massive sphalerite, galena, iron sulfide and barite lenses with associated calcite, dolomite and quartz gangue in dolomitized platformal limestones." (Hoy, 1996). Interestingly, "normal" MVT deposits contain only minor barite, while Irish Type MVT deposits are barite rich, hence our interest in them.

Common features of "Irish Type" MVT deposit worldwide are:

- Epigenetic Origin - mineralization was after the host rock formed
- Unassociated with igneous activity
- Hosted by Dolostones and Limestones
- Dominant Minerals - sphalérite, galena, pyrite, marcasite, dolomite, barite, calcite
- Ore Fluids - basinal brines with 10 - 30 wt. percent salts
- Crustal sources for metals, barium and sulfur
- Mineralization Deposition Temperatures - 75º C - 200º C
- Mineralization Controls - faults, fractures, dissolution collapse breccias, lithological boundaries
- Timing of mineralization - Coincident with mountain building

The B. C. Geological Survey has further sub-classified the Irish Type-MVT barite deposits of British Columbia as to the mineralization controls responsible for barite deposition. These are fracture controlled, replacement and manto type deposits. These deposits formed after consolidation of the host rock. They occupy voids formed along faults and fractures and also replace the original minerals in favorable zones of rock by replacing the host rock molecule by molecule with barite molecules.

More specifically, Voyageur's Frances Creek Property is sub classified using the B.C. Geological Survey system as Fracture Controlled.

Basis of Exploration Planning - The basis for which past exploration was planned for the Frances Creek Property was to explore outlying barite outcrops using geochemical and geophysical means to obtain idea of development potential. Extend known occurrences by drilling down dip for depth extensions and on strike for lateral extension of known barite bodies (2017 Program).

These are common exploration methods in mineralized terrain, where the explorationist tries to extend known areas of mineralization. It is known in the trade as "Headframe Exploration". Chances of success are generally higher with this method as opposed to "Grassroots Exploration", which explores where no known mineralized areas exist.

9 EXPLORATION

The following section has been extracted from previous technical report.

Voyageur became a public company in 1Q – 2017. Once funds were secured from the issue, Voyageur was able to initiate exploration work on the Frances Creek property. Prior to the 2017 drill program, almost, all exploration work undertaken on the property was by predecessor companies.

Prior to Voyageur's acquisition of the property, it was operated by Tiger Ridge, the immediate predecessor in title. Prior to that, the property was operated by Mountain Minerals, an industrial minerals exploration company (early 1990's). Since title to the properties is held by mining claims, the claimant is required by law to perform yearly "assessment work" on the claim block to maintain title. Usually, mining claimants choose to fulfill this requirement by performing some sort of exploration work on the claims.

Once the work is performed, the claimant must file an "assessment report" with the B.C. Ministry of Minerals. The reports are placed in a file at the Ministry and are available to interested parties. This results in a rather extensive geologic library for some properties; The Frances Creek Property being one of them. In this way, a current operator of the claim can review what was done in the past and incorporate that data into their geologic model of the property; thus allowing for a more cost effective exploration program going forward.

9.1 Pre-Tiger Ridge Exploration Campaign – Frances Creek

The Frances Creek Property was operated by Mountain Minerals, Inc. from 1990 - 1992. Work undertaken by Mountain Minerals on the property in 1990 consisted of:

- Geological Mapping - 1/5000 scale
- Soils Geochemical Survey - lines - 50 m, samples - 25 m, 184 samples
- Exploration Trenching & Sampling - 4 total
- Work undertaken in 1992 on the property consisted of diamond Drilling - 304 m - 11 holes

Mountain Minerals work was reviewed by Tiger Ridge and was fundamental to their optioning the property. The knowledge base represented by Mountain Minerals work was instrumental in formulating Tiger Ridge's extensive drilling campaigns between 2000 and 2005. The soils geochemical survey was used to site several of Tiger Ridge's drill holes.

9.1.1 Mountain Minerals Geochemical Survey

The soils geochemical survey was completed using industry wide procedures and parameters (these are still in use today). A baseline (800 m) which transected the long axis of the deposit was surveyed and marked in the field. Cross lines were turned off at 80 m intervals. Soils samples were collected from the B horizon along lines that were spaced 50 m apart. Sample interval was 25 m; a total of 184 samples were collected. The samples were bagged and shipped to International Plasma Laboratory in Vancouver for analysis by ICP. Barium was the only element analyzed for.

It is standard practice to collect B horizon soils geochemical samples. B horizon soils samples are normally representative of the ion content of the soils, as they are free of organic debris. Organic debris is found in the A horizon, and the organic matter may have selectively concentrated various ions.

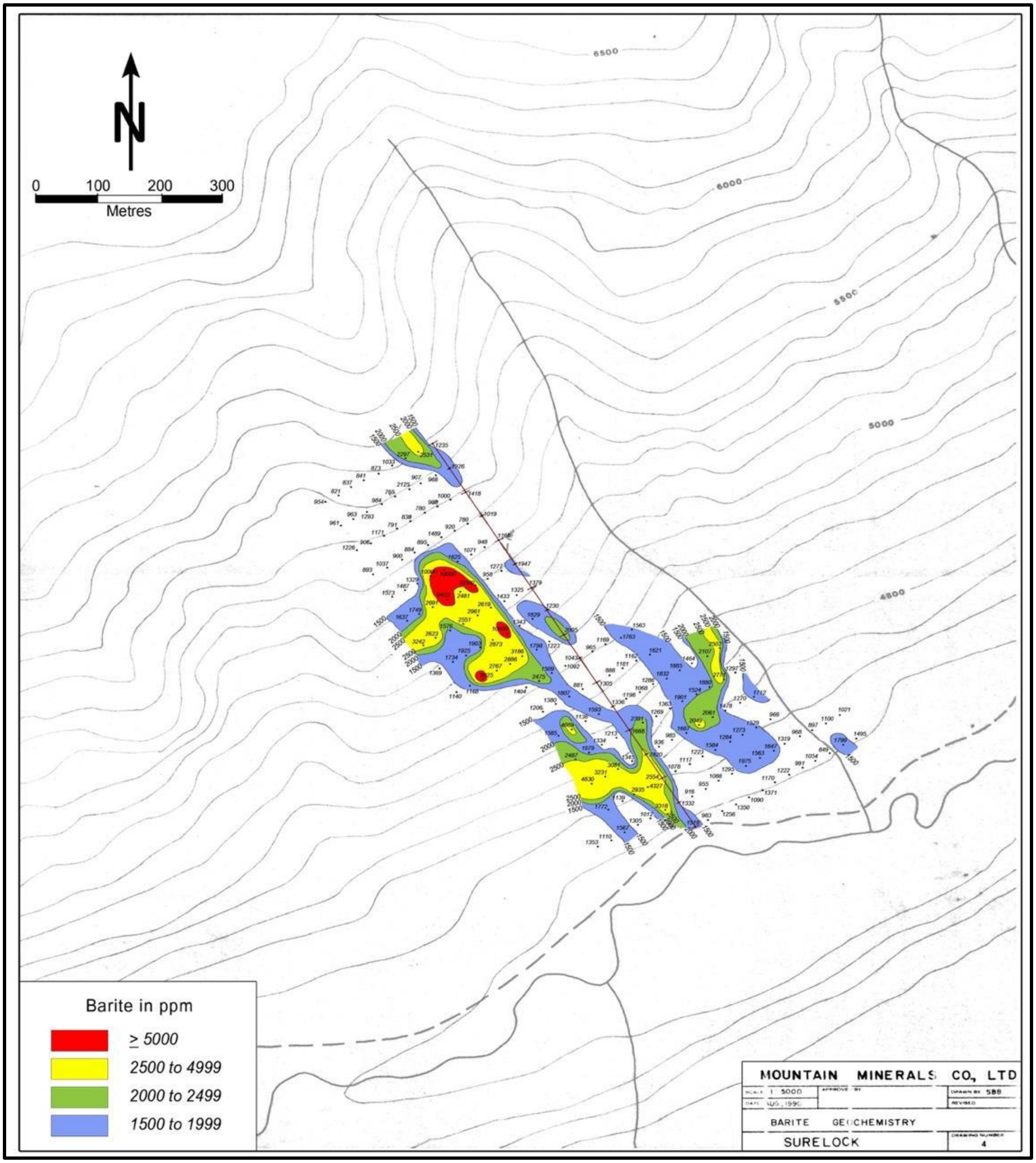


Figure 9-1: Soils Geochemistry – Frances Creek Property

The barium values for the samples ranged from 765 to greater than 10,000 ppm. Anomalous values were considered to those greater than 1,500 ppm (Butrenchuck, 1990). Once the lab values were received, they were plotted to scale on a topo map base and a contour map was prepared (Figure 9-1).

9.2 Tiger Ridge Resources Exploration Campaigns

Tiger Ridge's 2002 - 2005 exploration work at the Frances Creek Property consisted of limited outcrop mapping and sampling, a geophysical survey, and drilling. Drilling parameters and results will be discussed in Item 10. The geophysical survey results are shown in Figure 9-2.

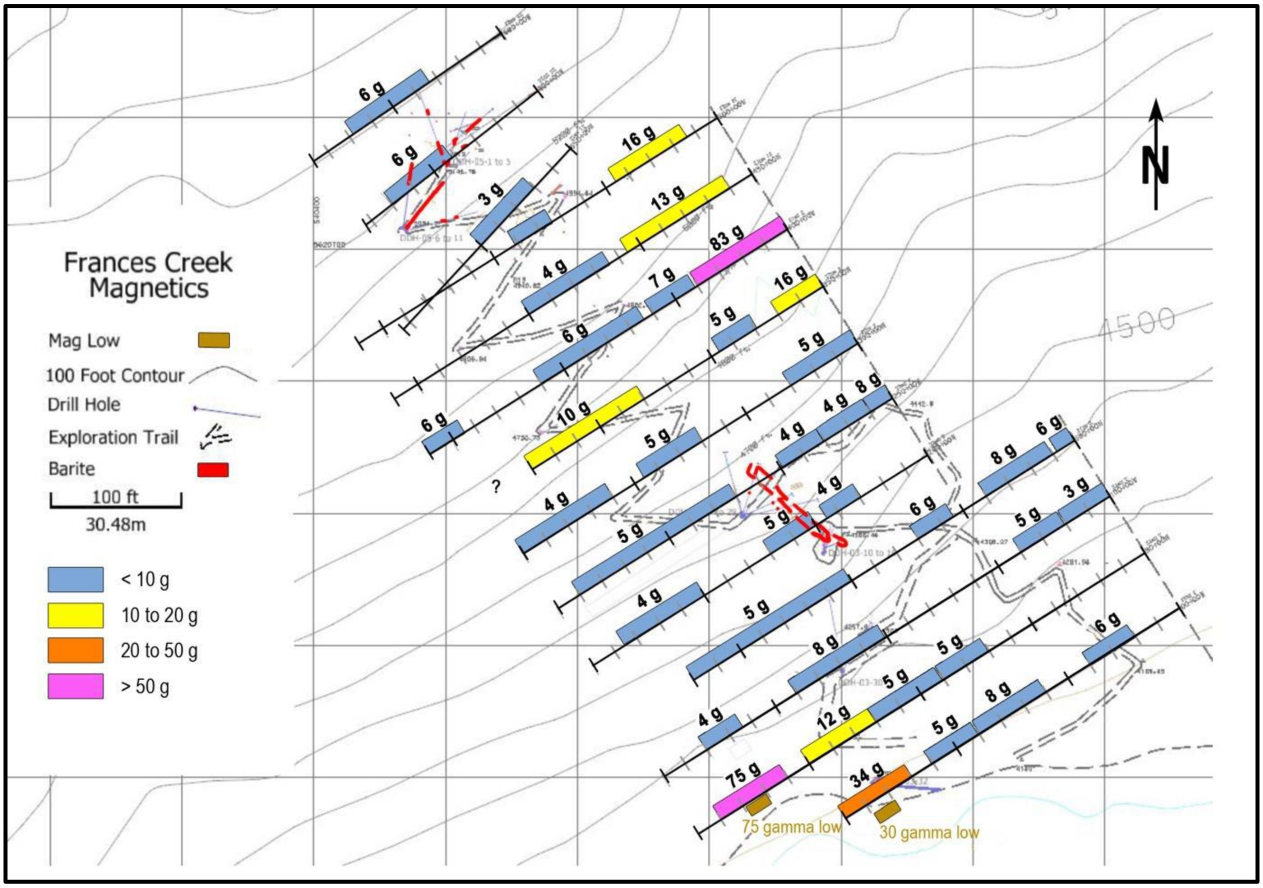


Figure 9-2: Magnetic Survey – Frances Creek Property

In 2003, Tiger Ridge drilled the lower zone outcropping barite occurrences (Item 10). In 2004, a geophysical survey was conducted over the property in order to try and extend the known occurrences upslope. A ground-based magnetometer survey was conducted using a proton precession magnetometer; 14 lines were laid out in a SW - NE direction at 15 m intervals. Magnetic readings were acquired at 6 m spacing along each line.

The survey defined a broad magnetic low oriented NW - SE (blue areas) along the slope of the mountain. The known barite occurrences (lower zone) were located towards the center of the magnetic low. It was conjectured that the upslope extension of the barite would also be located in the center of the magnetic low. The survey was useful in selection of drilling locations for the 2005 program. The 2005 drill program extended the barite occurrences up slope (Item 10).

Mr. Henkle resampled three of the lower zone outcrops during the 2014 field visit to the property. These sampling results were shown in Table 9-1. Mr. Henkle's sampling as well as the drilling results (Item 10) indicates that the Frances Creek Barite Zone is apparently + 4.2 SG and is apparently API compliant with respect to heavy metals.

Table 9-1: 2014 Outcrop Sample Results – Chemical Testing – Frances Creek Property

SAMPLE #	SG (4.1 - min)	% $BaSO_4$	Hg - ppm (1.0 max)	Cd - ppm (3.0 max)	SOLUABLE Ca - ppm (250 max)
8/12 - 1	4.12	91.78	0.019	<1	94
8/12 - 2	4.05	86.18	0.006	<1	155
8/13 - 1	3.62	70.02	0.014	<1	139

9.3 Voyageur Pharmaceuticals Ltd. Exploration Campaigns

As was mentioned in sections 7.2.1.3.1 and 9.3.4., Voyageur conducted outcrop sampling and sampling of previously drilled core at the Frances Creek property in 2014. In 2015, Voyageur conducted an outcrop sampling campaign at the Frances Creek property. In 2016, Voyageur collected and partially processed a trench sample from the Frances Creek property. A synoptic discussion of these exploration activities is discussed below.

9.3.1 2014 Sampling

The 2014 sampling program consisted of outcrop sampling at the property and sampling of archived previously drilled cores (2003 – 2005) at the core storage facility in Windemere, B.C. Both sampling exercises were supervised by Mr. Henkle, as part of the field portion of background research for preparation of the 2015 Technical Report on the three properties.

A total of three mineralized outcrop samples (Table 9-1) and 82 mineralized zones from 24 core holes were collected (Table 10-3 and Table 10-4 – Item 10) and analyzed at Loring Labs in Calgary, an ISO – 9001 certified laboratory. Details of the results of this sampling are shown in the report sections and tables referenced above. Voyageur's expenditure for the 2014 exploration campaign at Frances Creek was CA $ 39,500.

9.3.2 2015 Sampling

The 2015 sampling program consisted of outcrop sampling from hand dug exposures of the Frances Vein at the property. This sampling exercise was undertaken by a Voyageur geologist; a total of four channel samples were collected.

The four samples were analyzed for chemical composition (Table 9-2), and SG at Loring Labs in Calgary, AB. and for whiteness and brightness (Table 9-3) at SGS Mineral Services' lab in Lakefield, ON. Both labs are ISO – 9001 certified and both labs enjoy a sterling reputation for accurate analyses throughout the Canadian mining industry.

The chemical testing showed positive results; high purity, high SG and acceptable levels of accessory and contaminate elements and compounds. The whiteness – brightness testing which was positive (+94.0 – Hunter L). Testing from both labs indicated that the Frances Vein barite is potentially filler (paint) grade.

The filler market is an important segment of the industrial grade barite market.

Details of the results of this sampling are shown in the sections referenced above. Voyageur's expenditure for the 2015 exploration campaign at Frances Creek was CA $ 8,796.44.

Table 9-2: 2015 Outcroup Sample Results – Chemical Testing – Frances Creek Property

Sample #	Sample Width	$BaSO_4$ %	SG	Ca ppm	Cd ppm	Hg ppb	Pb ppm	As ppm	Sr ppm	Al_2O_3 %	Fe_2O_3 %	SiO_2 %
FC1 2015	1.41m	98.54	4.48	34	<1	7	6	2	8162	0.03	0.02	0.05
FC2 2015	1.25m	98.76	4.48	24	<1	6	4	1	5380	0.01	0.01	0.06
FC3 2015	0.92m	88.76	4.18	29	<1	7	4	<1	9023	0.27	0.53	0.54
FC4 2015	1.4m	97.86	4.47	24	<1	5	4	1	8864	0.06	0.03	0.10

Table 9-3: 2015 Outcroup Sample Results – Brightness Testing – Frances Creek Property

Sample #	(CIE 1976)			(Hunter)		
	L*	u'	v'	L	a	b
FC1 2015	95.4	0.202	0.462	94.1	0.9	0.8
FC2 2015	95.8	0.202	0.460	94.6	1.4	-0.6
FC4 2015	95.6	0.203	0.462	94.4	1.4	1.1

9.3.3 2016 Sampling

The 2016 sampling program was supervised by Voyageur's exploration team and consisted of collection of a bulk sample of 17 tonnes of barite breccia from the Frances Vein. The vein was sampled at the portal of a small underground adit into the vein.

The 17 tonnes sample was trucked to an off-site location and washed and crushed, then trucked to a second off-site location where it was ground to – 325 mesh. The powdered sample was drummed and was then shipped to ST Equipment and Technology in Needham, MA, USA, where it was tested in February 2017. ST has a dry separation machine that sorts mineralized material from waste using electrostatic techniques.

A total of 36 representative samples were collected from the 20 barrels shipment. Average barite purity of the bulk sample was 17.46% $BaSO_4$, Specific Gravity (SG) was not analyzed. Using the Barite Purity Curve, the SG of the bulk sample can be estimated at ~ 2.95.

The sample was shipped to ST Equipment and Technology in Needham, MA, USA, where a 5 tonnes sample was tested. ST Equipment has an electro-static separation machine that sorts mixed material by differing electrical properties. The objective of the test was to separate the powdered barite from the intermixed dolomite by using a dry method. Use of dry methods to clean the barite verses using a water-based jig method (proven technology) would eliminate the need for a tailings pond at the future mill, and hopefully improve recovery of barite.

The electrostatic separation testing showed that a low grade – low SG (~3.0) powdered sample, such as the one that was shipped could not be upgraded by dry methods to the desired SG (4.3 – 4.4) needed to penetrate the higher end barite markets. Consequently, Voyageur will use conventional water jigging and tabling, to produce a clean industrial grade, high SG product.

9.3.4 Barite Trench Samples

There were three trench samples taken from breccia vein with samples #1 & #2 taken from the A Zone barite and sample #3 taken from the lower B Zone barite zone (Figure 9-3). An excavator was used to clear the overburden and expose the outcrop followed by washing the face with high pressure water to ensure a clean sample.

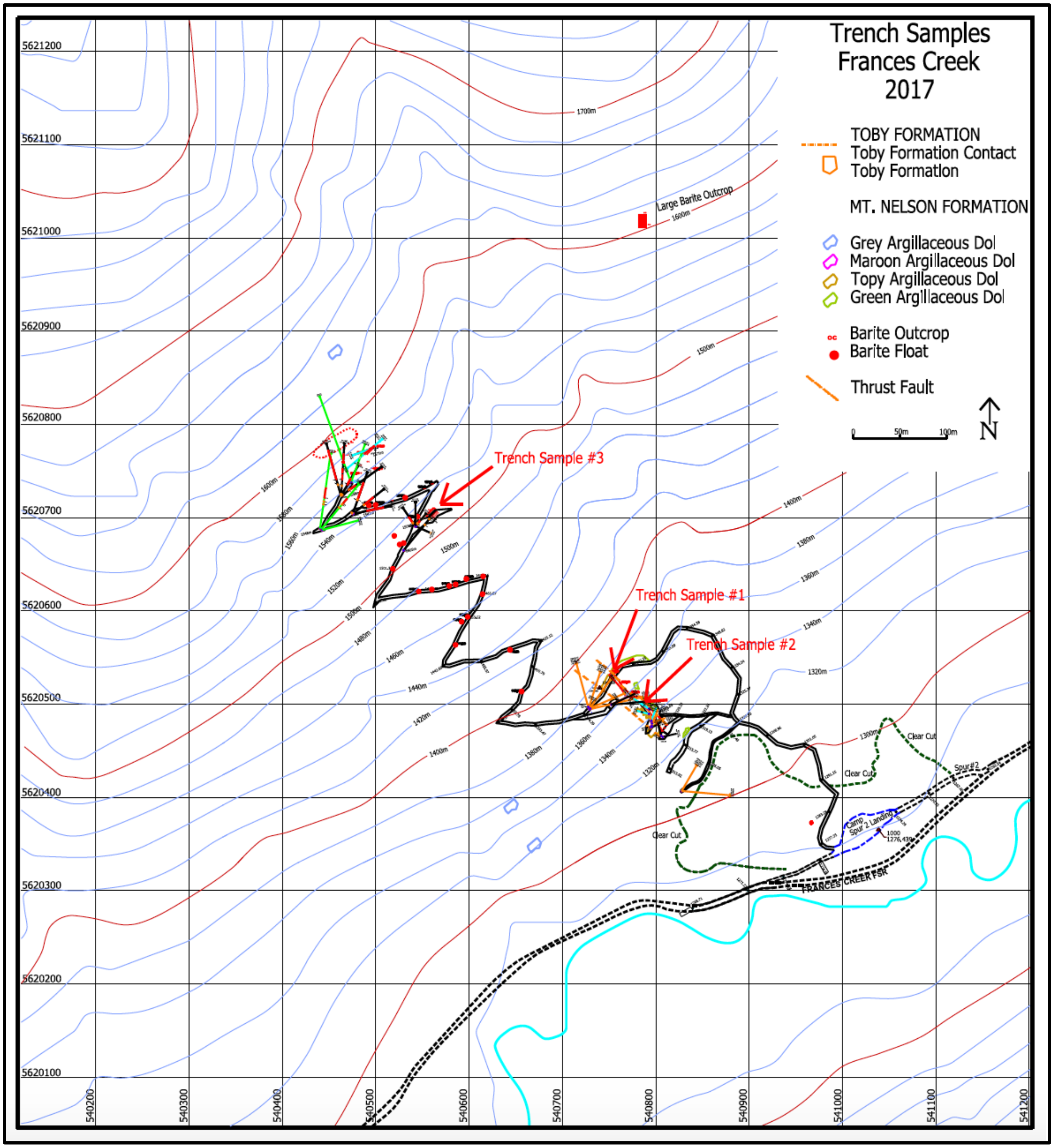


Figure 9-3: Trench Samples

Sample #1 was taken from alongside the trail located at an elevation of 1361 m and UTM coordinates of 5620518N 540764E. The channel sample consisted of 3 individual samples within the zone. Samples were chipped by rock hammer and collected and bagged. A line was measured and painted running perpendicular to the dip of the vein. The line was broken into 3 intervals of 0-1 m, 1-2 m and 2-2.5 m for a combined 3 sample bags. The average grade across 2.5 m of exposed barite vein was 46% $BaSO_4$.

Table 9-4: Trench Sample 1

Channel Samples Frances Creek					%Ba & m	%Ba & m	%Ba & m
Trench sample1. (true width)		Coordinate	Coordinate	Elevation	0-1m	1-2m	2-2.5m
Above portal on trail	Foot wall	**5620518.43**	**540763.99**	**1361.81**	**20.34**	**81.14**	**27.5**
Sample taken across true dip	Hanging wall	**5620517.38**	**540762.71**	**1362.6**	**wt avg**	**46**	

Figure 9-4: Trench Sample #1

Sample #2 was taken from the vein above the old (buried) Mountain Mineral Portal. This sample is located at an elevation of 1340 m and UTM coordinates of 5620500N 540784E. The channel sample consisted of 4 individual samples within the zone. Samples were chipped by rock hammer and collected and bagged. A line was measured and painted running perpendicular to the dip of the vein. The line was broken into 4 intervals of 0-1 m, 1-2 m, 2-3 m and 3-4 m for a combined 4 sample bags. The average grade across 3 m of breccia was 57.38% $BaSO_4$.

Table 9-5: Trench Sample 2

Channel Samples Frances Creek					%Ba & m	%Ba & m	%Ba & m	%Ba & m
Trench sample2 (true width)		Coordinate	Coordinate	Elevation	0-1m	1-2m	2-3m	3-4m
At portal area, excavated verti	Hanging wall	**5620500.16**	**540784.74**	**1342.37**	**65.34**	**48.38**	**58.41**	**0.41**
face, ba true width across dip	Foot wall	**5620503.21**	**540788.78**	**1339.61**	**3m wt avg**	**57.38**		

Figure 9-5: Trench Sample #2

Sample #3 was taken from the large barite outcrop located near drill holes FC17-20, 21, 22 & 23. This sample is located at an elevation of 1507 m and UTM coordinates of 5620700N 540556E. The channel sample consisted of 9 individual samples within the zone. Samples were chipped by rock hammer and collected and bagged. A line was measured and painted running flat across the contour of the outcrop and is the only channel sample that was not taken across the true dip of the breccia. The line was broken into 9 intervals of 0-1 m, 1-2 m, 2-3 m, 3-4 m, 4-5 m, 5-6 m, 6- 7 m, 7-8 m & 8-8.4 m for a combined total of 9 sample bags. The results of the channel indicated a total width of 8.4 m averaging 51.4% $BaSO_4$.

Table 9-6: Trench Sample 3

Channel Samples Frances Creek								
Trench sample 3 (across contour/not TW)					Coordinate	Coordinate	Elevation	
Trench below switch, in front of FC17-21				SW side	5620700.23	540556.21	1507.88	
				NE side	5620708.35	540564.54	1507.33	
%Ba & m	%Ba & m	%Ba & m	%Ba & m	%Ba & m	%Ba & m	%Ba & m	%Ba & m	%Ba & m
0-1m	1-2m	2-3m	3-4m	4-5m	5-6m	6-7m	7-8m	8-8.4m
38.57	22.68	56.51	44.19	60.25	65.27	52.05	68.93	58.97
8.4m wt avg	51.43							

Figure 9-6: Trench Sample #3

9.3.4.1 <u>Trench Sample Data Usage</u>

The trench sample surveyed coordinates as well as % $BaSO_4$ and SG lab results were entered into the project database and were used to help estimate the resource estimate. Additional details are discussed in Item 14.

10 DRILLING

The following section has been extracted from previous technical report.

Previous drilling was undertaken by both Mountain Minerals (1992) and Tiger Ridge (2003 – 2005) at the Frances Creek Property. The Mountain Minerals drilling at Frances Creek was apparently drilled down the dip of the vein and is not representative (P.C., Brad Willis, 2014). In addition, assay results from the 1992 campaign cannot be verified by lab certificates. Consequently, the data from the 1992 program could not be used in the resource model and thus was not used for this report. Only the drilling programs conducted by Tiger Ridge and the 2017 Voyageur drilling will be discussed here.

10.1 Frances Creek – Tiger Ridge Drilling Campaigns

Tiger Ridge drilled this property in 2003 and 2005, a total of 29 core holes were drilled from four separate platforms. Holes were drilled with a Diamec 251 diesel powered hydraulic wireline core drilling rig; core size was BQ - Wireline. A total of 1950.25 meters of core was collected during the two campaigns. Holes were drilled as arrays of drill fans, from prepared stations situated along a switch backing access road located about 30M to the SW of the outcrop of the vein. The azimuth of the initial drill hole at each drill station was aimed so as to intersect the vein perpendicular to strike at an angle of ~ - 35 degrees to horizontal. A second hole was then drilled with the same azimuth at an angle of ~ -60 degrees to horizontal. This completed one leg of the fan. At least two, sometimes three other similar fan legs were then drilled at azimuths which were 30 to 50 degrees either side of the initial bore. The drill rig was then moved to a different station and this drill sequence was repeated (Figure 10-1 and Figure 10-2 and Table 10-1 and Table 10-2). Note that a few elevations were changed for the preparation of the resource as explained in the part 14 of this report.

The core from these holes was logged by the Voyageur's Exploration Manager, who was Tiger Ridge's exploration manager at the time. The core was logged for lithologic and structural data, but it was not assayed for SG (specific gravity). Detailed core examination resulted in visual estimates of percentage barite for prospective mining horizons. Tiger Ridge was able to use this technique to mine successfully at the Tiger Ridge Mine at Jubilee Mountain for several years. The thinking at the time was that since that technique worked well at the mine, that it was sufficient for this property.

Since Tiger Ridge was a private company, it did not have stringent resource reporting requirements such as Voyageur has. Consequently, there was no lab analyses performed on the drill core.

During the field investigation for the 2014 and 2016 reports, core boxes from 22 of the 29 holes drilled during the 2003 and 2005 campaigns were retrieved. Mr. Henkle then examined the core in detail and a total of 82 samples were collected from barite mineralized zones. These samples were logged and photographed and then taken to Loring Labs in Calgary for analyses; results are presented in Table 10-3 and Table 10-4. See Figure 10-1 and Figure 10-2 for maps showing the locations and azimuths of the core holes. This data was used in the resource model for this report.

During the 2003 campaign, all the holes were collared in Zone A, the lower zone at the property. During the 2005 campaign, all the holes were collared in Zone B, the topographically higher zone at the property.

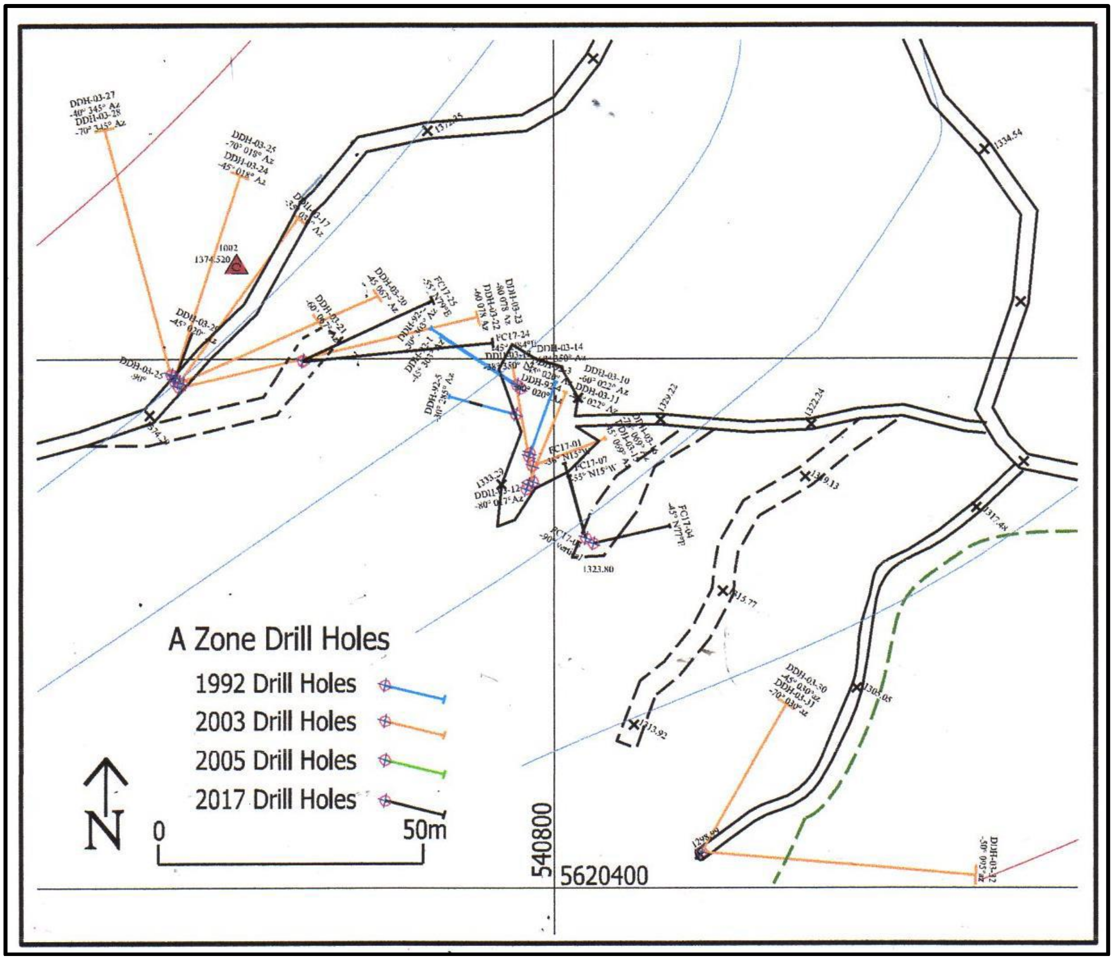


Figure 10-1: Drill Hole Map – Zone A

Table 10-1: 2003 DH Survey Data

DDH	ELEVATION	EASTING	NORTHING	Bearing		Angle	Total Depth m.
FC03-10	1331.36	540786.50	5620470.50	N22E	22	-60	47.85
FC03-11	1331.36	540786.00	5620470.00	N22E	22	-40	27.4
FC03-12	1331.36	540786.00	5620469.50	N17E	17	-80	32.92
FC03-13	1331.00	540788.00	5620471.00	N10W	350	-38	28.04
FC03-14	1331.36	540788.40	5620470.00	N10W	350	-60	32.9
FC03-15	1331.36	540787.50	5620474.00	N69E	69	-45	25.9
FC03-16	1331.36	540786.00	5620473.70	N69E	69	-70	27.13
FC03-17	1375.25	540725.00	5620498.00	N36E	36	-35	46.9
FC03-18	1375.25	540725.00	5620498.00	N36E	36	-55	49.07
FC03-19	1375.25	540725.00	5620498.00	N36E	36	-69	55.78
FC03-20	1375.20	540725.00	5620498.00	N67E	67	-45	53.8
FC03-21	1375.20	540725.00	5620498.00	N67E	67	-60	56.7
FC03-22	1375.25	540725.00	5620498.00	N78E	78	-60	60.05
FC03-23	1375.25	540725.00	5620498.00	N78E	78	-80	61.87
FC03-24	1375.25	540725.00	5620498.00	N18E	18	-45	56.39
FC03-25	1375.25	540725.00	5620498.00	N18E	18	-80	57.3
FC03-27	1375.25	540725.50	5620498.00	N15W	345	-40	62.8
FC03-28	1375.25	540725.00	5620498.00	N15W	345	-70	63.4
FC03-30	1298.99	540846.86	5620417.93	N30E	30	-45	60.96
FC03-31	1298.99	540846.86	5620417.93	N30E	30	-70	57.6
FC03-32	1298.99	540846.86	5620417.93	N95E	95	-50	53.95

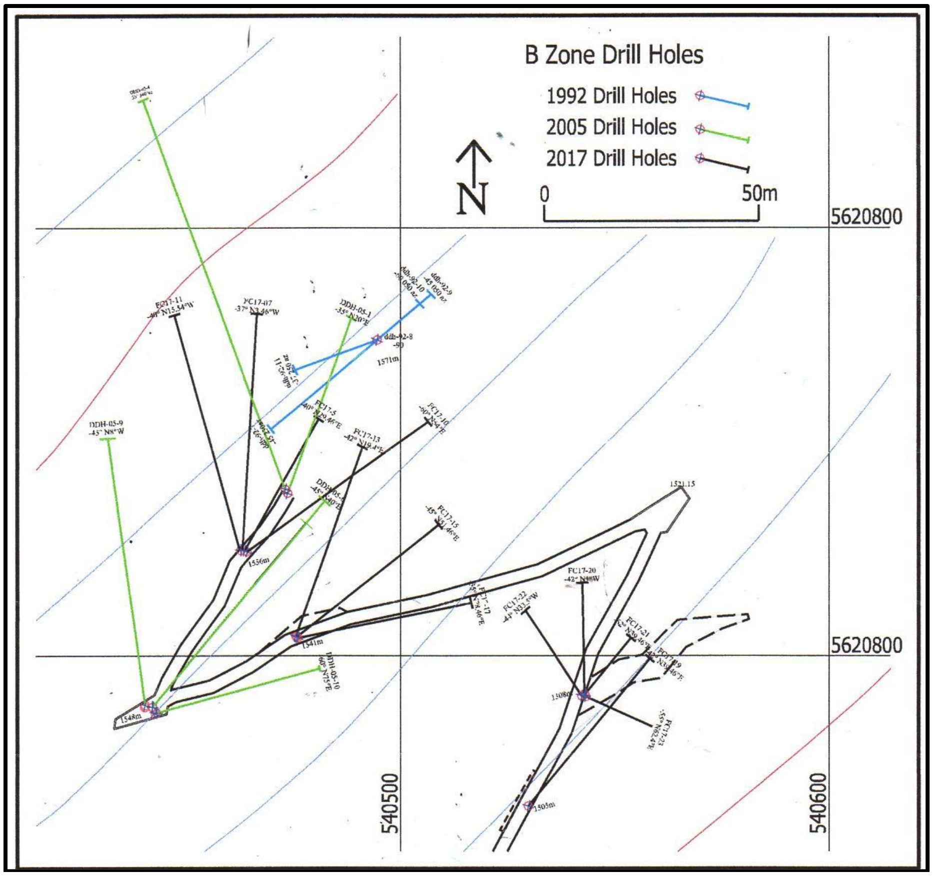


Figure 10-2: Drill Hole Map – Zone B

Table 10-2: 2005 DH Survey Data

DDH	ELEVATION	EASTING	NORTHING	Bearing		Angle	Total Depth m.
FC05-01	1561.34	540473.31	5620739.12	N20E	20	-35	53.04
FC05-02	1561.34	540473.31	5620739.12	N20E	20	-60	54.55
FC05-03	1561.34	540473.31	5620739.12	N20E	20	-90	86.26
FC05-04	1561.34	540473.31	5620739.12	N20W	340	-35	118.26
FC05-05	1561.34	540473.31	5620739.12	N20W	340	-50	19.81
FC05-06	1548.00	540445.65	5620689.88	N40E	40	-40	78.03
FC05-07	1548.00	540445.65	5620689.88	N40E	40	-60	122.53
FC05-08	1548.00	540445.65	5620689.88	N40E	40	-80	75.6
FC05-09	1548.00	540445.65	5620689.88	N8E	8.00	-45	81
FC05-10	1548.00	540445.60	5620689.88	N75E	75	-60	78.64
FC05-11	1548.00	540445.00	5620689.00	VERTICAL	0	-90	74

Table 10-3: 2003 Drill Campaign – Barite Assay Results

Hole Name	From (m)	To (m)	BaSO4 (%)	SG
FC03-10	19.81	21.03	31.42	3.31
FC03-11	16.76	17.53	0.26	2.79
FC03-11	17.53	19.2	29.2	3.18
FC03-12	21.79	22.86	24.08	3.27
FC03-12	24.84	25.98	20.86	3.22
FC03-14	18.75	20.79	37.08	3.21
FC03-15	17.31	18.29	33.98	3.48
FC03-15	18.29	19.81	29.5	3.16
FC03-15	19.81	21.34	13.5	3.02
FC03-16	17.07	20.3	25.36	3.02
FC03-16	20.3	20.73	7.92	2.86
FC03-16	20.73	22.59	72.1	4.1
FC03-17	37.8	39.62	22.8	2.98
FC03-17	39.62	40.84	14.94	2.89
FC03-17	40.84	41.91	67.46	4.05
FC03-18	44.81	46.02	65.44	3.74
FC03-19	51.72	52.73	30.5	3.21
FC03-19	52.73	54.56	54.04	3.79
FC03-20	42.21	43.89	27.42	2.95
FC03-20	43.89	44.96	0.68	2.86
FC03-20	44.96	45.72	10.42	2.7
FC03-20	45.72	46.57	0.89	2.72
FC03-20	46.57	47.09	50.62	3.68
FC03-20	47.09	48.16	3.02	2.86
FC03-22	51.51	53.64	27.28	2.92
FC03-22	53.64	55.47	57.06	3.44
FC03-23	57.91	59.44	40.66	3.65
FC03-24	39.93	43.04	19.48	2.96
FC03-24	47.55	49.07	4.58	2.67
FC03-24	49.07	53.04	20.74	2.93
FC03-25	48.92	49.68	11.02	3
FC03-25	49.68	51.51	67.42	4.03
FC03-28	54.25	56.21	48.38	3.37

Table 10-4: 2005 Drill Campaign – Barite Assay Results

Hole Name	From (m)	To (m)	BaSO4 (%)	SG
FC05-01	7.01	7.77	13.84	2.84
FC05-01	7.77	8.53	21.16	2.9
FC05-01	37.19	39.93	16.5	3.17
FC05-02	5.79	7.62	79.78	4.07
FC05-02	9.24	9.42	88.96	4.12
FC05-02	9.42	9.78	13.18	3.01
FC05-02	9.78	10.15	0.22	2.61
FC05-02	10.15	10.39	57.82	3.56
FC05-02	30.18	30.78	33.56	3.5
FC05-02	30.78	31.7	85.44	4.3
FC05-02	31.7	32.16	81	4.3
FC05-02	32.16	32.31	26.74	3.1
FC05-02	35.87	36.27	40.82	3.61
FC05-02	36.27	37	37.56	3.27
FC05-02	37	37.19	29.58	3.16
FC05-02	37.19	38.07	93.72	4.32
FC05-02	38.07	39.08	47.98	3.45
FC05-03	5.94	8.23	97.9	4.38
FC05-03	8.23	10.52	97.5	4.43
FC05-03	12.19	14.94	28.22	3.01
FC05-03	14.94	17.68	25.88	3.17
FC05-03	17.68	19.05	64.54	3.84
FC05-03	29.72	32	58.58	3.74
FC05-03	38.4	39.62	54.24	3.75
FC05-03	39.62	41.15	52.54	3.48
FC05-03	53.64	54.25	66.74	3.86
FC05-03	54.25	56.08	82.02	4.07
FC05-04	7.47	8.53	97.42	4.28
FC05-04	10.06	12.04	50.1	3.73
FC05-04	13.41	14.02	35.62	3.14
FC05-04	14.33	16.28	3.5	2.73
FC05-04	16.28	20.27	49.34	3.63
FC05-04	49.23	49.99	58.58	3.57
FC05-04	49.99	51.51	52.8	3.49
FC05-06	50.44	51.51	46.76	3.31
FC05-06	51.51	53.04	66.18	3.84
FC05-06	53.04	54.56	10.02	2.86
FC05-06	54.56	56.57	23.14	2.9
FC05-06	57.3	58.61	44.02	3.5
FC05-09	46.51	47.85	49.12	3.83
FC05-09	47.85	49.38	36.38	3.12
FC05-09	55.35	56.39	62.02	3.92
FC05-09	58.37	59.01	69.3	4.02
FC05-09	60.66	61.26	42.22	3.31
FC05-09	67.06	69.19	8.34	3.03
FC05-09	69.19	69.49	81.46	4.06
FC05-11	29.87	30.78	62.72	3.73
FC05-11	30.78	31.39	1	2.7
FC05-11	31.39	32.31	65.84	3.79

10.2 Frances Creek – Voyageur Pharmaceuticals Ltd. 2017 Drilling Campaign

Exploration activities on the Frances Creek property were started at the end of June. The area was prepared by Brad Willis of Voyageur, by clearing of the exploration trail and surveying the initial drill pad areas. Bertram Drilling was hired as the drilling contractor and they provided the excavator, drill and all equipment necessary to complete the drilling program. A Discovery II diamond core rig with NQ size core was used.

The drill was first located below the portal area to confirm the historical drilling and four shallow NQ drill holes were completed. Once the drill sites were prepared on the upper B Zone, the drill was moved and FC17-05 through FC17-23 were completed on the B Zone.

Operations were delayed by over one month due to forest fires in the area and the drilling operations were completed in late October.

The surface core holes were spaced and directed to intersect the zone perpendicular to the strike. The holes were drilled at angles from -40° to -55° with two holes per heading. Drill holes were spaced approximately with 10m distance between the barite hanging wall contact and fanned accordingly. The objective was to complete a resource study of the B Zone from surface down to a vertical depth of 50 m.

All drilling was supervised by Brad Willis and Katelynne Brown and logging of core and collection of core was done by both Brad Willis and Katelynne Brown. The core was placed in plywood core boxes; the boxes were then labeled with depth information, etc. Upon completion of logging on site, the core was then split with a rock splitter and 50% of the core was bagged by both Brad Willis and Katelynne Brown and stored temporarily onsite. The remaining core was then transported to a storage locker located in Invermere, BC for safe keeping.

The drill holes were surveyed by WSP Canada and Brad Willis applied all data of the survey, mapping, sections and drawings into Microstation PC software. A drill log data base was created using Excel.

The drilling conditions were very tough due to the large fault zone on the footwall side of the barite zone. Drill bits were destroyed on a regular basis due to the ground conditions, in particular we drilled the soft maroon argillaceous dolomite, entered the barite zone that consisted of soft pure barite and highly siliceous hard dolomite. The bits would be changed from a 5 series to an 11 series bit upon entering the zone. The holes would often create wedges within the barite zone of soft barite to hard dolomite creating high pressure squeeze on the bit. This would cause the teeth to disintegrate on many occasions. Drill hole FC17-10 was lost at 34 m depth in the zone and FC17-12 was lost at 57 m due to the hole diameter shrinking due to bit problems. Core recovery through the barite zone was also an issue in some holes due to washing out when not realizing the bit was deteriorating. Overall though, core recovery in the barite was an acceptable + 85%.

The 2017 holes were mostly collared in Zone B, as the barite breccia vein is thicker there. However, six of the 25 holes were collared in Zone A. A total of 1229.8 m of core was drilled during the campaign. The drilling pattern used was similar to what was used in the earlier Tiger Ridge campaigns. That is arrays of fans were drilled from prepared stations along the same road used earlier.

In addition to the 25 holes that were drilled, three channel samples, totaling 13.9 m length were cut from backhoe trenches constructed across prominent zones where the barite breccia vein outcropped. Details of the drill hole survey are shown in Table 10-5 below. Note that there are some errors in this table so the information was corrected with all other available data (maps, mineralization model trends). The final survey data used for the resource estimation is shown in Table 10-6. In more details, the length of FC17-CH2 was increased to fit with the assays that were taken, the coordinates for FC17-CH1 to FC17-CH3 were slightly adjusted to fit with the actual length sampled, the azimuth for FC17-07 and FC17-08 were adjusted to fit with the indicated "N03.46W", the channels were actually surveyed with different elevations for the start and finish so the actual dips were used in the final database.

Table 10-5: 2017 DH Survey Data (With a Few Errors)

VOYAGEUR MINERALS LTD.
FRANCES CREEK BARITE PROSPECT
2017 DRILL CAMPAIGN - SAMPLE RESULTS
PREPARED BY: Henkle and Assoc.

DRILL HOLE DATA - from Brad - 3/6/18

DDH	ELEVATION	EASTING	NORTHING	Bearing	Azimuth	Angle	Total Depth m.
FC17-01	1323.80	540805.84	5620465.94	N13W	347°	-36	18.29
FC17-02	1323.80	540805.84	5620465.94	N13W	347°	-50	19.00
FC17-03	1323.74	540807.38	5620465.02	N77E	77°	-87	24.00
FC17-04	1323.74	540807.38	5620465.02	N77E	77°	-45	21.00
FC17-05	1556.80	540463.50	5620724.71	N29E	29°	-40	46.00
FC17-06	1556.80	540463.50	5620724.70	N29E	29°	-57	64.00
FC17-07	1556.92	540462.70	5620725.00	N03.46W	365.54°	-37	69.00
FC17-08	1556.90	540462.70	5620725.00	N03.46W	365.54°	-60	66.00
FC17-09	1556.50	540464.04	5620724.49	N54E	54°	-45	73.50
FC17-10	1556.50	540464.04	5620724.49	N54E	54°	-60	34.00
FC17-11	1556.50	540462.60	5620725.00	N15.54W	344.46°	-40	74.00
FC17-12	1556.50	540462.60	5620725.00	N15.54W	344.46°	-61	57.00
FC17-13	1542.00	540475.00	5620704.00	N19.4E	19.4°	-42	63.00
FC17-14	1542.01	540475.42	5620704.54	N14.5E	14.5°	-60	63.00
FC17-15	1542.00	540475.40	5620704.50	N51.46E	51.46°	-45	60.00
FC17-16	1542.00	540475.42	5620704.54	N51.46E	51.46°	-67	60 - NO SPLS !
FC17-17	1541.80	540475.94	5620704.19	N78.46E	78.46°	-55	72.00
FC17-18	1564.05	540475.65	5620704.36	N41E	41°	-75	60 - FAULT
FC17-19	1505.53	540529.74	5620664.98	N39.46E	39.46°	-42	59.00
FC17-20	1508.42	540542.86	5620691.27	N01W	359°	-42	35.00
FC17-21	1509.80	540542.62	5620689.71	N39.46E	39.46°	-62	36.00
FC17-22	1508.27	540542.11	5620690.48	N33.5E	33.5°	-44	33.00
FC17-23	1507.99	540542.31	5620689.50	N62.4E	62.4°	-55	30.00
FC17-24	1360.80	540752.30	5620499.73	N84E	84°	-45	51.00
FC17-25	1360.80	540752.43	5620499.73	N65E	65°	-55	42.00
FC17-CHAN#3	1507.88	540556.21	5620700.23	N45E	45°	0	8.4
FC17-CHAN#2	1342.37	540784.74	5620500.16	N52E	52°	0	3
FC17-CHAN#1	1362.60	540762.71	5620517.38	N52.5E	52.5°	0	2.5

Table 10-6: 2017 DH Survey Data (Fixed Numbers for the Resource Estimation)

Hole Name	Easting	Northing	Elevation	Azimuth	Dip	Length
FC17-07	540,462.70	5,620,725.00	1,556.92	3.46	-37	69.00
FC17-08	540,462.70	5,620,725.00	1,556.90	3.46	-60	66.00
FC17-CH3	540,557.37	5,620,701.36	1,507.80	45.7	-2.7	8.40
FC17-CH2	540,785.01	5,620,500.36	1,342.19	52.9	-28.6	5.00
FC17-CH1	540,764.22	5,620,518.62	1,361.67	230.6	25.5	2.50

10.3 Results of Drilling

10.3.1 Mineralization - Frances Creek

Barite mineralization at the Frances Creek property occurs as a complex breccia vein which strikes NW and dips SW at about 40-50 degrees at the bottom zone and 65 degrees at the upper zone. The breccia vein occurs in the upper plate of the Forster Creek Thrust Fault, in the SW portion of the Frances Creek Claim, and is sub parallel to the trace of the thrust which outcrops ~ 200 m to the NE. The breccia vein material fills a small fault which was probably caused by tensional forces related to thrust emplacement. The Barite Thrust appears to act as an especially favorable host zone for barite mineralization emplacement. Barite mineralization is also found as fracture fillings, in the other minor structures at the property. The breccia vein is composed of mixed percentages of country rock (argillaceous dolomite) and white crystalline barite, which was injected into the Frances Creek Fault Zone (Figure 7-6).

As a consequence, zones were encountered within the vein with as little as 8.9% $BaSO_4$ over 8.9 m of core length and as high as 77.65% $BaSO_4$ over 2.9 m of core or 66.90% $BaSO_4$ over 17.2 m which were recovered during the 2017 drill program. The weighted average of all drill intercepts (2003 – 2005 – 2017) for the B Zone is 11.09m @ 41.2% $BaSO_4$ / 3.25 SG (calculated as for the resource estimation). The weighted average for the A Zone drill intercepts is 2.80 m @ 49.2% $BaSO_4$ / 3.40 SG.

The calculated true widths and assay results from the 2017 drill holes across the A, the B1 and the B2 Zones are as shown in Table 10-7.

Table 10-7: Calculated True Widths for 2017 Drill Holes Barite Intercepts

Hole Name	Zone	From (m)	To (m)	Length (m)	True Width (m)	BaSO4 (%)	SG	Calculated SG
FC17-05	B1	16.44	25.34	8.90	8.73	68.9	3.80	3.59
FC17-06	B1	20.30	37.50	17.20	15.28	66.9	3.71	3.58
FC17-07	B1	30.40	33.73	3.33	3.17	71.1	3.81	3.77
FC17-07	B2	47.13	54.17	7.04	6.71	51.5	3.46	3.35
FC17-08	B1	24.00	44.25	20.25	17.03	33.9	2.15	3.15
FC17-08	B2	52.20	64.50	12.30	10.35	32.1	3.18	3.13
FC17-09	B1	15.00	24.70	9.70	8.52	40.3	3.27	3.22
FC17-09	B2	42.50	55.50	13.00	11.42	24.9	3.09	3.06
FC17-10	B1	17.60	33.60	16.00	12.87	60.3	3.49	3.46
FC17-11	B1	22.20	47.30	25.10	21.09	30.6	2.40	3.13
FC17-11	B2	61.30	64.10	2.80	2.35	71.1	3.71	3.76
FC17-12	B1	25.00	50.30	25.30	19.37	50.0	3.37	3.33
FC17-12	B2	55.00	57.00	2.00	1.53	30.6	3.22	3.15
FC17-13	B1	20.50	30.80	10.30	10.06	41.9	3.28	3.24
FC17-13	B2	41.10	46.40	5.30	5.18	32.5	2.18	3.17

Hole Name	Zone	From (m)	To (m)	Length (m)	True Width (m)	BaSO4 (%)	SG	Calculated SG
FC17-14	B1	27.90	47.50	19.60	16.88	37.8	2.33	3.20
FC17-15	B1	21.50	35.70	14.20	12.67	46.2	2.88	3.33
FC17-16	B1	35.70	44.60	8.90	6.74	8.9	2.91	2.91
FC17-17	B1	30.00	53.70	23.70	16.38	35.9	3.07	3.20
FC17-20	B1	5.00	10.50	5.50	5.07	22.7	3.02	3.04
FC17-21	B1	7.00	13.30	6.30	5.24	62.0	3.12	3.59
FC17-22	B1	6.00	13.20	7.20	6.91	36.4	3.25	3.18
FC17-CH3	B1	0.00	8.40	8.40	6.90	52.2	3.48	3.43
FC17-01	A	12.00	14.90	2.90	2.57	77.7	4.02	3.91
FC17-02	A	9.00	11.00	2.00	1.76	41.4	2.32	3.28
FC17-04	A	18.00	20.00	2.00	1.47	24.6	1.65	3.08
FC17-24	A	45.00	48.00	3.00	2.03	52.5	3.48	3.44
FC17-25	A	32.70	36.90	4.20	3.43	30.1	3.17	3.14
FC17-CH1	A	0.00	2.50	2.50	2.22	50.2	3.50	3.40
FC17-CH2	A	0.00	3.00	3.00	2.66	57.6	3.52	3.52

Figure 7-6 shows core photos from drill hole FC17 – 05 and is intended to illustrate the non- homogeneous nature of the vein mineralization. The photos show that Crystalline barite in varying percentage concentrations is consistent though out the breccia zone of the vein. In order to test the purity of the crystalline barite portion of the breccia, a select sampling program was initiated. Eight drill holes were selectively re-sampled with the results shown in Table 10-8. These samples were selected from previously reported intersections of barite breccia. The pure barite zones within the breccia intercepts were then split from the vein to determine the nature of the purity of the barite.

Table 10-8: Results of Select Sampling of 2017 Drill Core (NOT Representative of the Zones)

Hole Number	Crystalline Barite Zone Sampled	%$BaSO_4$	Specific Gravity
FC17-5	23.7 – 24.9 m	97.76%	4.36
FC17-7	25.6 – 25.8 m	97.74%	4.46
FC17-7	32.4 – 32.9 m	99.12%	4.50
FC17-7	51.5 – 53.4 m	96.41%	4.44
FC17-8	24.5 – 24.9 m	97.02%	4.47
FC17-8	41.2 – 43.8 m	97.81%	4.39
FC17-9	16.9 – 24.3 m	97.58%	4.46
FC17-10	19.9 – 33.5 m	96.87%	4.36
FC17-11	33.0 – 41.9 m	97.26%	4.40
FC17-12	32.0 – 48.6 m	96.89%	4.40
FC17-15	29.7 – 32.8 m	95.32%	4.33

Crystalline barite in varying percentage concentrations is consistent though out the breccia zone of the vein. The sampling shows a very high grade for the crystalline barite. This select sampling of the crystalline barite to date indicates that it is exceptionally pure and is possibly pharmaceutical grade.

10.3.2 Reliability of Data

To the best of the writer's belief, there were no drilling, sampling or adverse recovery factors that could have materially impacted the accuracy or reliability of the assay results presented in this report. It should be noted, that true thickness are not shown for drill intercepts in Table 10-8, Table 10-9, and Table 10-10; these are the actual drill intercepts.

The Barite Purity Curve shown on Figure 14-6, shows a relation between barite grade (or purity) and SG. This chart uses assay data from all 183 samples that were assayed during the program. The linear relation shows a continuous transition from low purity / low SG samples to high purity / high SG samples. Charts such as this are standard for barite deposits worldwide. The continuous transition from 0% $BaSO_4$ – SG ~ 2.5 to 100% $BaSO_4$ – SG ~ 4.5 is strong evidence, that the assay data is reliable. This is strong evidence for data reliability.

Table 10-9: 2017 Drill Campaign – Barite Assay Results – 1 of 2

Hole Name	From (m)	To (m)	BaSO4 (%)	SG
FC17-01	12	14.9	77.65	4.02
FC17-02	9	10.2	68.92	3.87
FC17-04	18	18.94	52.3	3.52
FC17-05	16.44	25.34	68.88	3.8
FC17-06	20.3	33	73.93	3.82
FC17-06	33	37.5	45.27	3.37
FC17-07	20.2	22.6	11.97	2.93
FC17-07	25.4	26	62.06	3.59
FC17-07	30.4	33.73	71.12	3.81
FC17-07	43.2	43.72	58.26	3.57
FC17-07	47.13	54.17	51.48	3.46
FC17-08	24	30.51	26.47	3.08
FC17-08	39	44.25	86.08	4.06
FC17-08	52.2	64.5	32.13	3.18
FC17-09	15	24.7	40.29	3.27
FC17-09	28.8	30.6	10.43	2.94
FC17-09	35.5	38.3	20.8	3.05
FC17-09	42.5	55.5	24.85	3.09
FC17-10	17.6	33.6	60.32	3.49
FC17-11	22.2	26.7	26.37	3.13
FC17-11	32.7	42.9	40.5	3.33
FC17-11	43.4	45.3	75.96	3.83
FC17-11	45.3	47.3	51.39	3.33
FC17-11	51	53	29.59	3.11
FC17-11	61.3	64.1	71.08	3.71
FC17-12	20.5	21.5	19.03	2.98
FC17-12	25	32	20.31	2.96
FC17-12	32	50.3	59.79	3.51
FC17-12	50.3	52.2	15.28	2.98
FC17-12	55	57	30.62	3.22
FC17-13	20.5	30.8	41.94	3.28
FC17-13	32.9	33.2	41.63	3.34
FC17-13	41.1	42.6	48.88	3.34
FC17-13	43.7	44.2	17.03	2.97
FC17-13	44.9	46.4	60.03	3.47
FC17-14	27.9	33.3	55.11	3.38
FC17-14	36.6	43.3	53.46	3.35
FC17-14	45.9	47.5	57.92	3.4
FC17-15	21.5	27	40.5	3.13
FC17-15	29.6	30.1	99.09	4.49
FC17-15	30.1	32.1	75.7	3.98
FC17-15	32.1	32.9	95.27	4.42
FC17-15	32.9	35.7	42.67	3.18
FC17-15	38	38.4	48.1	3.31

Table 10-10: 2017 Drill Campaign – Barite Assay Results – 2 of 2

Hole Name	From (m)	To (m)	BaSO4 (%)	SG	Hole Name	From (m)	To (m)	BaSO4 (%)	SG
FC17-16	35.7	44.6	8.91	2.91	FC17-24	29	32	19.63	3.13
FC17-17	26.6	30	12.52	2.96	FC17-24	45	48	52.54	3.48
FC17-17	30	32.4	34.63	3.18	FC17-25	31.3	32.2	11.33	2.97
FC17-17	32.4	39	36.03	3.15	FC17-25	32.7	36.9	30.06	3.17
FC17-17	39	42	36.58	3.19	FC17-CH1	0	1	20.34	3.02
FC17-17	42	45	19.59	3.01	FC17-CH1	1	2	81.14	4.03
FC17-17	45	47.4	21.38	3.06	FC17-CH1	2	2.5	27.5	3.05
FC17-17	47.4	47.8	96.33	4.37	FC17-CH2	0	1	65.34	3.64
FC17-17	47.8	48.7	21.64	3.26	FC17-CH2	1	2	48.38	3.4
FC17-17	48.7	49	97.54	4.4	FC17-CH2	2	3	58.41	3.52
FC17-17	49	49.3	61.36	3.53	FC17-CH2	3	4	0.41	2.81
FC17-17	50.7	51.1	63.56	3.58	FC17-CH2	4	5	1.2	2.8
FC17-17	51.1	51.4	97.34	4.41	FC17-CH3	0	1	38.57	3.27
FC17-17	51.4	53.7	50.37	3.44	FC17-CH3	1	2	22.68	3.11
FC17-17	56.3	56.7	20.91	3.1	FC17-CH3	2	3	56.51	3.5
FC17-20	5	10.5	22.73	3.02	FC17-CH3	3	4	44.19	3.4
FC17-21	7	8.8	88.28	4.22	FC17-CH3	4	5	60.25	3.54
FC17-21	9.2	9.8	93.83	4.29	FC17-CH3	5	6	65.27	3.7
FC17-21	9.8	11	38.96	3.29	FC17-CH3	6	7	52.05	3.4
FC17-21	12	13.3	94.88	4.35	FC17-CH3	7	8	68.93	3.78
FC17-22	6	13.2	36.38	3.25	FC17-CH3	8	8.4	58.97	3.53
FC17-22	15.7	16	29.76	3.24					

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

The following section has been extracted from previous technical report.

11.1 Analysis

Loring Labs, an independent commercial analytical laboratory, was used as the laboratory for the samples taken for the 2014 and 2015 outcrop sampling campaigns, as well as for the samples taken during the 2017 drill campaign. Loring is an ISO 9001 certified lab. Three of the samples taken during the 2015 campaign were sent to SGS labs in Lakefield, ON, which is also an ISO 9001 certified lab. Both labs enjoy superb reputations for analytical accuracy and repeatability in the Canadian mining industry.

Samples were analyzed for Specific Gravity by the Le Chatelier bottle method, the official API recognized method for determination of SG for Barite. Samples were analyzed for Barium by gravimetric analysis using a fusion platinum crucible. Once the ppm value for Ba was obtained, % $BaSO_4$ was determined by a mathematical calculation (it was assumed that all the available SO_4 combined with the Ba to form Barite). Mercury content was determined by ASTM method D - 6722, which is a total mercury by direct combustion analysis.

Cadmium, lead, copper, silver and calcium analyses, as well as 39 other elements were determined by multi acid digestion - ICP methods. Soluble calcium was determined by the standard API test method to dissolve calcium and then by ICP to determine the amount of calcium dissolved.

The brightness – whiteness testing was done at SGS labs in Lakefield, ON., which is one of the only labs in Canada that does this type of work. The testing is a photovoltaic color analysis technique which measures the reflectance of light coming off of a powdered barite specimen. Several different readings are taken for each sample. Of these, the Hunter L value is the main brightness / whiteness number relied upon by the filler manufacturing industry to determine if a particular barite product makes specification. A Hunter L value of 94.0 or higher is usually required to make specification. The three samples tested from Frances Creek were all above 94.0, averaging at 94.37.

11.1.1 Laboratory Sample Preparation

Each rock chip and core sample were prepared by:

- logging the sample into the Laboratory’s tracking system (assigning the sample a unique bar code number)
- drying and weighing the sample
- fine crushing the sample to > 70% passing 2 mm
- splitting off a 250 g subsample
- pulverizing the sub sample to > 85% passing 75 microns

The sub sample was then analysed by the methods discussed in Section 11.1.

11.1.2 Laboratory Quality Assurance/Quality Control

Loring Labs and SGS Labs are both certified laboratories. Loring is certified through the ISO 9001:2008 standard and SGS through the ISO/IEC standard. To obtain these certifications, a rigorous in-house system to prevent cross contamination between samples is in place. Elements of the system include the use of barren wash material between sample preparation batches and where necessary between highly mineralized samples, through cleaning of all glassware and the tracking of samples with high mineral values. To ensure quality control and quality assurance, the lab employs, on a routine basis, a program that uses blanks, duplicates and standards.

Loring Lab's Quality Management System ISO certificate (Certificate # CERT - 0088592) issued by SAI Global, states that the lab has implemented and maintains a Quality Management System that fulfills the requirements of the ISO 9001:2008 standard. The certificate was issued on June 08, 2015 and is valid until July 12, 2018. SGS Canada's – Mineral Services – Lakefield Labs were assessed by the Standards Council of Canada (SCC) and were found to conform with the requirements of ISO/IEC 17025:2005 (CAN-P4E) and was recognized as an Accredited Testing Laboratory. The accreditation certificate for Laboratory #184 was issued on 2013-05-07 and is valid until 2017-03-06.

11.1.3 Duplicates from the Laboratory

For the 2017 drilling in particular, SGS was able to find 31 duplicate Barite grades. Some duplicates are Gravimetric duplicates for gravimetric originals (26) and the other are some ICP duplicates for some gravimetric originals (5). Given that the 2017 campaign consists of only 87 assays, the number of duplicates of 31 corresponds to 35% and that is much above the requirements. There are 7 duplicates with grades between 0 and 50% $BaSO_4$ (shown in Figure 11-1). There are 24 duplicates with grades between 70 and 100% $BaSO_4$ (shown in Figure 11-2). There are no duplicates of material in the 50 to 70% $BaSO_4$ range. All duplicates fit well within the +/- 10% margin of error except one with the original $BaSO_4$ being 48.1% and the second duplicate being exactly 1%. This result appears like a typo error in the certificate as this sample is expected to be above 1% $BaSO_4$.

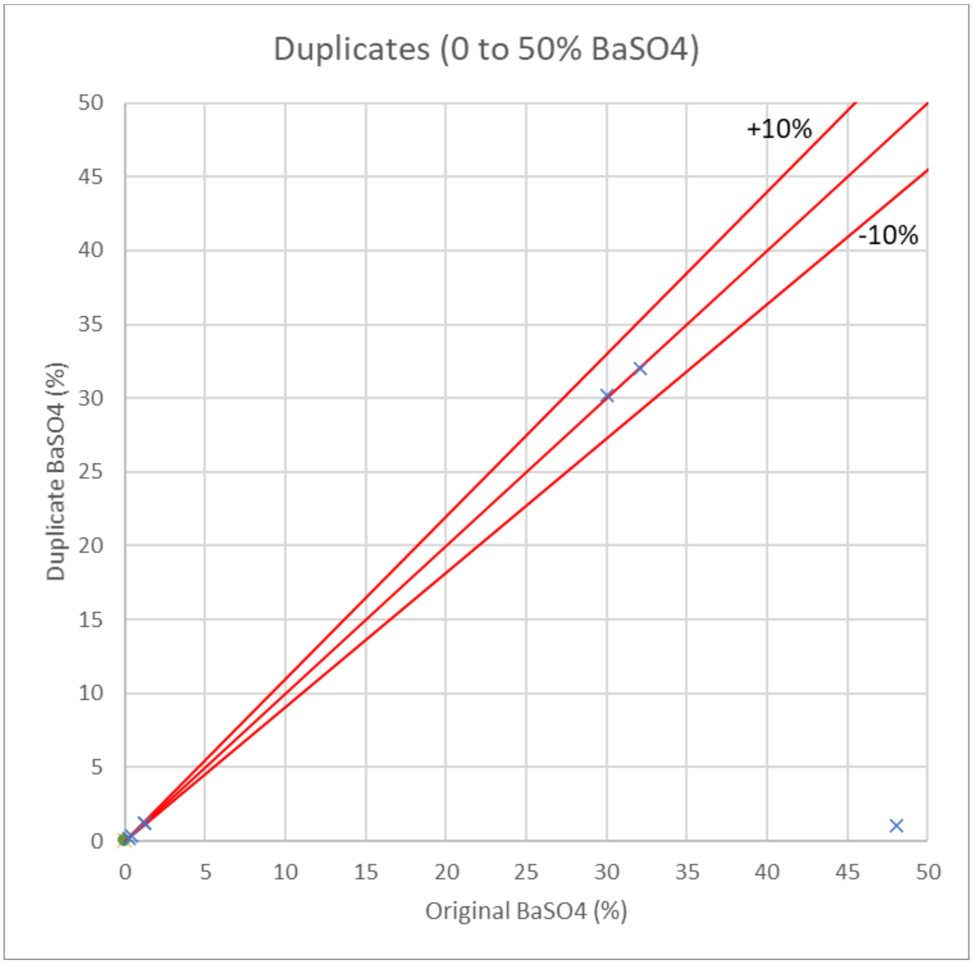


Figure 11-1: Duplicates Between 0 and 50% $BaSO_4$

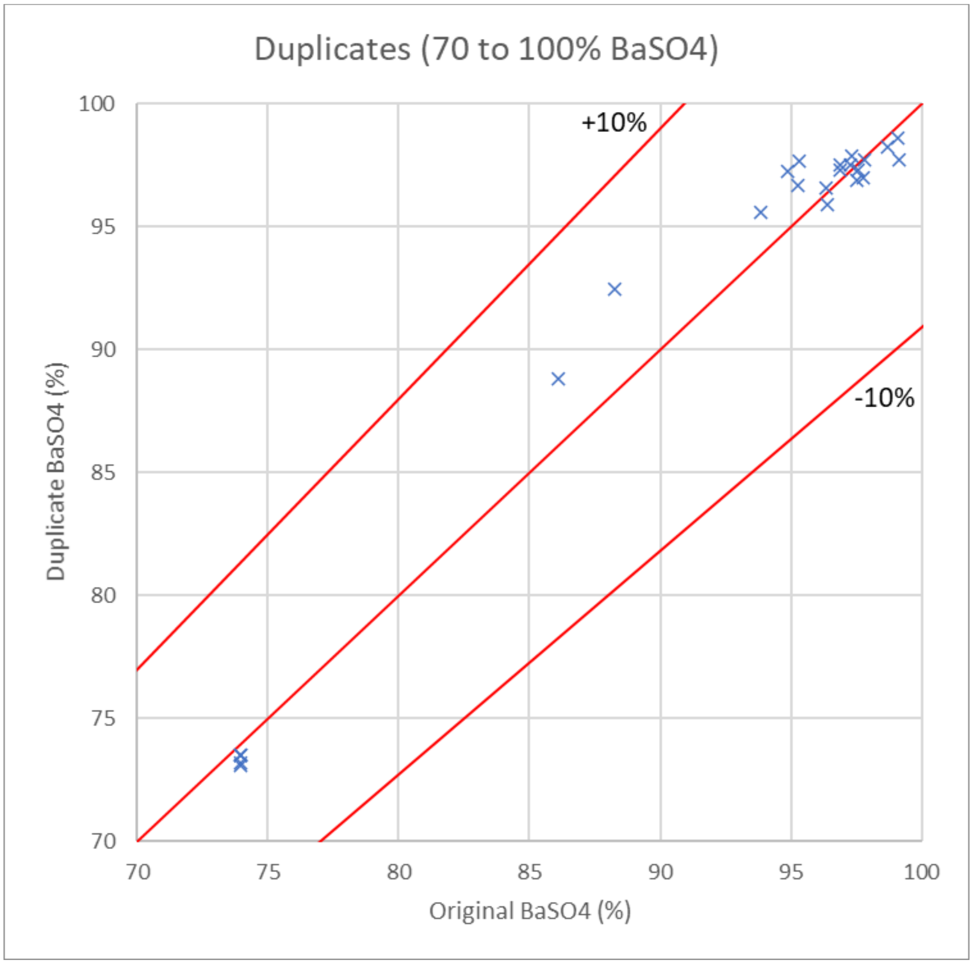


Figure 11-2: Duplicates Between 70 and 100% $BaSO_4$

11.1.4 Umpire Duplicates

In 2018, Henkle and Associates did a verification for the 2018 technical NI 43-101 report of the project.

ALS – Chemex Labs, of Reno, Nevada, USA was used as an umpire lab, to check Loring's work. Henkle and Associates sent a total of 14 samples to ALS for check testing. The samples submitted to ALS were pulps of the originals. This means that the crushing, splitting, grinding and other preparatory work prior to analysis was done at Loring Labs. Only the actual analysis work was done at the ALS umpire lab.

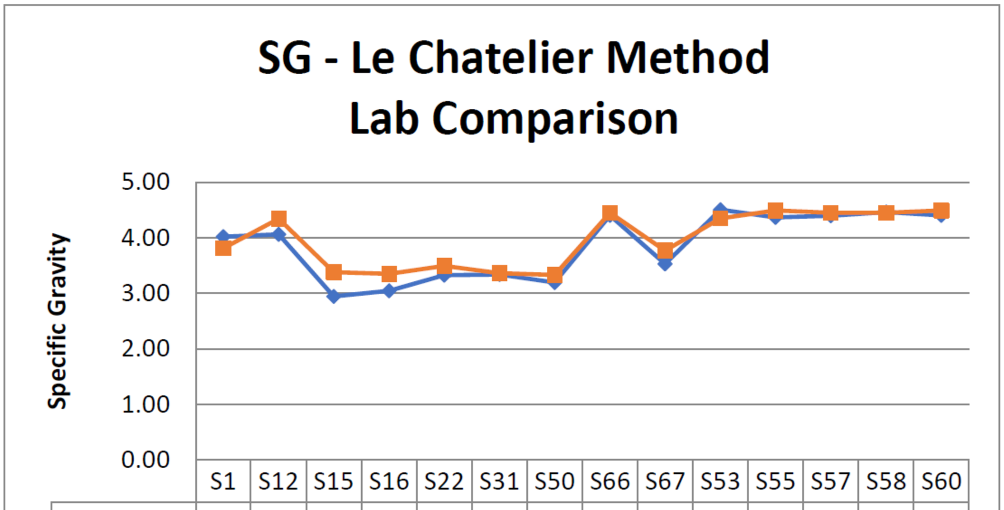
A listing of the check samples is shown in Table 11-1.

Table 11-1: Check Samples for Lab Comparison

Check Sample #	Hole #	Intersection
1	FC17-01	12m-14.9m
12	FC17-08	39m-44.25m
15	FC17-09	28.8m-30.6m
16	FC17-09	35.5m-38.3m
22	FC17-11	45.3m-47.3m
31	FC17-13	32.9m-33.2m
50	FC17-17	39m-42m
66	HG FC17-17	48.7m-49m
67	FC17-17	56.3m-56.7m
53	HG FC17-07	32.4m-32.9m
55	HG FC17-05	23.7m-24.9m
57	HG FC17-08	41.2m-43.8m
58	HG FC17-09	16.9m-24.3m
60	HG FC17-11	33m-41.9m

11.1.4.1 Specific Gravity

Specific Gravity is the most important specification for drilling grade barite and is also an important specification for the higher-grade barites. The American Petroleum Institute (API) specifies that the Le Chatelier Flask method as the default method to measure SG. Both labs used this method to determine SG, the comparison results are shown in Figure 11-3, below.



	S1	S12	S15	S16	S22	S31	S50	S66	S67	S53	S55	S57	S58	S60
Loring	4.02	4.06	2.94	3.05	3.33	3.34	3.19	4.40	3.53	4.50	4.36	4.39	4.46	4.40
ALS	3.81	4.34	3.38	3.35	3.49	3.36	3.33	4.45	3.77	4.35	4.49	4.45	4.45	4.49

Figure 11-3: Lab Comparison - SG

Figure 11-3 shows that in 11 out of the 14 analyses, the SG determined by Loring was slightly lower than that determined by ALS. The Loring values ranged between -12.9% to +5.4% (relative difference) of the

ALS reported value. The average Loring reported value was -3% (relative difference) of the reported ALS value.

11.1.4.2 Barite Grade (%$BaSO_4$)

Both labs use gravimetric methods to determine % $BaSO_4$. Loring Labs uses a methodology first published in 1905. This method precipitates $BaSO_4$ as a final analyses product and the result is reported as % BaSO4. ALS uses an in-house analytical method (Ba-GRA-81) which also precipitates BaSO4% as a final analyses product. The ALS result is reported as % Ba – stoichiometric equations must be used to convert to % BaSO4. The comparison results are shown as Figure 11-4.

Figure 11-4 shows that in 14 out of the 14 analyses, the % $BaSO_4$ determined by Loring was slightly higher than that determined by ALS. The Loring values ranged between +0.7% to +11.9% (relative difference) of the ALS reported value. The average Loring reported value was +4.5% (relative difference) of the reported ALS value.

Of the 14 samples selected for check analysis, 6 out of 14 analyzed had grades over 94% of $BaSO_4$. These were hand selected samples of nearly pure barite and are thought to be representative of the future finished barite products to be produced at the Frances Creek Property. These are samples 53, 55, 57, 58, 60 and 66; they are designated in Figure 11-4 by the initials HG (High Grade). When one considers only the 6 higher grade samples, differences are of lesser magnitude. The Loring values ranged between +0.7% to +3.0% (relative difference) of the ALS reported value. The average Loring reported value was +2.0% of the reported ALS value. This is a good correlation between the two labs when restricted to the samples above 94% of $BaSO_4$.

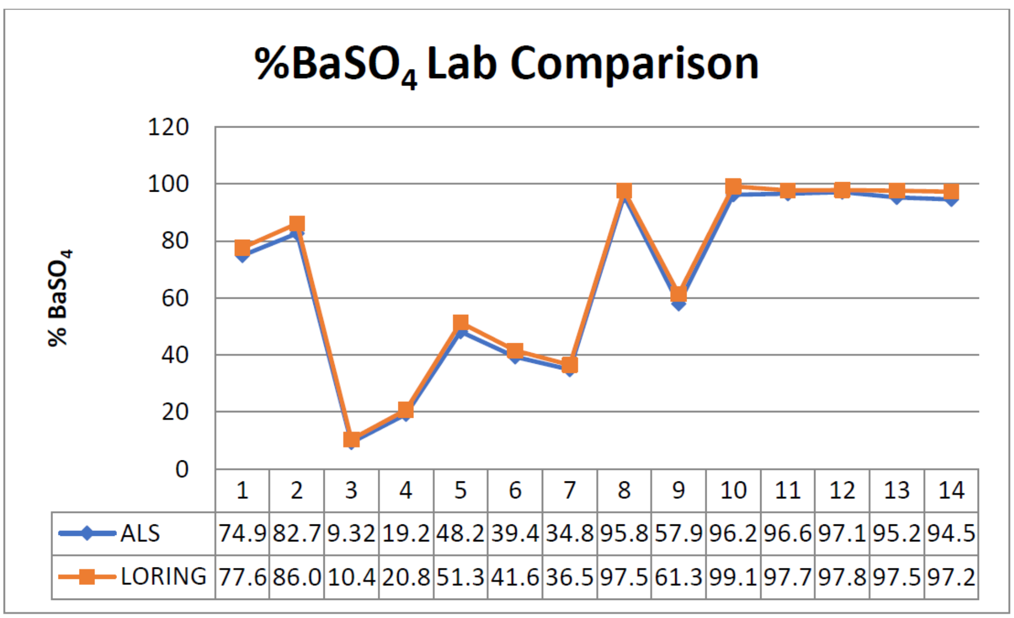


Figure 11-4: Lab Comparison – %$BaSO_4$

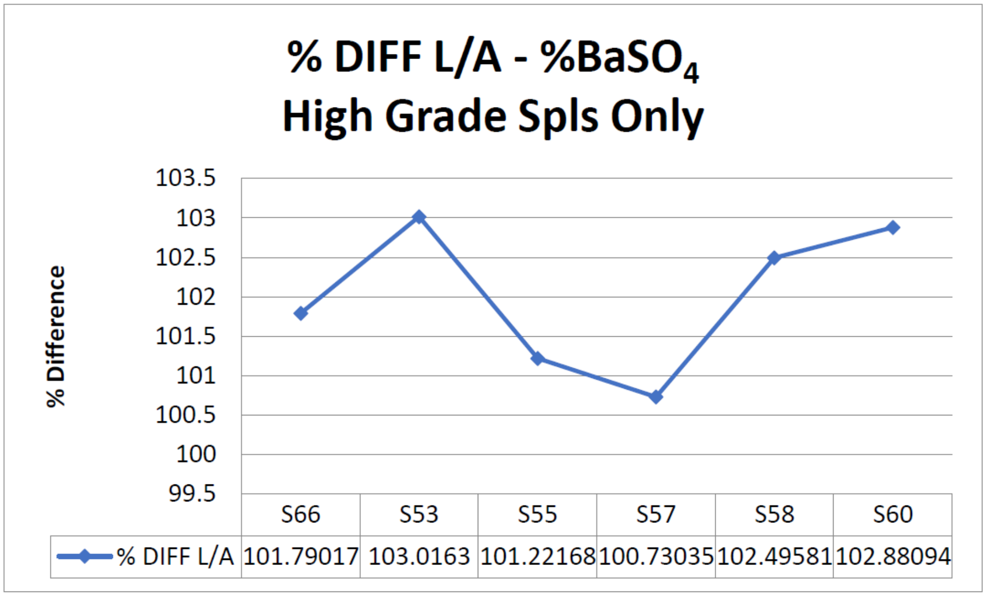


Figure 11-5: Lab Comparison – %$BaSO_4$ – High Grade Samples

11.1.4.3 ICP

The ICP analysis method is used to determine trace element specifications for the Barite industry. Both labs offer various ICP analysis packages to their clients. Loring used its standard 30 Element ICP analysis package for the Frances Creek program samples. This package uses 3 acids and aqua regia to dissolve the sample. Loring states on the analysis sheet, that the sample undergoes near total digestion. This means that near 100% of each analyte is available for the ICP analysis.

ALS offers its ME-ICP61 – 33 Element analysis, which we chose for the umpire analysis of the 14 submitted samples. Most, but not all the 30 Elements analyzed for by Loring are also analyzed for in the ALS package; lower detection limits between the two packages are also considerably different. ALS uses an industry standard 4 acid digestion to prep the samples for analysis and does not use any other reagents to completely dissolve the sample.

Table 11-2 compares the analyses of 11 of the more important trace metals which determine the specifications for higher grades of barite products. The yellow shading indicates the 6 high grade samples discussed previously. The ALS results are shown in red font.

Table 11-2: Lab Comparison – Trace Elements by ICP

		As	Bi	Cd	Cu	Hg	Pb	Sb	Sn	Sr	Fe	Ca
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
LORING	S1	1	3	1	7	na	3	4	na	3705	0.30	2.40
ALS	S1	<5	<2	<0.5	1	0.015	3	<5	na	3550	0.25	1.6
LORING	S12	2	<1	<1	3	na	1	4	na	1313	0.30	2.37
ALS	S12	<5	<2	<0.5	<1	0.013	<2	<5	na	2590	0.3	2.53
LORING	S15	2	<1	1	19	na	32	<1	na	748	0.73	13.41
ALS	S15	5	<2	<0.5	6	0.032	6	5	na	1340	0.83	15.3
LORING	S16	1	<1	<1	13	na	23	1	na	1449	0.63	12.22
ALS	S16	<5	2	<0.5	6	0.022	3	<5	na	2060	0.7	13.75
LORING	S22	<1	1	1	8	na	8	<1	na	1257	1.01	8.60
ALS	S22	<5	2	<0.5	1	0.018	3	<5	na	2650	1.05	9.11
LORING	S31	1	<1	1	5	na	12	1	na	2390	0.81	9.04
ALS	S31	<5	<2	0.5	1	0.018	4	<5	na	3230	0.84	9.63
LORING	S50	2	<1	1	1031	na	78	2	na	1778	1.20	8.19
ALS	S50	<5	<2	<0.5	3	0.026	4	<5	na	1915	1.23	8.7
LORING	S66	121	<1	<1	23	na	5	<1	na	820	0.77	7.01
ALS	S66	<5	<2	<0.5	1	<0.005	<2	<5	na	2460	0.86	7.67
LORING	S67	36	<1	<1	9	na	<1	<1	na	1759	0.05	0.36
ALS	S67	<5	<2	<0.5	<1	0.005	<2	<5	na	2910	0.04	0.35
LORING	S53	1	<1	<1	9	na	5	<1	na	1780	0.06	0.09
ALS	S53	<5	<2	<0.5	1	0.005	<2	<5	na	3040	0.06	0.08
LORING	S55	<1	2	<1	20	na	5	<1	na	1799	0.02	0.25
ALS	S55	<5	<2	<0.5	<1	<0.005	<2	<5	na	3330	0.02	0.12
LORING	S57	<1	<1	<1	9	na	4	<1	na	1937	0.01	0.31
ALS	S57	<5	<2	<0.5	1	<0.005	<2	<5	na	3080	0.01	0.03
LORING	S58	<1	<1	<1	10	na	2	<1	na	1460	0.04	0.32
ALS	S58	<5	<2	<0.5	<1	<0.005	<2	<5	na	2730	0.04	0.33
LORING	S60	<1	<1	<1	25	na	2	<1	na	1711	0.05	0.44
ALS	S60	<5	<2	<0.5	1	<0.005	<2	<5	na	3300	0.05	0.4

As – Arsenic – The lower detection limit (LDL) for As for Loring is 1 ppm; for ALS, it is 5 ppm. ALS reports all samples as < 5ppm. Loring reports 9 out of 14 as 1 or <1 ppm. Loring reports samples S66 and S67 as 121 and 36 ppm respectively. These are probably statistical outliers; S67 is a low-grade sample and the As probably resides in the gangue portion of the sample.

Bi – Bismuth – The LDL for Loring is 1 ppm while for ALS, it is 2 ppm. Both labs report very low concentrations for Bi in the samples tested.

Cd – Cadmium –. ALS reports 1 sample out of 14 at LDL (0.5 ppm) and 13 out of 14 at below LDL. Loring reports 5 samples out of 14 at the LDL (1.0 ppm) and 9 out of 14 below LDL for this metal.

Cu – Copper – The LDL for Loring was not attained, while for ALS, it is 1.0 ppm. ALS reports S15 and S16 at 6 ppm, while Loring reports the same samples at 19 and 13 ppm. ALS reports S50 at 3 ppm, while Loring reports the same sample at 1031 ppm. The remaining 11 samples are reported at 1 or <1 by ALS and a range of 25 – 3 ppm by Loring.

This is the most glaring discrepancy between the two labs. The report by Loring of 1031 and ALS of 3 ppm can be explained away as a statistical outlier – also the sample only assayed at 36.5% $BaSO_4$ by Loring and 34.8% by ALS. Most likely, the anomalous Cu is with the gangue material and will drop out during milling. For the six high grade samples, ALS reports and average of ~ 1 ppm Cu, while Loring reports an average of 16 ppm Cu.

There is still a discrepancy between the two labs when reporting Cu however. The reason for the wide difference between the two labs is probably due to incomplete digestion of the sample before analysis. Since Loring's sample preparation procedure results in complete sample digestion, Loring's analyses are probably more exact for copper.

Hg – Mercury – ALS uses ICP methodology to assay for mercury, Loring uses the Teledyne mercury analyzer method. As per Table 11-2, ALS reports values of 0.026 ppm (26 ppb) - < .005 ppm (5 ppb) for Hg; Loring did not assay these samples for mercury. Consequently, a direct cross check for this element is not possible.

Since 2014 however, Loring has assayed four core samples and 7 outcrop channel samples assaying at + 95% $BaSO_4$ for mercury. The outcrop samples were collected by Henkle and Associates. The core samples were from the 2005 drill program; these were selected by Henkle and sent for assay during the 2014 field investigation at the property. These results are shown in Table 11-3 below:

ALS reported Hg values of 26 ppb to < 5 ppb for 14 samples. Loring reported Hg values of 19 ppb to 1 ppb for a different set of 11 samples taken from the Frances Creek Property. These results are very similar. Even though the mercury assays from the two labs cannot be compared directly, an indirect comparison suggests good correlation between the two labs for this heavy metal. It should be noted that the specification limit for mercury in commercial barite products is 1 ppm, several orders of magnitude higher than were found in any of these test samples.

Pb – Lead – Inspection of Table 11-2 shows that Loring reported values of 78 ppm to 1 ppm vs. a max of 6 ppm - < 1 ppm for ALS for the 8 lower grade samples tested. For the + 94% $BaSO_4$ samples, Loring reported from 5 ppm to 2 ppm (average = 3.8 ppm) and ALS reported all 6 samples at < 2 ppm.

It is not possible to say, which lab is correct in this instance. We suspect that the reason for the wide difference between the two labs is probably due to incomplete digestion of the sample before analysis. Since Loring's sample preparation procedure results in complete sample digestion, Loring's analyses are probably more exact.

Table 11-3: Hg Assays – Loring Labs

Sample #	Hole / Depth	% BaSO4	Hg – ppb	SG
BA – Dens 1	05-03/5.9-8.2m	98.58	2	4.48
BA – Dens 2	05-03/29.7-32m	95.86	3	4.42
BA – Dens 3	05-04/7.5-8.5m	99.26	1	4.48
BA – Dens 3	05-04/16.3-20.3m	97.86	2	4.47
FC 1 – 2015	CHAN – 1.41m	98.54	7	4.48
FC 2 – 2015	CHAN – 1.25m	98.76	6	4.48
FC 3 – 2015	CHAN – 0.92m	88.76	7	4.18
FC 4 – 2015	CHAN – 1.4m	97.86	5	4.47
8/12/14-1	Rock Chip – Nd	91.78	19	4.12
8/12/14-2	Rock Chip – Nd	86.18	6	4.05
8/13/14-1	Rock Chip – Nd	70.02	14	3.62

Sb – Stibnite – The lower detection limit (LDL) for Sb for Loring is 1 ppm; for ALS, it is 5 ppm. ALS reports 13 out of 14 samples as < 5ppm, and one sample at 5 ppm. Loring reports 2 samples at 4ppm, 1 sample at 2 ppm, 2 samples at 1 ppm and 9 samples at <1 ppm. There is good correlation between the two labs for this trace metal.

Sn – Tin – Neither lab analyzed for this trace metal.

Sr – Strontium – Inspection of Table 11-2 and Figure 11-6, reveals that there is very poor correlation between the two labs with respect to ICP analyses for this trace metal. Percent differences between the two labs for this analyte range from a low of + 4.18% to a high of – 199.85%. The reason for the wide difference between the two labs is probably due to incomplete digestion of the sample before analysis. Since Loring's sample preparation procedure results in complete sample digestion, Loring's analyses are probably more exact.

Fortunately, the maximum allowable $SrSO_4$ percentage allowed in various grades of finished barite products varies from 2.0% to 2.5%, or 20,000 to 25,000 ppm $SrSO_4$. This is an order of magnitude higher than the levels of Sr detected by either lab. The lowest Sr concentration detected was 748 ppm and the highest was 3705 (both detected by Loring). A stoichiometric calculation for $SrSO_4$ using these two numbers ranges from 1570.8 ppm to 7780.5 ppm, well below these limits.

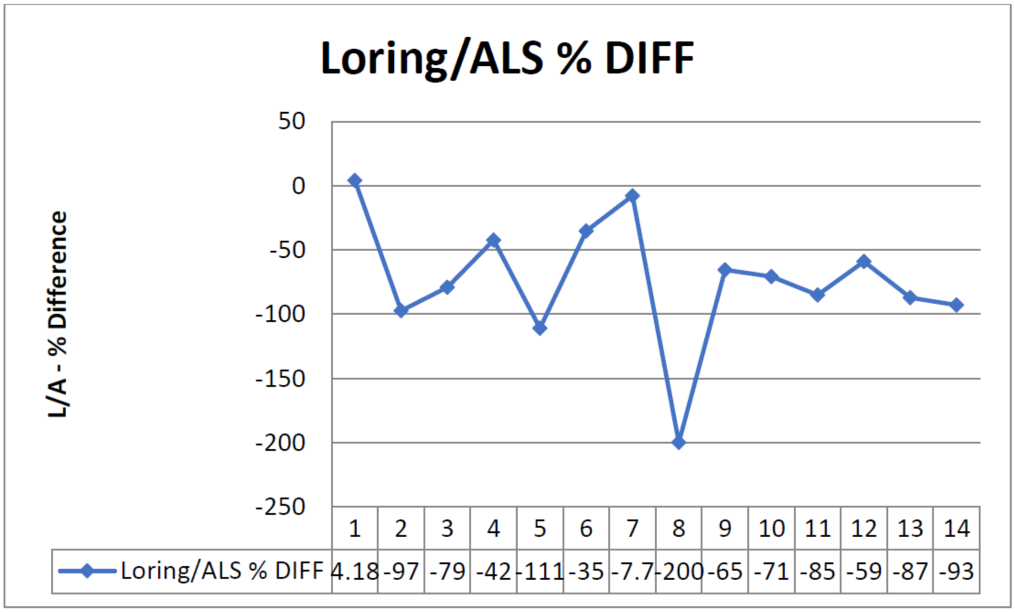


Figure 11-6: Comparison of % Difference Loring/ALS for Sr

Fe – Iron – Inspection of Table 11-2 shows that 5 out of 14 samples (36%) analyzed for this metal showed noticeable differences between the two labs, while 9 out of 14 (64%) showed no or minimal difference between the two labs.

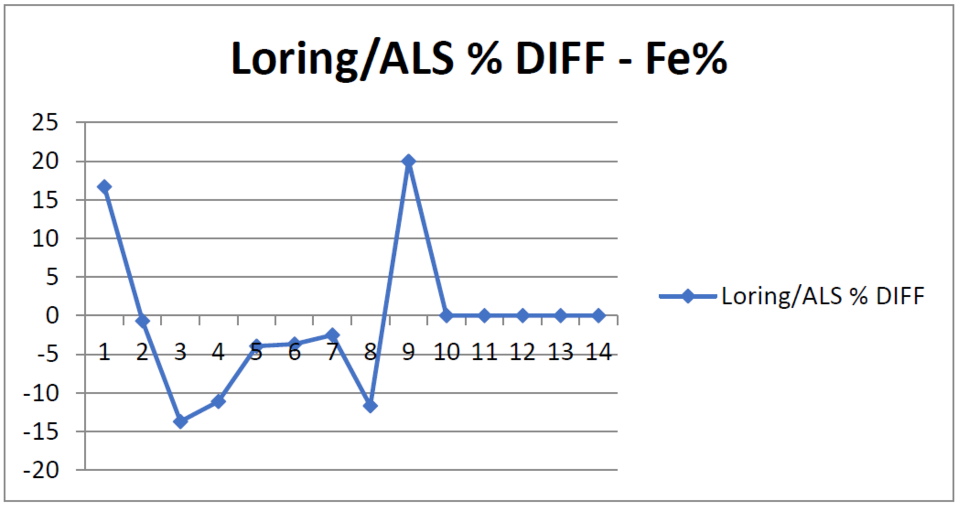


Figure 11-7: Comparison of % Difference Loring/ALS for Fe

Inspection of Figure 11-7 shows that for the 9 samples with good correlation, the difference was less than 5% for 4 of the samples and 0% for 5 of the samples. For the six +94% $BaSO_4$ samples, which Voyageur believes will be representative of the finished barite products, one had a difference of 11.7% and five had a difference of 0%.

Ca – Calcium – Inspection of Table 11-2, shows that there is a wide variation between the two labs when analyzing for this metal. The divergence between the two labs was greater than 10% in 6 out of 14 samples analyzed (43%). For the +94% $BaSO_4$ samples, the differences varied from – 3.1 to + 90.3%. Figure 11-8 shows this in graphical format.

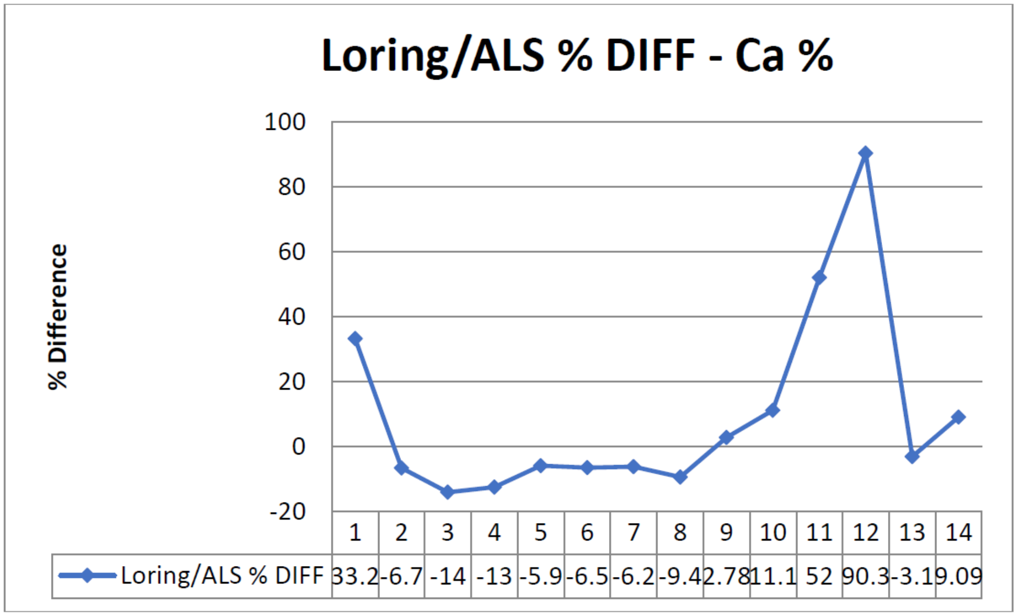


Figure 11-8: Comparison of % Difference Loring/ALS for Ca

The reason for the wide difference between the two labs is probably due to incomplete digestion of the sample before analysis. Since Loring's sample preparation procedure results in complete sample digestion, Loring's analyses are probably more exact.

Table 11-4: Results from 12% HCl Acid Test

Lot	Strontium (≤ 2.5%)	Silica (≤ 1.0%)	% BaSO4
Barite sample 1 200 mesh	0.59%	0.13%	97.80%
Barite sample 1 200 mesh 12% HCl	0.62%	0.18%	97.90%
Barite sample 2 >200 mesh	2.08%	0.17%	97.20%
Barite sample 2 >200 mesh 12% HCl	1.54%	0.15%	97.70%

Table 11-5: 2015 Outcrop Sample Results – Chemical Testing – Frances Creek Property

SAMPLE #	SAMPLE WIDTH	$BaSO_4$ %	SG	Ca ppm	Cd ppm	Hg ppb	Pb ppm	As ppm	Sr ppm	Al2O3 %	Fe2O3 %	SiO2 %
FC1 2015	1.41m	98.54	4.48	34	<1	7	6	2	8162	0.03	0.02	0.05
FC2 2015	1.25m	98.76	4.48	24	<1	6	4	1	5380	0.01	0.01	0.06
FC3 2015	0.92m	88.76	4.18	29	<1	7	4	<1	9023	0.27	0.53	0.54
FC4 2015	1.4m	97.86	4.47	24	<1	5	4	1	8864	0.06	0.03	0.10

Table 11-6: 2014 Outcrop Sample Results – Chemical Testing – Frances Creek Property

SAMPLE #	SG (4.1 - min)	% $BaSO_4$	Hg - ppm (1.0 max)	Cd - ppm (3.0 max)	SOLUABLE Ca - ppm (250 max)
8/12 - 1	4.12	91.78	.019	<1	94
8/12 - 2	4.05	86.18	.006	<1	155
8/13 - 1	3.62	70.02	.014	<1	139

11.2 Sample Security

The samples taken by both Bradley Willis and Randy Henkle between 2014 and 2016 and the 2003, 2005 and 2017 core samples collected by them, were kept under the direction of Mr. Henkle and Voyageur - Tiger Ridge personnel from the time of taking the sample until delivery to the laboratory. Based on conversations with Randy Henkle is not aware of any security or chain of custody issues with respect to sample security.

11.3 Adequacy of Sampling, Sample Preparation, Security and Analyses

The author is of the opinion that the samples taken are adequate for the purpose of this report which is to provide an independent assessment of Voyageur's Frances Creek Property, as well as an indication of the possible industrial grade quality of the barite from the Frances Creek Property. Sampling, sample prep and analyses techniques meet or exceed CIM standards. Security precautions as to sample integrity meet the standards of the industry.

12 DATA VERIFICATION

The following sub-sections summarise the data verification procedures that were carried out and completed and documented by the authors for this technical report.

As part of their verification process, the authors reviewed all geological data and databases, past public and technical reports, and reviewed procedures and protocols as practiced by the Frances Creek field and technical team. The Voyageur technical team provided all relevant data, explanations and interpretations.

In addition, as described below, the SGS team conducted its own site visit to better evaluate the veracity of the data.

SGS conducted verification of the laboratories analytical certificates and validation of the Project digital database supplied by Voyageur for errors or discrepancies. All the digital assay records were checked against the laboratory assay certificates. Verifications were carried out on drill hole locations (i.e. collar coordinates), down hole surveys, lithology, SG, trench data, and topography information. All errors found in the database were fixed and before using the data for any resource estimation procedures.

12.1 SGS Site Inspection and Data Verification

Yann Camus personally inspected the Property on October 27, 2020, accompanied by Sabry A. Abdel Sabour, Ph.D., Eng. Mining engineer and Mr. Brad Willis, P.Eng. and COO of Voyageur Pharmaceuticals Ltd.

The Figure 12-1 shows the path visited by Yann and Sabry during the site visit in yellow. The precision for the handheld GPS as used during the visit is of about 10m in XY and 20m for the elevation. Especially the project is on the slope of a mountain, so the satellite reception is not ideal. Yann and Sabry found and measured some 2017 drilling collars found as pickets. The Figure 12-2 shows the outcrop at the Zone A on the day of the visit. There was some snow coverage, but the Barite was obvious and very abundant on surface with some very high-grade blocks. The Figure 12-3 shows the Barite as found on the Zone A location at GPS point 34 taken by SGS. The Figure 12-4 shows the picket found at the location of drill holes FC17-01 and FC17-02. The Figure 12-5 shows the outcrop at the Zone B on the day of the visit. We can see on the same picture the 2 pickets found at the location of drill holes FC17-06 to FC17-12 range. The Figure 12-6 shows For each measurement, the location is within the handheld GPS error, but the pickets do not have any identification. Also, no casing was left to be able to measure azimuth and dips.

When on site, independent samples were taken for both the “Zone A” and the “Zone B”. The barite was evident, visible to the eye in the field and in the samples. Given the quantity of previous verifications and assays, these 2 samples were taken back to the SGS offices in Blainville, Québec but were not sent to the laboratory for analysis.

After the site visit, Yann and Sabry were taken by Brad to the core storage in Invermere were the 2017 drill hole core is secured. The 2003 and 2005 drill hole core is not available as it was destroyed in a fire. Yann Camus examined several holes core and accompanying drill logs and assay certificates. Assays were examined against drill core mineralized zones. As the core boxes were not in order it was not possible to find any specific box. The Figure 12-7 shows how the boxes are in piles with FC17-25 box 8 open showing sample 82 that graded 30 % $BaSO_4$. Other boxes opened and checked were FC17-06 box 5, box 6 and box 7 (from 21.2m to 34.5m) as shown in Figure 12-8. This material corresponds to the sample 6 and graded 73.93 % $BaSO_4$.

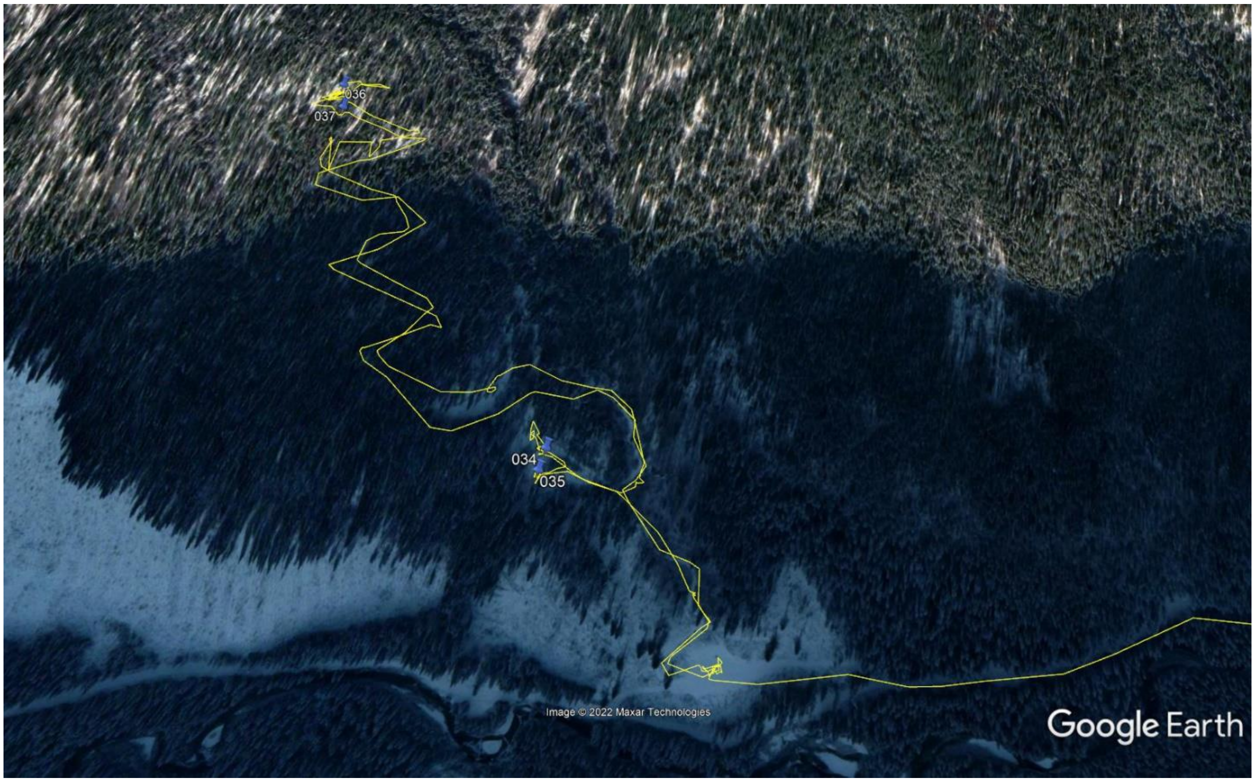


Figure 12-1: Path of the Author's Site Visit with Points of Interest

Figure 12-2: Zone A Outcrop (GPS point 34)

Figure 12-3: Pictures of the Barite on the A Zone (GPS point 34)

Figure 12-4: Pickets Found (GPS Point 35, Zone A, Location of Holes FC17-01 and FC17-02)

Figure 12-5: Zone B Outcrop (GPS Point 36, with 2 of the FC17-06 to FC17-12 Holes)

Figure 12-6: Pickets Found (GPS Point 37, Zone B, Holes FC17-16 and FC17-17)

Figure 12-7: Piles of Boxes at the Storage

Figure 12-8: Barite in Core in FC17-06 Box 5, Box 6 and Box 7

12.2 QP's Opinion as Data Adequacy

The author of this report had access to all available core, data and could visit all the site without limit. It is the author's opinion, that the project data is adequate for the purposes of this report and can be used for the resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 2018 Metallurgical Testing (Henkle, 2020)

In June and July of 2018, Voyageur initiated a laboratory metallurgical testing program for the Frances Creek Prospect. The purpose of the test program was to simulate the acid wash process, to see if the mineralized Frances Creek barites could be upgraded by relatively low cost acid wash techniques. Additional acid testing is planned for the near future. The additional testing will be used to determine the optimal acid types and treatments to produce the most beneficial metallurgical results.

Loring Labs recovered splits from 18 previously assayed core samples from storage. The splits were pulverized and then prepared for assay. Prior to assay, the samples underwent a simulated acid wash. After the acid wash, the samples were assayed by ICP analysis for the Whole Rock and ICP 30 assays and by gravimetric analysis for the $BaSO_4$% assay. The techniques uses are listed below:

4. 10% HCl Leach – 20.0 of reserved sample from previous assays were submerged in 10% HCl solution, and brought to a boil on hotplate for approx. 30 minutes. All samples were then filtered and washed out with hot distilled water to remove all remaining HCl, and allowed to dry in low temp oven to remove moisture only.
5. Post-leach sample then underwent digestion via fusion digestion – 0.2 g sample mixed evenly with lithium metaborate, and incinerated at 900 C (turning sample into a fused molten button), dissolved into solution in 5% nitric acid. Solution was then submitted to ICP-OES for Whole Rock and ICP 30 element packages. Silica % was characterized separately via a gravimetric method, and Loss on Ignition was done by burning off the solid sample at 900 C.

   Fusion digestion method was used for post-leach samples since it allows for better recovery in strontium.

   It is worth noting that near-total digestion method was used originally for pre-leach samples. This is done by digesting 0.5 g of the solid sample overnight in HF, and then working it up with Aqua Regia, and then submitted to ICP for ICP 30 Element.
6. $BaSO_4$ % was characterized by gravimetric method for both pre- and post-leach samples. There was no change in methodology used.

The 10% HCL leach was a reasonable lab scale test to simulate an industrial scale acid leach. The post leach assays give a reasonable picture of the effectiveness of the leach process when compared to the original assay results from the 2017 drill program testing. The results of the test are shown in Table 13-1, Table 13-2, Table 13-3, and Table 13-4.

The acid leach (simulated acid wash) testing was successful, in that it showed that $BaSO_4$ % increased (0.7% Avg) slightly, due to dissolution of Fe_2O_3, $CaCO_3$ and other acid soluble components. It also showed a marked decrease in Fe_2O_3 from an average of 0.31% to an average of 0.01%; which is well below the limit for all the higher end markets. Likewise, $CaCO_3$ % was reduced to an average of 2.3% (too high for the paint grade market limit of 0.5%), to less than 0.5% for all 18 samples.

It was impossible to compare before and after results for $SrSO_4$%, as the digestion method was not the same for the two assay runs. What the analyses did show though was that for the acid treated samples, $SrSO_4$% will meet paint grade specifications of < 3.5%. The average of 2.395% $SrSO_4$ for the 18 samples is just below the 2.5% cutoff for pharmaceutical grade barite. Half of the samples returned assays above and half below the cutoff. This means that the Blanc Fixe (AKA – Black Ash Process) precipitation technique will probably have to be used to produce a consistent product for the pharmaceutical market.

Gravity separation testing (jigging and tabling) is planned for the next phase of the project, Strontium assaying of the concentrates produced by this testing should be part of the test. It is possible that the crystalline barite may lose strontium during the gravity concentration process. This is because the SG of pure $BaSO_4$ is 4.5, while the SG of pure $SrSO_4$ is 4.0 (11% lower).

It was impossible to compare before and after results for Heavy metals, as the digestion method was not the same for the two assay runs.

In conclusion, the lab scale metallurgical testing program indicated that conventionally milled barite concentrates from Frances Creek should be able to be sold into the paint grade markets using only acid washing as an advanced metallurgical processing technique. The more expensive Blanc Fixe precipitation technique should not be necessary to access these markets.

Blanc Fixe techniques (AKA – Black Ash Process) will probably be required in order to produce pharmaceutical grade barite from the Frances Creek prospect however.

The acid tests reported on above are initial tests. Voyageur is in the process of testing multiple types of acids with various strengths. Upon completion of all acid testing, more advanced conclusions can be arrived at as to the methodology of using acid to high grade the barite concentrates for paint, filler and pharmaceutical markets.

Table 13-1: % Difference After Leach – $BaSO_4$%

	BEFORE	AFTER	DIFF
	Reported	Reported	AFT - BEFORE
Sample #	% BaSO4	% BaSO4	% BaSO4
12	86.08	88.82	2.74
39	99.09	98.61	-0.48
41	95.27	96.69	1.42
53	99.12	97.72	-1.4
54	96.41	95.9	-0.51
55	97.76	96.96	-0.8
57	97.81	97.69	-0.12
58	97.58	97.29	-0.29
59	96.87	97.49	0.62
60	97.26	97.51	0.25
61	96.89	97.32	0.43
62	95.32	97.68	2.36
64	96.33	96.58	0.25
66	97.54	96.89	-0.65
69	97.34	97.88	0.54
73	88.23	92.43	4.2
74	93.83	95.56	1.73
76	94.88	97.23	2.35
	AVG % Diff = 0.70% - 18 samples		

Table 13-2: % Fe_2O_3 – After Leach

ACID WASHING - REDUCTION IN Fe2O3					
	BEFORE			AFTER	
		Calculated	SPEC	Reported	
Sample #	ICP - Fe%	Fe2O3%	< 0.1%	Fe2O3%	Remarks
12	0.30	0.85228	Fail	<0.01	Spec
39	0.03	0.078078	Spec	<0.01	Spec
41	0.04	0.10439	Fail	<0.01	Spec
53	0.06	0.1716	Fail	<0.01	Spec
54	0.02	0.0572	Spec	<0.01	Spec
55	0.02	0.0572	Spec	<0.01	Spec
57	0.01	0.0286	Spec	<0.01	Spec
58	0.04	0.1144	Fail	<0.01	Spec
59	0.05	0.143	Fail	<0.01	Spec
60	0.05	0.143	Fail	<0.01	Spec
61	0.03	0.0858	Spec	<0.01	Spec
62	0.02	0.0572	Spec	<0.01	Spec
64	0.07	0.2002	Fail	<0.01	Spec
66	0.05	0.143	Fail	<0.01	Spec
69	0.61	1.7446	Fail	<0.01	Spec
73	0.29	0.8294	Fail	0.03	Spec
74	0.13	0.3718	Fail	0.01	Spec
76	0.12	0.3432	Fail	0.01	Spec
	NOTE: All Spls meet Paint, Glass & Filler Spec with Acid Wash				

Table 13-3: % Difference After Leach – $CaCO_3$%

ACID WASHING - REDUCTION IN CaCO3							
	BEFORE			AFTER			
		Calculated	Calculated	Reported	Calculated	Paint Spec	
Sample #	ICP - Ca%	CaO%	CaCO3%	CaO%	CaCO3%	CaCO3	Remarks
12	2.37	3.318	5.91789	0.02	0.0356	< 0.50%	Spec
39	0.09	0.126	0.22473	0.03	0.0534	< 0.50%	Spec
41	0.8	1.12	1.9976	0.01	0.0178	< 0.50%	Spec
53	0.09	0.126	0.22473	0.01	0.0178	< 0.50%	Spec
54	0.56	0.784	1.39832	0.01	0.0178	< 0.50%	Spec
55	0.25	0.35	0.62425	0.01	0.0178	< 0.50%	Spec
57	0.31	0.434	0.77407	0.01	0.0178	< 0.50%	Spec
58	0.32	0.448	0.79904	0.01	0.0178	< 0.50%	Spec
59	0.36	0.504	0.89892	0.01	0.0178	< 0.50%	Spec
60	0.44	0.616	1.09868	0.01	0.0178	< 0.50%	Spec
61	0.33	0.462	0.82401	0.01	0.0178	< 0.50%	Spec
62	1.87	2.618	4.66939	0.03	0.0534	< 0.50%	Spec
64	0.37	0.518	0.92389	0.01	0.0178	< 0.50%	Spec
66	0.36	0.504	0.89892	0.01	0.0178	< 0.50%	Spec
69	5.96	8.344	14.88212	0	0	< 0.50%	Spec
73	0.97	1.358	2.42209	0.01	0.0178	< 0.50%	Spec
74	0.58	0.812	1.44826	0.01	0.0178	< 0.50%	Spec
76	0.75	1.05	1.87275	0.01	0.0178	< 0.50%	Spec
		NOTE: All Spls meet Paint/Chem Spec with Acid Wash					

Table 13-4: % $SrSO_4$ - Difference After Leach – yellow indicates too high for Voyageur

	ACID WASH		
	Reported	Fus - Digest	Calculated
Sample #	% BaSO4	Sr ppm	SrSO4%
12	88.82	10834	2.2708064
39	98.61	8878	1.8608288
41	96.69	7625	1.5982
53	97.72	10464	2.1932544
54	95.9	10909	2.2865264
55	96.96	12954	2.7151584
57	97.69	12942	2.7126432
58	97.29	10162	2.1299552
59	97.49	12712	2.6644352
60	97.51	12312	2.5805952
61	90.71	14799	3.1018704
62	97.68	10108	2.1186368
64	96.58	11152	2.3374592
66	96.89	12412	2.6015552
69	97.88	5271	1.1048016
73	92.43	13935	2.920776
74	95.56	14088	2.9528448
76	97.23	14200	2.97632

NOTE: All Spls meet Paint Spec (< 3.5%) with Acid Wash

13.2 2021 SGS Test on Beneficiation of Barite Ore from the Frances Creek Deposit

13.2.1 Introduction

This report presents the details of testwork conducted on samples received from TOMRA mineral sorting from the barite resource, Frances Creek, located in British Columbia, Canada. he objectives of this program were to obtain data to support the economic evaluation of the Frances Creek deposit by revisiting historical testwork conditions and expanding the previous study to include regrinding and solid-liquid separation. The test program included bench scale testing of gravity separation, acid washing, fine grinding, and solid-liquid separation.

The test program was directed by Mr. Brad Willis (Voyageur Pharmaceuticals) and the results were forwarded to him as they became available.

13.2.2 Testwork Summary

13.2.3 Material Receipt

Products of ore sorting testwork conducted by TOMRA on the Pedley Mountain and Frances Creek deposits were stored at SGS Lakefield under project number 17032-01 in containers CC000110757 and CC000110758. The Pedley Mountain samples (CC000110757) were returned to storage under 17032-01 and the Frances Creek samples were inventoried and labelled for testing under project 18503-01. The inventory is presented in Table 13-5.

Table 13-5: Inventory of Frances Creek Ore Sorting Products

Test	Desc 1	Desc 2	Grainsize (mm)	Mass (kg)
Test 1.1	Waste	Eject	+12 mm	37.00
Test 1.2	Product	Drop	+12 mm	24.40
Test 1.2	Waste	Eject	+12 mm	16.40
Test 3.1	Product	Drop	2 - 4 mm	2.80
Test 3.1	Waste	Eject	2 - 4 mm	2.70
Test 4.1	Waste	Eject	2 - 4 mm	0.25
Test 4.1	Product	Drop	2 - 4 mm	3.10
Test 5.1	Product	Drop	2 - 4 mm	0.90
Test 5.1	Waste	Eject	2 - 4 mm	1.60
Test 9.1	Product	Drop	4 - 6 mm	3.40
Test 9.1	Waste	Eject	4 - 6 mm	2.50
Test 10.1	Product	Drop	4 - 6 mm	3.90
Test 10.1	Waste	Eject	4 - 6 mm	0.10
Test 11.1	Product	Drop	4 - 6 mm	1.00
Test 11.1	Waste	Eject	4 - 6 mm	1.50
Test 15.1	Product	Drop	6 - 12 mm	8.70
Test 15.1	Waste	Eject	6 - 12 mm	4.10
Test 16.1	Product	Drop	6 - 12 mm	10.30
Test 16.1	Waste	Eject	6 - 12 mm	0.10
Test 17.1	Product	Drop	6 - 12 mm	4.00
Test 17.1	Waste	Eject	6 - 12 mm	3.40
Test 1.2	Product	Drop	-2 mm	6.40
Test 1.2	Waste	Eject	-2 mm	4.10

13.2.4 Sample Preparation and Characterization

For each of the 23 Frances Creek sorting products, a 1 kg aliquot was representatively subsampled for testing and the remainder stored as reject. For samples less than 1 kg, the entire sample was used. Each test sample was crushed to pass nominal 6 mesh (3.36 mm). A 50 g aliquot was riffled from each of the crushed test samples and submitted for chemical analyses including whole rock by ICP, ICP-MS including barium, strontium, and mercury. A summary of results is presented in Table 13-7. The full suite of assays are available through Voyageur Pharmaceuticals Ltd. Table 13-6 presents the conversion of barium and strontium analyses to $BaSO_4$ and $SrSO_4$, respectively.

Table 13-6: Conversion of Barium and Strontium to Sulphates

Sample	Ba % (dir.)	$BaSO_4$ % (calc.)	Sr % (dir.)	$SrSO_4$ % (calc.)
Test 1.1 Waste	1.35	2.29	0.05	0.10
Test 1.2 Prod	59.6	101.3	1.37	2.62
Test 1.2 Waste	29.8	50.6	0.68	1.30
Test 3.1 Prod	55.7	94.6	1.26	2.41
Test 3.1 Waste	19.4	33.0	0.44	0.84
Test 4.1 Waste	42.0	71.4	0.96	1.84
Test 4.1 Prod	61.9	105.2	1.39	2.66
Test 5.1 Prod	52.6	89.4	1.19	2.28
Test 5.1 Waste	11.9	20.2	0.28	0.54
Test 9.1 Prod	57.4	97.5	1.30	2.49
Test 9.1 Waste	12.0	20.4	0.26	0.50
Test 10.1 Prod	60.7	103.1	1.39	2.66
Test 10.1 Waste	20.9	35.5	0.47	0.90
Test 11.1 Prod	45.7	77.6	0.99	1.89
Test 11.1 Waste	7.54	12.8	0.18	0.34
Test 15.1 Prod	52.9	89.9	1.18	2.26
Test 15.1 Waste	5.98	10.16	0.15	0.29
Test 16.1 Prod	60.0	101.9	1.35	2.58
Test 16.1 Waste	17.5	29.7	0.40	0.77
Test 17.1 Prod	28.7	48.8	0.66	1.26
Test 17.1 Waste	2.17	3.69	0.06	0.11
Test 1.2 Prod (-2mm)	61.1	103.8	1.37	2.62
Test 1.2 Waste (-2mm)	33.6	57.1	0.76	1.45

Highlighted samples used to form Master Composite

Table 13-7: Chemical Analyses of Frances Creek Ore Sorting Products

Sample	Assays (%)															
	Ba	Sr	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	$P2O_5$	MnO	Cr_2O_3	V_2O_5	LOI	Hg
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	g/t
Test 1.1 Waste	1.35	0.05	27.1	2.78	1.92	13.6	19.7	0.05	1.13	0.14	0.03	0.08	< 0.01	< 0.01	31.1	< 0.3
Test 1.2 Prod	59.6	1.37	2.06	0.30	0.23	0.76	1.28	0.03	0.10	0.02	< 0.01	0.01	< 0.01	< 0.01	2.16	< 0.3
Test 1.2 Waste	29.8	0.68	14.9	1.40	1.08	7.13	10.9	0.04	0.57	0.09	0.02	0.04	< 0.01	< 0.01	17.0	< 0.3
Test 3.1 Prod	55.7	1.26	4.47	0.41	0.35	1.31	2.17	0.03	0.17	0.02	< 0.01	0.02	0.01	< 0.01	3.61	< 0.3
Test 3.1 Waste	19.4	0.44	20.4	2.33	1.49	9.11	13.5	0.04	0.92	0.12	0.02	0.05	< 0.01	< 0.01	21.3	< 0.3
Test 4.1 Waste	42.0	0.96	10.5	1.36	0.94	4.01	6.40	0.03	0.52	0.12	0.01	0.02	0.02	0.01	9.93	< 0.3
Test 4.1 Prod	61.9	1.39	1.21	0.12	0.12	0.30	0.56	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.98	< 0.3
Test 5.1 Prod	52.6	1.19	6.75	0.45	0.45	1.88	3.18	< 0.01	0.18	0.04	< 0.01	< 0.01	< 0.01	< 0.01	4.90	< 0.3
Test 5.1 Waste	11.9	0.28	21.1	1.54	1.65	11.5	17.4	0.02	0.67	0.10	0.01	0.07	< 0.01	< 0.01	27.5	< 0.3
Test 9.1 Prod	57.4	1.30	3.86	0.32	0.30	1.05	1.73	0.01	0.13	0.02	< 0.01	< 0.01	< 0.01	< 0.01	2.83	< 0.3
Test 9.1 Waste	12.0	0.26	23.2	2.54	1.64	10.9	16.0	0.04	1.05	0.13	0.02	0.07	< 0.01	< 0.01	25.3	< 0.3
Test 10.1 Prod	60.7	1.39	1.99	0.23	0.20	0.46	0.83	0.02	0.06	0.02	< 0.01	< 0.01	< 0.01	< 0.01	1.43	< 0.3
Test 10.1 Waste	20.9	0.47	21.1	2.74	1.84	8.14	12.3	0.07	0.99	0.17	0.03	0.05	< 0.01	< 0.01	18.9	< 0.3
Test 11.1 Prod	45.7	0.99	10.7	0.78	0.67	3.02	5.01	0.01	0.35	0.05	< 0.01	0.03	< 0.01	< 0.01	7.67	< 0.3
Test 11.1 Waste	7.54	0.18	23.8	1.77	1.64	12.4	18.5	0.03	0.76	0.11	0.01	0.06	< 0.01	< 0.01	29.1	< 0.3
Test 15.1 Prod	52.9	1.18	5.14	0.45	0.41	2.15	3.46	< 0.01	0.18	0.02	< 0.01	0.02	< 0.01	< 0.01	5.46	< 0.3
Test 15.1 Waste	5.98	0.15	25.9	2.91	1.80	12.3	17.9	0.03	1.21	0.15	0.03	0.07	< 0.01	< 0.01	28.4	< 0.3
Test 16.1 Prod	60.0	1.35	2.21	0.22	0.21	0.68	1.19	0.01	0.08	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	1.98	< 0.3
Test 16.1 Waste	17.5	0.40	23.7	2.76	1.89	8.56	13.7	0.15	0.86	0.15	0.03	0.06	< 0.01	< 0.01	20.0	< 0.3
Test 17.1 Prod	28.7	0.66	19.5	1.43	1.06	6.47	9.88	0.02	0.68	0.10	0.01	0.03	< 0.01	< 0.01	15.7	< 0.3
Test 17.1 Waste	2.17	0.06	22.9	1.60	1.68	14.5	21.4	0.03	0.66	0.09	0.02	0.08	< 0.01	< 0.01	33.6	< 0.3
Test 1.2 Prod (-2mm)	61.1	1.37	1.46	0.21	0.18	0.47	0.89	0.02	0.08	< 0.01	< 0.01	0.01	< 0.01	< 0.01	1.50	< 0.3
Test 1.2 Waste (-2mm)	33.6	0.76	11.7	0.94	1.15	6.35	10.2	0.01	0.40	0.06	< 0.01	0.05	< 0.01	< 0.01	15.7	< 0.3

Using the assay results in consultation with the client, nine of the high-grade test products were selected to form a master composite (highlighted in Table 13-6). The test sample rejects from these nine samples were crushed to nominally pass 10 mesh (1,680 µm), homogenized, and then riffled into 10 kg test charges labelled as “Master Comp”. A representative subsample of the Master Comp was submitted for chemical analyses as presented in Table 13-8.

Table 13-8: Master Comp Chemical Analyses

Master Comp			
ICP-MS		*ICP-MS*	
BaO (%)	57.7	Ag (g/t)	< 0.2
SrO (%)	1.29	As (g/t)	< 10
GFAA		Be (g/t)	< 10
Hg (g/t)	< 0.3	Bi (g/t)	< 0.6
WRA by ICP		Cd (g/t)	< 0.2
SiO_2 (%)	3.47	Co (g/t)	0.9
Al_2O_3 (%)	0.32	Cr (g/t)	< 20
Fe_2O_3 (%)	0.28	Cu (g/t)	59
MgO (%)	1.05	Li (g/t)	< 8
CaO (%)	1.75	Mo (g/t)	< 0.6
Na_2O (%)	0.04	Ni (g/t)	< 2
K_2O (%)	0.12	Pb (g/t)	< 20
TiO_2 (%)	0.02	Sb (g/t)	< 0.8
P_2O_5 (%)	< 0.01	Se (g/t)	< 10
MnO (%)	< 0.01	Sn (g/t)	< 2
Cr_2O_3 (%)	< 0.01	Tl (g/t)	< 0.4
$V2O_5$ (%)	< 0.01	U (g/t)	1.7
LOI (%)	2.85	Y (g/t)	11.4
Sum (%)	9.90	Zn (g/t)	104

13.2.5 Development of Test Flowsheet

The Master Comp was initially screened at 500 and 75 µm, with the minus 75 µm being a tailings output stream. The -1680/+500 µm and -500/+75 µm fractions were then sent to gravity separation testwork. Following the initial stage of gravity testing, the material went through a primary HCl wash. The original plan included secondary gravity separation after the primary HCl wash, however fines were generated during the initial leaching stage and the resulting material was unfit for further gravity testwork. Selected materials were then combined for regrind testing before going through final acid leaching and solid-liquid separation. The report will go into further detail to explain the various flowsheet unit operations. The process flowsheet used for the mill design, as described, is presented in Figure 13-1.

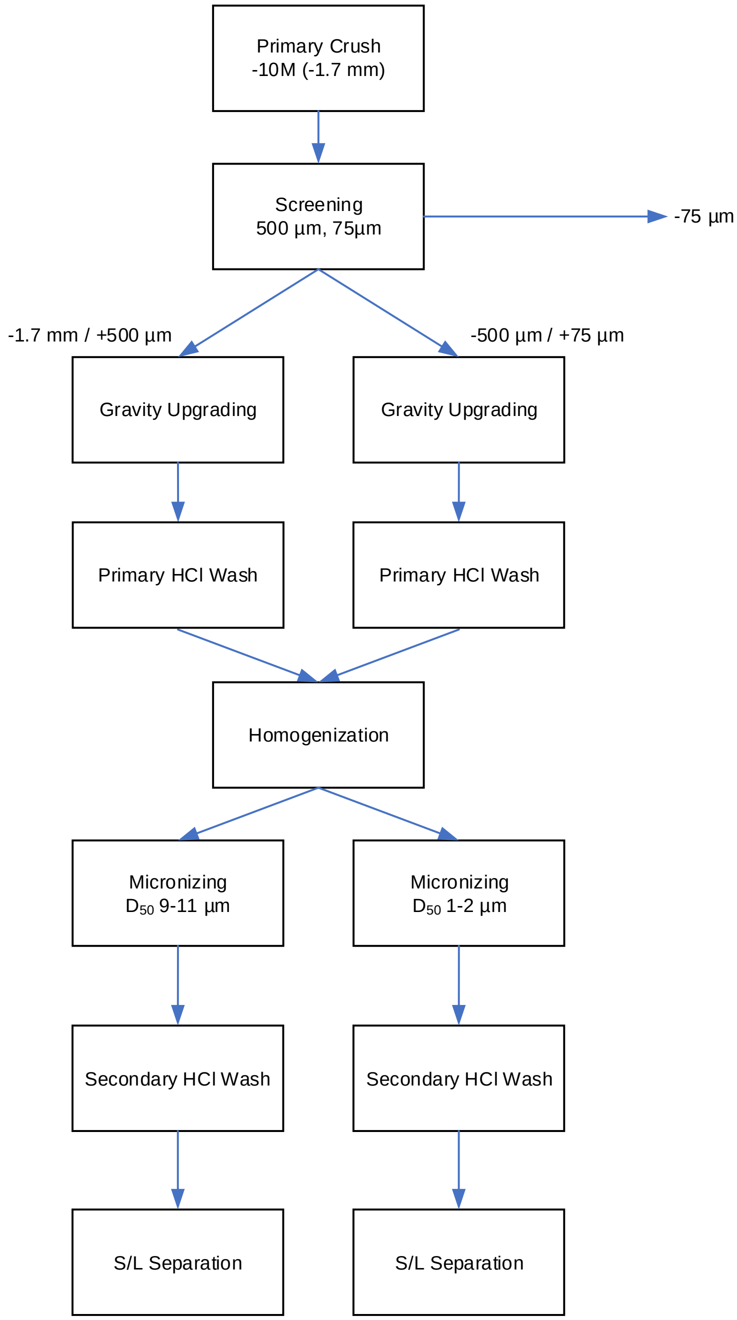


Figure 13-1: Design Process Flowsheet

In order to optimize mineral separation using laboratory scale equipment, the gravity upgrading stage for each size fraction produced both high- and mid-grade products which were then processed separately through the primary acid washing, micronizing, secondary acid washing, and solid-liquid separation stages.An overview is presented in Figure 13-2.

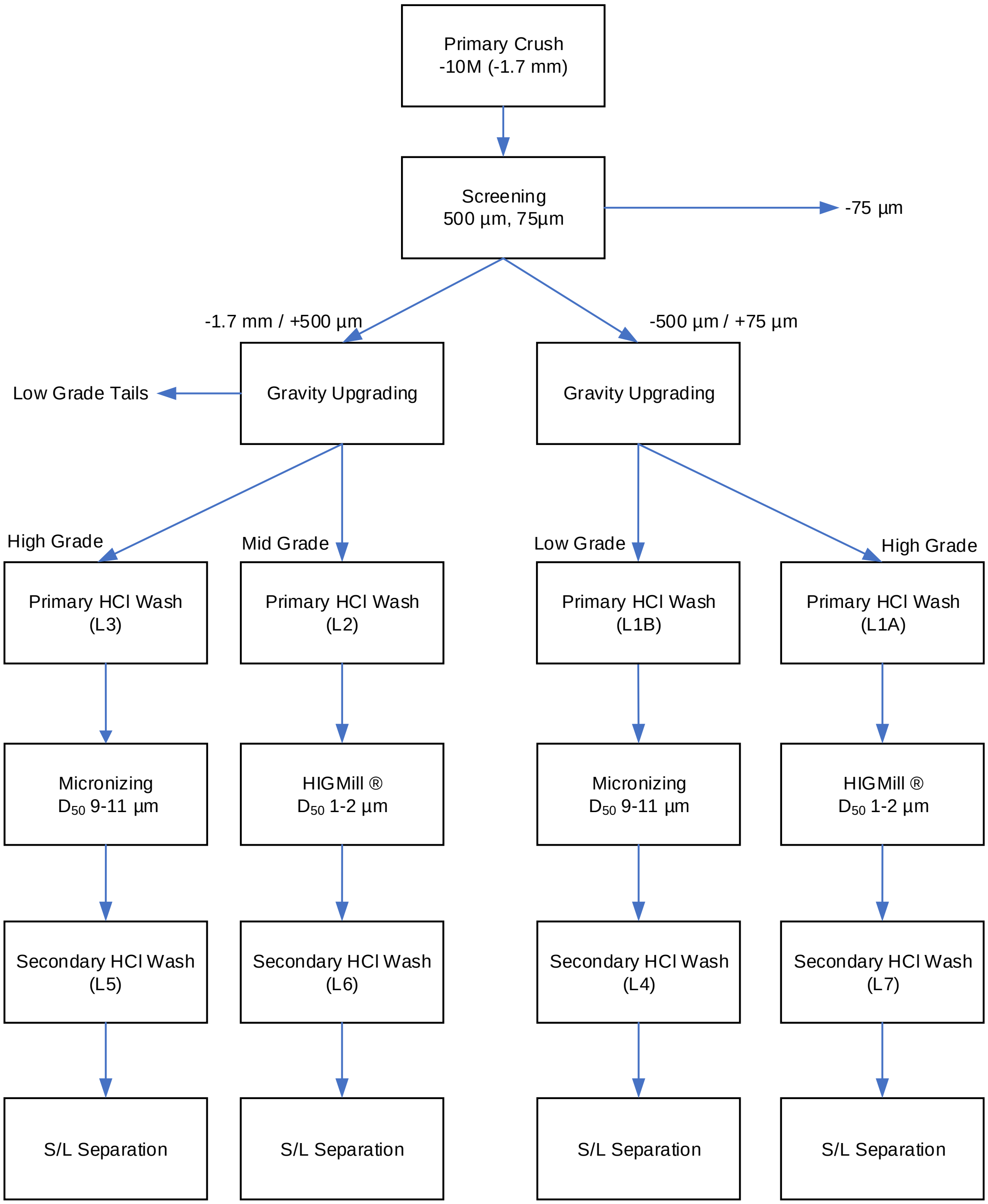


Figure 13-2: Laboratory Testing Flowsheet

13.2.6 Gravity Testing

The Master Comp test charges were combined to form a feed charge of 39.9 kg which was screened into three size fractions: +500 µm, -500/+75 µm, and -75 µm. Each fraction was weighed, subsampled and submitted for chemical analyses. Key assays and their metallurgical balance are presented in Table 13-9 and the full assay suites are available through Voyageur Pharmaceuticals Ltd. As in the mine process flowsheet, the finest fraction (-75 µm) was removed and stored. The two remaining fractions were passed across a Wilfley Table to create upgraded products for primary acid washing as well as final tailings.

Table 13-9: Screening Assays and Metallurgical Balance

Fraction	Weight		Assays, %						% Distribution					
	g	%	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg
+500 µm	23017.5	58.2	86.9	2.30	0.09	4.08	1.37	0.70	**57.3**	57.9	59.0	69.8	64.0	64.2
-500/75 µm	10537.3	26.6	90.7	2.35	0.07	2.44	0.97	0.45	**27.4**	27.0	21.4	19.1	20.6	19.1
-75 µm	6007.8	15.2	89.1	2.30	0.12	2.48	1.26	0.70	**15.3**	15.1	19.6	11.1	15.3	16.8
Head (calc)	39562.6	100.0	88.2	2.32	0.09	3.40	1.25	0.63	**100.0**	100.0	100.0	100.0	100.0	100.0
Head (dir)			87.8	2.29	0.10	3.47	1.25	0.63						

As part of the scoping test procedure, the following products were collected from the coarse +500 µm fraction: Wilfley Conc 1, Wilfley Conc 2, Wilfley Mids, and Wilfley Tails. The Wilfley Mids product was passed over the Wilfley Table a second time, producing a Mids Wilfley Conc, Mids Wilfley Mids, and Mids Wilfley Tailings. The +500 µm products were submitted for chemical analyses, which are presented along with its metallurgical balance in Table 13-10. The +500 µm Wilfley Conc 1 was kept separate and submitted as the +500 µm High-Grade sample for primary acid washing test (L3). The +500 µm Mid-Grade sample for test L2 was made up from +500 µm Wilfley Conc 2, +500 µm Mids Wilfley Conc, and +500 µm Mids Wilfley Tails. The +500 µm Mids Wilfley Tails and +500 µm Wilfley Tails were stored as low-grade tailings.

The -500/+75 µm fraction was passed over a Wilfley Table producing -500/+75 µm Wilfley Conc and a tailings sample. The tailings sample was repassed over the Wilfley Table creating -500/+75 µm Wilfley Tails Conc, -500/+75 µm Tailings Mids, and -500/+75 µm Final Tails. Subsamples of the four products were submitted for analyses and a metallurgical balance was conducted (Table 13-11). The -500/+75 µm Wilfley Conc was combined with the -500/+75 µm Wilfley Tailings Conc as high-grade feed for acid washing test L1A. The -500/+75 µm Wilfley Tailings Mids and -500/+75 µm Wilfley Final Tails were combined and submitted for acid washing test L1B as a low-grade sample.

Table 13-10: Coarse (+500 µm) Gravity Upgrading Assays and Metallurgical Balance

Sample Name	To Downstream Test	Weight		Global Wt	Assays, %						% Distribution					
		g	%	%	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg
+500 µm Wilfley Conc 1	L3 +500 µm High-Grade	6744.2	29.3	17.0	95.6	2.50	0.02	0.67	0.25	0.12	32.1	31.7	7.6	5.0	5.4	5.1
+500 µm Wilfley Conc 2	L2 +500 µm Mid-Grade	4240.2	18.4	10.7	94.4	2.52	0.03	1.15	0.42	0.21	20.0	20.1	6.8	5.4	5.7	5.6
+500 µm Mids Wilfley Conc		4097.1	17.8	10.4	93.8	2.48	0.04	1.23	0.46	0.24	19.2	19.1	7.3	5.6	6.1	6.1
+500 µm Mids Wilfley Mids		4416.8	19.2	11.2	91.8	2.45	0.06	2.26	0.77	0.39	20.2	20.3	12.1	11.0	10.9	10.8
+500 µm Mids Wilfley Tailings	To Final Tails	2311.9	10.0	5.8	64.5	1.74	0.28	12.4	4.35	2.21	7.4	7.6	30.2	31.7	32.2	32.3
+500 µm Wilfley Tailings		1207.3	5.2	3.1	18.0	0.50	0.64	31.0	10.2	5.26	1.1	1.1	35.9	41.4	39.6	40.1
Head (calc)		23017.5	100.0	58.2	87.1	2.31	0.09	3.93	1.35	0.69	100.0	100.0	100.0	100.0	100.0	100.0
+500 µm High-Grade L3 Feed	L3	6744.2	29.3	17.0	95.6	2.50	0.02	0.67	0.25	0.12	32.1	31.7	7.6	5.0	5.4	5.1
+500 µm Mid-Grade L2 Feed	L2	12754.1	55.4	32.2	93.3	2.48	0.04	1.56	0.56	0.28	59.3	59.6	26.3	22.0	22.8	22.5
+500 µm Tailings	To Final Tails	3519.2	15.3	8.9	48.6	1.31	0.41	18.78	6.36	3.26	8.5	8.7	66.1	73.0	71.8	72.4

Table 13-11: Finer (-500/+75 µm) Gravity Upgrading Assays and Metallurgical Balance

Sample Name	To Downstream Test	Weight		Global Wt	Assays, %						% Distribution					
		g	%	%	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg	$BaSO_4$	$SrSO_4$	Fe	SiO_2	Ca	Mg
-500/+75 µm Wilfley Conc	L1A -500/+75 µm High-Grade	655.3	6.2	1.7	97.1	2.50	0.03	0.21	0.09	0.04	6.7	6.6	2.3	0.5	0.6	0.6
-500/+75 µm Wilfley Tailings Conc		3927.4	37.3	9.9	96.8	2.50	0.03	0.24	0.12	0.05	39.8	39.6	15.6	3.7	4.7	4.0
-500/+75 µm Wilfley Tailings Mids	L1B -500/+75 µm Low-Grade	1160.3	11.0	2.9	95.0	2.41	0.04	0.81	0.42	0.21	11.5	11.3	5.6	3.6	4.8	5.0
-500/+75 µm Wilfley Final Tails		4794.3	45.5	12.1	83.7	2.20	0.13	4.95	1.91	0.90	42.0	42.5	76.4	92.2	89.9	90.5
Head (calc)		10537.3	100.0	26.6	90.7	2.35	0.07	2.44	0.97	0.45	100.0	100.0	100.0	100.0	100.0	100.0
-500/+75 µm High-Grade L1A Feed	L1A	4582.7	43.5	11.6	96.9	2.50	0.03	0.24	0.12	0.05	46.5	46.2	18.0	4.2	5.3	4.5
-500/+75 µm Low-Grade L1B Feed	L1B	5954.6	56.5	15.1	85.9	2.24	0.11	4.14	1.62	0.77	53.5	53.8	82.0	95.8	94.7	95.5

13.2.7 HIGmill® Fine Grinding

Two samples were submitted for HIGmill® fine grinding testwork. Sample 1 was the mid-grade +500 µm material produced from acid wash test L2, and Sample 2 was the high-grade -500/+75 µm material produced from acid wash test L1A. Both samples were ground in a laboratory rod mill prior to the regrind testing.

13.2.7.1 Sample Characterization

The results of the sample characterization are summarized in Table 13-12. The concentrate samples were shown to have a F_{80} of 89.1 and 58.8 µm, with 17.5% and 16.9% passing 10 µm.

Table 13-12: HIGmill® Feed Sample Characterization

Sample Name	F_{80} (µm)	% Passing 10 µm
+500 µm Mid-Grade (L2)	89.1	17.5
-500/+75 µm High-Grade (L1A)	58.8	16.9

13.2.7.2 HIGmill® Signature Plot Testing

The samples were submitted for HIGmill® testing to determine the Signature Plot, with a target P_{50} grind size of ~1 to 2 µm. The main results are discussed below, while the mill description, testing procedure, and full test details are available through Voyageur Pharmaceuticals Ltd.

The small sample HIGmill® test on the two concentrates were conducted in June 2021, using the following parameters:

- Media fill of 60% of mill volume (9.19 kg of media)
- Feed flow rate of 240 L/h (15 sec/L)
- Target milling density of 39% w/w
- Shaft speed of 1000 and 1200 rpm (sometimes referred to as mill speed)

The grinding media size and quality were chosen according to the feed and product size, and had the following composition and size:

- Media Type: RIMAX Zirpro Ceramic media 3.90 SG
- Media Diameter: 100% 1-2 mm

The test results are summarized in Table 13-13 and Table 13-14, and then depicted in Figure 13-3 and Figure 13-4. The energy requirement for the HIGmill® to grind the mid-grade concentrate sample from a feed F_{80} of 89.1 µm to a P_{50} of 1.6 µm was 69.2 kWh/t. The energy requirement for the HIGmill® to grind the second high-grade concentrate sample from a feed F_{80} of 58.8 µm to a P_{50} of 1.8 µm was 89.6 kWh/t.

There may be ways of improving the grinding efficiency to reach the final grind target, for example by using a media with a higher density. Further testing can be conducted at SGS to investigate this if required, and if sample is available.

Table 13-13: HIGmill® Signature Plot Results for Mid-Grade Material

Cycle #	Net kW	% Solids	kWh	Cumul E (kWh/t)	P_{80} (µm)	P_{50} (µm)	CSI
Feed	-	-	-	0.0	89.1	35.8	0.4
1	1.32	36.7	0.220	18.4	9.2	4.1	0.4
2	1.30	36.2	0.217	36.7	6.1	2.6	0.4
3	1.27	35.4	0.212	54.6	4.9	2.3	0.5
4	1.82	32.4	0.607	106.1	3.3	1.6	0.5
Specific Energy Requirement 89 µm to 2 µm:						**69.2**	**kWh/t**

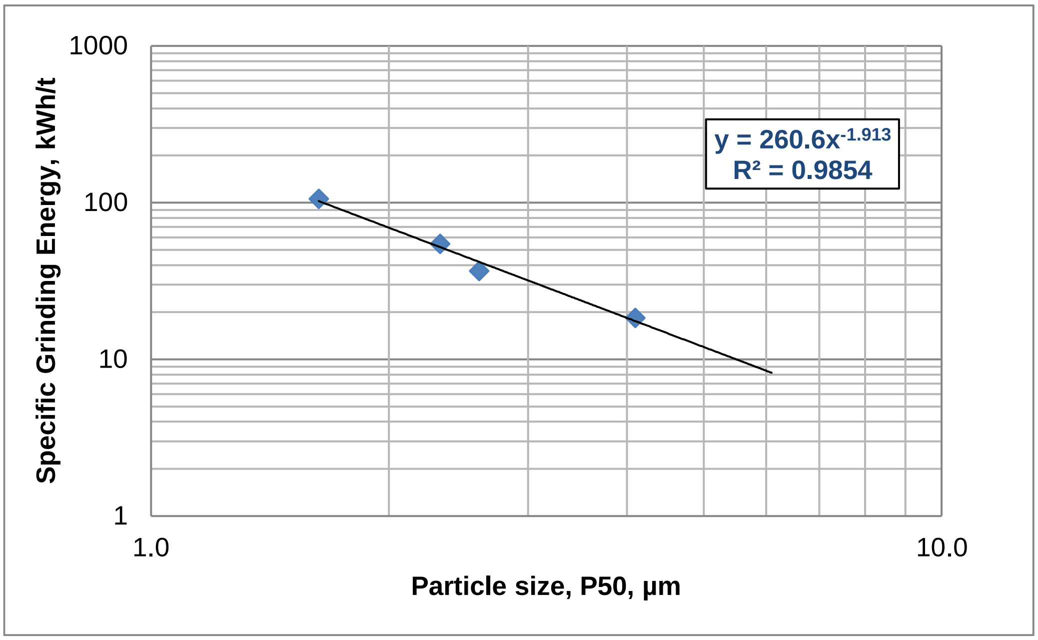


Figure 13-3: HIGmill® Signature Plot for Mid-Grade Material

Table 13-14: HIGmill® Signature Plot Results for High-Grade Material

Cycle #	Net kW	% Solids	kWh	Cumul E (kWh/t)	P_{80} (µm)	P_{50} (µm)	CSI
Feed	-	-	-	0.0	58.8	28.7	0.5
1	1.87	43.5	0.094	24.4	8.5	3.2	0.4
2	1.83	41.1	0.092	48.7	5.6	2.4	0.4
3	1.74	36.3	0.145	87.5	4.1	2.0	0.5
4	1.75	28.8	0.146	127.1	3.4	1.8	0.5
Specific Energy Requirement 59 µm to 2 µm:						**89.6**	**kWh/t**

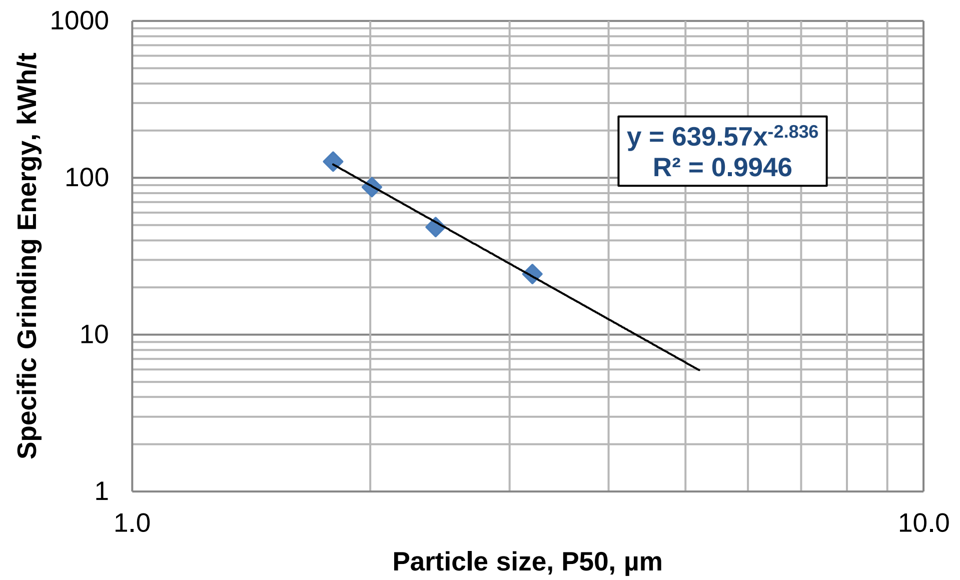


Figure 13-4: HIGmill® Signature Plot for High-Grade Material

13.2.8 Acid Wash Upgrading

Seven acid wash/leach tests were conducted on a bulk product generated by gravity concentration, seeking to upgrade the barite content/purity through hydrochloric acid leaching. The conditions used were taken from historical testing on similar material, with no allowance for optimization in the testing, with the focus on simply producing material for solid-liquid separation testing.

Each acid leach used the same procedure and conditions, pulping the barite concentrate to 20% w/w solids in a 10% w/w hydrochloric acid solution. The slurry was then heated to 90°C and held for 24 hours before ending the test. The general conditions and key results from the seven tests are summarized in Table 13-15. Full test details are available through Voyageur Pharmaceuticals Ltd. The first four tests (L1A through L3) processed gravity concentrates as received. Leach pulps were filtered and the residue was washed with deionized water before returning to the mineral processing group for further treatment. The final four tests (L4-L7) processed the reground residues from the first four leaches, and were subsampled for assaying purposes while the rest of the pulp was collected and stored in pails for use in settling testing.

Table 13-15: Bulk Barite Leach Conditions and Key Results

Test ID	L1A	L1B	L2	L3	L4	L5	L6	L7
Feed	-500/+75 um High Grade	-500/+75 um Low Grade	+500 um Medium Grade	Wilfley Conc 1 +500	Reground L1B Residue*	Reground L3 Residue*	Reground L2 Residue*	Reground L1A Residue*
Lixiviant (% HCl w/w)	10%	10%	10%	10%	10%	10%	10%	10%
Retention Time (h)	24	24	24	24	24	24	24	24
Temperature (°C)	90	90	90	90	90	90	90	90
Initial % Solids	20%	20%	20%	20%	20%	20%	20%	20%
Weight Loss	6.6%	11.6%	15.7%	14.3%	5.2%	4.3%	-0.5%	7.9%
Final Acidity (g/L)	102	116	144	121	-	113	108	127
Feed BaSO4 (%)	96.8	85.9	93.3	95.6	92.8	97.2	96.3	97.4
Residue BaSO4 (%)	97.4	92.8	96.3	97.2	94.0	97.4	96.7	97.2
Feed SiO2 (%)	0.2	4.1	1.6	0.7	4.4	0.7	1.6	0.4
Residue SiO2 (%)	0.4	4.4	1.6	0.7	4.0	0.7	1.7	0.8

* Material was passed through gravity testiing prior to re-leaching

Overall, due to the relatively high barite grade to begin with, the acid leaching resulted in only minor weight losses, with most of the leaching taking place in the first round of leaching (L1A-L3). Weight loss was directly related to the purity of the feed. For example, L1B and L2 had and the lowest barite grade in the feed concentrates and experienced the highest weight loss, and thus the largest upgrading factors. Conversely, the second round of leaching resulted in only minor improvements to the barite grade, mainly serving as a polish for whatever impurities may have accrued during the extra handling and reprocessing. This is best seen in Figure 13-5.

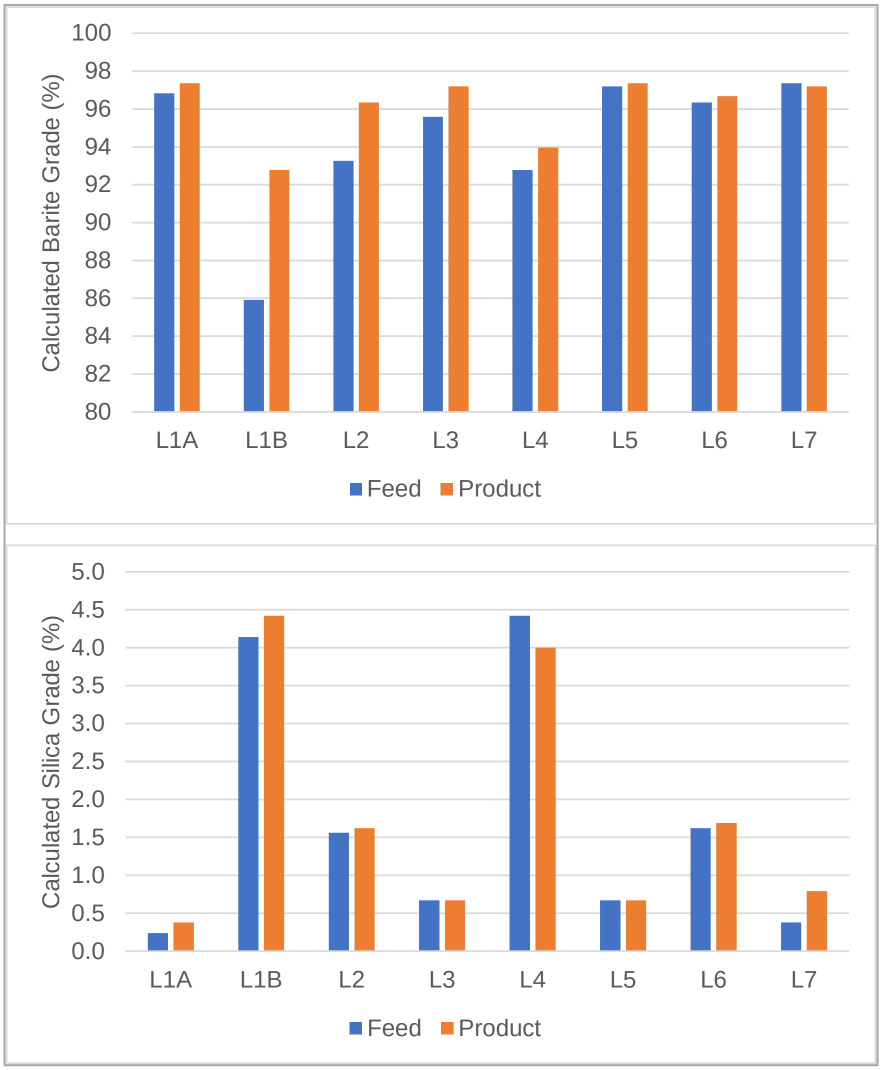


Figure 13-5: Comparison of Barite and Silica Grades in Leach Feeds and Products

Table 13-16 and Table 13-17 summarize the final product assays from all seven leaches, and show that the first round of leaching resulted in more calcium and magnesium in solution, with a significant drop in the second round of leaching, as to be expected if the first round dissolved the majority of the available impurities. Iron was present through the test series, and is thought to be an impurity exacerbated by pick-up of fine particles from the milling/handling in between leaches. This was seen as grey coloured solids often present after grinding. After leaching, the residues were bright white, while the liquor was green/yellow, as befitting an iron chloride solution.

Table 13-16: Bulk Barite Leach Final Filtrate Assays

	Final Filtrate (mg/L)							
Element	L1A	L1B	L2	L3	L4	L5	L6	L7
Ag	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Al	11.7	222	70.7	31	28.5	14.8	73.5	80.6
As	<3	<3	<3	<3	<3	<3	<3	<3
Ba	7.08	22.9	51.4	84.8	33.5	11.4	11.1	10.6
Be	<0.03	<0.03	<0.007	<0.002	0.006	<0.6	0.004	<0.6
Bi	<1	<1	<1	<1	<1	<1	<1	<1
Ca	301	4250	2110	760	49.3	53	65.6	77.2
Cd	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Co	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cr	2.2	15.5	16.8	11.2	21	11.1	8.2	7.3
Cu	3	3.1	1.4	0.8	1	4.8	15.2	8.5
Fe	122	601	319	162	766	656	758	535
K	7	137	44	19	15	9	31	20
Li	<2	<2	<2	<2	<2	<2	<2	<2
Mg	121	1970	954	354	9.96	10.4	55.2	33.5
Mn	3.14	29.6	14.5	4.96	3.71	2.46	5.94	5.32
Mo	<2	<2	2.1	1.4	<0.6	<0.6	<0.6	<0.6
Na	19	30	21	21	21	15	25	22
Ni	<2	10	9.9	6.4	5	1.9	4.2	4.8
P	<5	<5	<5	<5	<5	<5	<5	<5
Pb	<3	<3	<2	<2	<2	<2	<2	<2
Sb	<1	<1	<1	<1	<1	<1	<1	<1
Se	<3	<3	<3	<3	<3	<3	<3	<3
Si	-	-	-	-	-	-	-	-
Sn	<2	<2	<2	<2	<2	<2	<2	<2
Sr	220	162	405	329	339	445	597	646
Ti	1.45	2.55	0.89	1.14	0.43	0.4	1.62	1.04
Tl	<3	<3	<3	<3	<3	<3	<3	<3
U	<1	<1	<1	<1	<1	<1	<1	<1
V	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
W	<2	<2	<2	<2	<2	<2	<2	<2
Y	0.07	0.5	0.16	<0.05	0.61	0.07	2.74	13.2
Zn	1.5	2.4	1.2	0.8	0.8	1.1	<2	1.8

Table 13-17: Bulk Barite Leach Final Residues Assays

	Final Residue (g/t)							
Element	L1A	L1B	L2	L3	L4	L5	L6	L7
Ag	<1	<1	<2	<1	<1	<2	<1	<2
Al	480	1220	641	210	640	260	950	740
As	<50	<50	<30	<50	759	<50	<50	<50
Ba	573000	546000	567000	572000	553000	573000	569000	572000
Be	<50	<50	<0.03	<50	<50	<50	<50	<50
Bi	<3	<3	<20	<3	<3	<3	<3	<3
Ca	290	70	28	<70	<70	<70	70	70
Cd	<1	<1	<2	<1	<1	<1	<1	<1
Co	<3	<3	<4	<3	3	3	<3	<3
Cr	<20	<70	6	<20	<49	<70	<70	<70
Cu	<2	46	4.5	<80	<80	62	32	84
Fe	350	420	163	210	280	210	280	280
K	170	660	244	170	330	80	250	170
Li	<40	<40	<5	<70	<70	<100	<100	<100
Mg	60	180	70	<60	60	<60	<60	<60
Mn	<80	<80	1.9	<80	<80	<80	<80	80
Mo	<3	<3	<5	<3	<3	<3	8	6
Na	220	220	74	<70	150	150	<70	220
Ni	<10	<10	<20	19	39	27	22	36
P	<40	<40	<30	<40	<40	<40	<40	<40
Pb	71.8	61	<20	<10	31	38	37	47
Sb	<4	<4	<10	<30	<30	<4	<4	<4
Se	<50	<50	<30	<50	<50	<50	<50	<50
Si	1780	20660	7570	3130	18700	3130	7900	3690
Sn	<10	<10	<20	<10	<10	<10	<10	<10
Sr	11000	10800	10800	11200	9200	9300	8900	8500
Ti	<60	<60	36.9	<60	120	<60	<60	<60
Tl	<2	<2	<30	<2	<2	<2	<2	<2
U	<2	<2	<20	<2	<2	<2	<2	<2
V	<30	<30	<2	<30	<30	<30	<30	30
W	-	-	-	-	-	-	-	-
Y	11	11	<0.2	5	4	7	10	11
Zn	151	123	67	69	47	91	109	66

13.2.9 Quality of Final Leach Products

Subsamples of the final leach products from each stream were submitted to SGS Life Sciences for product quality determination. Results are presented in Table 13-18. All final leach products met USP reference standards for barium salts. Barium sulphate analyses range from 97.8% to 100.3%. Full reports are available through Voyageur Pharmaceuticals Ltd.

Table 13-18: Analyses of Final Leach Products

Test	Method	Parameter / Specification	Final Leach Product Results (Status)			
			L5 +500 µm High-Grade	L6 +500 µm Mid-Grade	L7 -500/+75 µm High-Grade	L4 -500/+ 75 µm Low-Grade
Elemental Impurity Screening by ICP-MS	USP <232>	V (ppm)	0.2535	0.2184	0.2927	0.2663
		Cr (ppm)	0.5485	0.6971	1.4731	1.0256
		Co (ppm)	0.0321	0.0830	0.0765	0.0173
		Ni (ppm)	0.0215	0.0507	0.0391	0.0122
		Cu (ppm)	1.8094	1.5937	1.8916	0.7963
		As (ppm)	0.1652	0.3495	1.0708	0.0943
		Se (ppm)	0.1370	0	0.074	0.0112
		Mo (ppm)	0	0.2923	0.0128	0
		Ru (ppm)	0.0002	0.0003	0.0013	0.0004
		Rh (ppm)	0.0007	0.0011	0.0009	0.0007
		Pd (ppm)	0.0020	0.0048	0.0053	0.0033
		Cd (ppm)	0.0003	0	0.0003	0.0003
		Os (ppm)	0.0015	0.0033	0.0011	0.0013
		Ir (ppm)	0	0	0	0
		Pt (ppm)	0.0011	0.0021	0.0016	0.0012
		Hg (ppm)	0.0096	0.0563	0.0068	0.0204
		Th (ppm)	0.0005	0.0027	0.0014	0.0008
		Pb (ppm)	0.0737	0.1804	0.2337	0.0396
		Li (ppm)	0	0.0250	0.0252	0.7177
		Sn (ppm)	0	0	0	0
		Ag (ppb)	0.0004	0.0101	0.0045	0.0014
		Sb (ppm)	0	0	0	0
		Ba (ppm)	n/a	n/a	n/a	n/a
		Au (ppm)	0.4386	0.5472	0.4101	0.4868

(continued)

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Test	**Method**	**Parameter / Specification**	**Final Leach Product Results (Status)**			
			L5 +500 µm High-Grade	**L6 +500 µm Mid-Grade**	**L7 -500/+75 µm High-Grade**	**L4 -500/+ 75 µm Low-Grade**
Description	Specification		Fine, white, odorless, tasteless, bulky powder, free from grittiness	Fine, white, odorless, tasteless, bulky powder, free from grittiness	Fine, white, odorless, tasteless, bulky powder, free from grittiness	Fine, white, odorless, tasteless, bulky powder, free from grittiness
	Result		Off-white powder	Off-white powder	Off-white powder	Off-white powder
Identification A	USP <191>	The filtrate acidified with hydrochloric acid, meets the requirements of the tests for Sulphate	Meets specifications (Pass)	Meets specifications (Pass)	Meets specifications (Pass)	Meets specifications (Pass)
Identification B	USP <191>	The solution meets the requirements of the tests for Barium	Meets specifications (Pass)	Meets specifications (Pass)	Meets specifications (Pass)	Meets specifications (Pass)
pH	USP <791>	3.5 - 10.0	4.2 (Pass)	5.2 (Pass)	4.0 (Pass)	4.4 (Pass)
Limit of Sulphides	USP	NMT 0.5 µg/g	Meets specifications (Pass) *Comment: LT 0.5 µg/g*	Meets specifications (Pass) *Comment: LT 0.5 µg/g*	Meets specifications (Pass) Comment: LT 0.5 µg/g	Meets specifications (Pass) Comment: LT 0.5 µg/g
Limit of acid-soluble substances	USP	NMT 0.3%	0.0% (Pass) *Comment: 0.02%*	0.1% (Pass)	0.0% (Pass) Comment: 0.05%	0.0% (Pass) Comment: 0.04%
Limit of soluble barium salts	USP	NMT 0.001%	Meets specifications (Pass) *Comment: LT 0.001%*	Meets specifications (Pass) *Comment: LT 0.001%*	Meets specifications (Pass) Comment: LT 0.001%	Meets specifications (Pass) Comment: LT 0.001%
Assay	**USP**	**97.5 - 100.5%**	**99.8% (Pass)**	**100.3% (Pass)**	**99.0% (Pass)**	**97.8% (Pass)**

13.2.10 Solid Liquid Separation

An acid leached pulp sample was subjected to solid-liquid separation testing. The test results are summarized in this report. The sample identification and a list of completed tests are summarized in Table 13-19.

Table 13-19: Test Summary

Sample I.D.	Test Program
L6-L7 Combined Final Leach Pulp	Sample Characterization, Flocculant Selection, Static Settling, Dynamic Thickening, Direct Discharge Vacuum and Pressure Filtration

13.2.10.1 Sample Preparation and Characterization

The sample was received separately as L6 Final Leach Pulp and L7 Final Leach Pulp. Both leach pulps were combined and formed the test sample. Decanted clear supernatant was used as dilution liquor for test purposes, as required.

A particle size analysis was conducted on the sample. The analysis was performed using a Malvern Mastersizer 3000 laser particle sizer fitted with a wet dispersion system. The particle size determination is summarized in Table 13-20 and the complete details of the analysis are available through Voyageur Pharmaceuticals Ltd.

Subsamples were collected from each sample for solid content analysis in a Halogen Moisture Analyzer HR83 (Mettler-Toledo) as well as in a conventional oven for comparison purposes. The dried sample was submitted for specific gravity (SG) determination using a Quantachrome Pentapyc 5200e gas pycnometer. The SG determination result is included in Table 13-20.

Table 13-20: Sample Characterization

Sample I.D.	[1]Particle Sizing				SG of Dried Solids	Pulp pH	[2]Liquor Density, kg/L
	d_{80}, µm	d_{50}, µm	<20 µm % vol	<1 µm % vol			
L6-L7 Combined Final Leach Pulp	14.4	9.18	94.3	5.0	4.50	<1	1.025

[1]Determined using laser diffraction (Malvern Mastersizer 3000)

[2]Liquor density was determined at 80 °C

13.2.10.2 Flocculant Scoping

An extensive flocculant scoping test series was performed on the L6-L7 Combined Final Leach Pulp sample. Scoping tests included evaluation of a range of BASF flocculants, including anionic, non-ionic, and cationic flocculants, and several different reagent combinations (i.e., coagulant/flocculant and flocculant/flocculant combinations). Scoping test results indicated that the best response was achieved using BASF Magnafloc 455, which is a high molecular weight slightly cationic polyacrylamide flocculant.

13.2.10.3 Static Settling

Static settling tests were performed on the L6-L7 Combined Final Leach Pulp in 2 L graduated cylinders that were fitted with rotating “picket-style” rakes. Flocculant was added to the cylinder at a concentration of 0.25 g/L. The required flocculant volume was added in three increments. The graduated cylinder was manually mixed three times after each of the incremental flocculant additions. Static settling test results were used as preliminary starting conditions for subsequent dynamic (continuous) thickening tests. Test results for the optimum static settling test are summarized in Table 13-21. Complete details of the flocculant confirmation and static settling tests are available through Voyageur Pharmaceuticals Ltd.

Table 13-21: Preliminary Static Settling Test Results Summary – Best Conditions

Sample I.D.	Dosage, g/t	[1]Feed %w/w	[2]U/F %w/w	Unit Area m^2/(t/day)	[3]ISR m^3/m^2/day	[4]Supernatant Clarity	[5]TSS mg/L
L6-L7 Combined Final Leach Pulp	203	2.0	38	0.36	402	Hazy	109

All values were calculated without a safety factor.

Test conditions: 2L cylinder with rotating picket-style raking, 80 °C

Flocculant: BASF Magnafloc 455

[1]Diluted Thickener Feed.

[2]Final Thickened "Underflow" Density.

[3]Initial Settling Rate.

[4]Supernatant Visual Clarity at 10 minutes of elapsed settling time.

[5]Supernatant Total Suspended Solids (TSS) at 10 minutes of elapsed settling time.

13.2.10.4 Dynamic Thickening

Dynamic thickening testing was conducted on the L6-L7 Combined Final Leach Pulp at 2.0% w/w solids. The effect of flocculant dosage on thickening response was examined at a constant thickener unit area of 0.45 m^2/(t/d). Magnafloc 455 flocculant was added inline into the diluted thickener feed stream at a concentration of 0.1 g/L. The flocculant + diluted feed was continuously pumped through a 1 m length of tubing that discharged into the thickener feedwell. Adding a dosage of 200 g/t Magnafloc 455 flocculant produced a thickener overflow with a total suspended solid content (TSS) of 294 mg/L. Increasing the dosage to 250 g/t and 300 g/t did not improve the overflow TSS. Flocculant dosage optimization results are summarized in Table 13-22.

Subsequent dynamic thickening tests were conducted at a constant dosage of 200 g/t Magnafloc 455 over a range of thickener unit areas.

Table 13-22: Effect of Flocculant Dosage on Overflow Quality (TSS)

Unit Area, $m^2/(t/d)$	Dosage flocc't, g/t	Overflow TSS, mg/L
0.45	200	294
0.45	250	319
0.45	300	361

Diluted thickener feed at 2.0% w/w Solids
Flocculant: BASF Magnafloc 455 at 0.1 g/L
Bed height was maintained around 150 mm

Tested thickener unit areas ranged from 0.45 to 0.65 $m^2/(t/d)$. A larger unit area was examined in order to improve the overflow clarity. The minimum TSS achieved in the overflow was 201 mg/L when operating at 0.65 $m^2/(t/d)$ unit area and the maximum TSS was 294 mg/L at 0.45 $m^2/(t/d)$ unit area. Thickener underflow density was 39.6% w/w solids at 0.45 $m^2/(t/d)$ and the underflow density increased as unit area was increased. The underflow density was 45.9% w/w solids at the largest unit area operated at 0.65 $m^2/(t/d)$. Results are summarized in Table 13-23.

A thirty-minute period of extended thickening was conducted without feeding or raking to mimic an operational upset that may be encountered in the full-scale thickener operation. The yield stress of the underflow was measured before raking was stopped and thirty minutes after raking was stopped. After thirty minutes, the underflow density increased from 39.6% w/w solids to 43.8% w/w solids when operating at 0.45 $m^2/(t/d)$. A yield stress value could not be achieved for this sample using a Viscometer fitted with a vane sensor geometry. Results are summarized in Table 13-23. Raw data for the dynamic thickening test is available through Voyageur Pharmaceuticals Ltd.

Table 13-23: Summary of Thickening Results by Thickener Unit Area

Dosage flocc't, g/t	Unit Area, $m^2/(t/d)$	Solids Loading, $t/m^2/h$	Net Rise Rate $m^3/m^2/d$	Underflow, %w/w solids	Overflow TSS, mg/L	Residence Time, h	U/F Yield Stress, Pa
200	0.45	0.09	102.9	39.6	294	1.15	No Yield
200	0.55	0.08	84.2	45.6	240	1.40	No Yield
200	0.65	0.06	71.2	45.9	201	1.65	No Yield
Underflow extended for 30 minutes:				43.8			No Yield

Bed height was maintained around 150 mm

13.2.10.5 Filtration (Using direct Process Discharge)

After consulting with Voyageur Pharmaceuticals, it was agreed that the thickening test results indicated that the quality of the overflow (i.e., TSS) was not suitable for the process. It was also agreed that filtration tests should be conducted on a direct process discharge stream (i.e., not thickened) to determine if the sample is amenable to filtration as discharged. Therefore, subsequent vacuum and pressure filtration tests were conducted on the L6-L7 Combined Final Leach Pulp sample in the form of a direct discharge at 19%w/w solids.

13.2.10.5.1Vacuum Filtration – without Cake Washing

Vacuum filtration tests were conducted on the L6-L7 Combined Final Leach Pulp as a direct discharge filter feed at 19% w/w solids based on the process specifications. Cake washing was not included as part of the scope. All vacuum filtration tests were conducted at 20 inches mercury (0.68 bar) of vacuum. Cloth scoping tests were conducted using a range of filter cloths. Testori P6620 TC polypropylene cloth was selected for the vacuum filtration test. Filter cloth specifications are available through Voyageur Pharmaceuticals Ltd.

Tested cake thicknesses ranged from 16 to 26 mm. The resulting solids output (i.e., dry solids capacity) ranged from 319 to 644 kg/m^2·h. The discharge cake residual moisture content ranged from 31.5% to 34.2% w/w moisture. Cake surface texture was sticky for all test cakes. Vacuum filtration results are summarized in Table 13-24. Detailed vacuum filtration test details are available through Voyageur Pharmaceuticals Ltd.

Table 13-24: Vacuum Filtration Results Summary

Filter Cloth	Operating Conditions					Filter Outputs				
	Feed Solids %w/w	Vacuum Level, Inch Hg	Form Time, s	Dry Time, s	Form/Dry Time Ratio	Cake Thickness, mm	[1]Throughput, dry solid kg/m^2•h	Cake Moisture % w/w	Filtrate TSS, mg/L	Cake Texture
Testori P 6620 TC	19.0	20	200	20	10.09	26	562	34.2	88	Sticky
			130	26	5.05	21	633	33.4	97	Sticky
			120	40	2.99	21	644	32.6	116	Sticky
			125	62	2.02	21	547	32.3	94	Sticky
			127	127	1.00	21	397	31.8	104	Sticky
			68	76	0.89	16	539	31.5	123	Sticky
			112	216	0.52	22	319	32.2	105	Sticky

[1]Throughputs are calculated using cycle time which includes form and dry times only.

[2]Indicates that the cake surface was dry-to-touch.

13.2.10.5.2Pressure Filtration – without Cake Washing

Pressure filtration tests were also conducted on the L6-L7 Combined Final Leach Pulp as a direct discharge feed at 19% w/w solids. Cake washing was not included as part of the scope. Pressure filtration was conducted at 5.5 bar (80 PSI) and 6.9 bar (100 PSI) pressure levels. Testori P6620 TC polypropylene cloth was also selected for pressure filtration test after extensive cloth scoping tests.

Pressure filtration test cake thicknesses ranged from 22 to 37 mm (note: cake thickness in the test equipment is equivalent to half of the filter chamber thickness at full scale). Filter throughput ranged from 878 to 1004 kg/m^2·h when calculated using the filtration time only, however when calculated using an estimated full cycle time[1], the filter throughput was recalculated to a range of 134 to 231 kg/m^2·h. The discharge cake residual moisture content ranged from 13.2% to 15.6% w/w. The surface texture of the majority of discharged cakes was dry-to-touch. Pressure filtration test results are summarized in Table 13-25. Detailed pressure filtration test results are available through Voyageur Pharmaceuticals Ltd.

[1] Estimated full cycle time includes filtration time plus an additional 10 minutes of miscellaneous time which incorporates time required for filter loading, cake discharge, cloth washing, and filter assembly.

Table 13-25: Pressure Filtration Results Summary

Filter Cloth	Operating Conditions			Filter Outputs					
	Feed Solids %w/w	Pressure Level bar	Filtration Time s	[1]Cake Thickness mm	[2]Filtration Time Cycle Throughput, dry solid kg/m^2•h	[3]Estimated Full Cycle Throughput, dry solid kg/m^2•h	Cake Moisture % w/w	Filtrate TSS mg/L	Cake Texture
Testori P 6620 TC	19.0	5.5	78	31	889	215	14.7	47	Sticky
			58	26	1004	203	14.8	62	[4]DTT
			42	26	899	167	15.6	68	DTT
			26	23	878	134	15.5	69	DTT
		6.9	73	37	903	231	14.6	50	DTT
			53	33	909	203	13.3	81	DTT
			36	25	990	173	14.0	64	DTT
			23	22	932	135	13.2	80	DTT

[1]Cake thickness represents half of the chamber thickness.

[2]Throughput calculated using cycle time which includes filtration time only.

[3]Estimated pressure filter throughput, calculated using a full cycle time which includes filtration time plus 10 minutes of miscellaneous cycle time which includes filter loading, cake discharge, cloth washing, and filter assembly.

[4]Indicates that the cake surface was dry-to-touch.

Dry solids capacity (expressed in kg/m^{2}h) was calculated using the formula CD/(A*T), where CD is dry solids per test, A is the test filter area (0.002m^2) and T is cycle time in h.

13.2.11 Conclusion

The primary objective of this study was to evaluate the feasibility of producing a purified synthetic barite product from the Frances Creek deposit. TOMRA ore sorting products were assayed and a high-grade master composite was formed from selected samples and used in the test program. Testing included bench scale gravity separation, acid washing, fine grinding, and solid-liquid separation. The following conclusions can be drawn from this study:

- Screening of the Master Comp did not upgrade barite in any individual fraction, with grades being between 86.9% and 90.7% $BaSO_4$ in all size fractions. Mass distribution was 58.2%, 26.6%, and 15.2% in the +500 µm, -500/+75 µm, and -75 µm fractions, respectively.
- Gravity separation using a Wilfley Table showed upgrading in both the +500 µm and -500/+75 µm fractions. Upgrading to 95.6% $BaSO_4$ was observed in the coarser fraction and 97.1% $BaSO_4$ in the finer fraction.
    - Gravity separation of the coarser fraction produced a high grade of 95.6% $BaSO_4$ in the initial Wilfley concentrate which accounted for 32.1% of the barite in that fraction. This +500 µm High-Grade sample was submitted for further downstream testing along with a +500 µm Mid-Grade sample with a calculated $BaSO_4$ grade of 93.3% containing 59.3% of barite in the fraction. A final tailings product consisted of the Wilfley tailings and the second pass tailings from the Wilfley middlings accounted for 8.5% of barite in that fraction with a grade of 48.6% $BaSO_4$.
    - The finer -500/+75 µm fraction showed the highest $BaSO_4$ grade of 97.1% in the Wilfley concentrate with just 6.7% of barite in that fraction. The concentrate from the Wilfley repass of the Tailings was combined with the initial concentrate to form a -500/+75 µm high-grade product for downstream testing at a grade of 96.9% $BaSO_4$ and including 46.5% of the barite in the finer fraction. A -500/+75 µm low-grade sample (85.9% $BaSO_4$) was created using the second pass Wilfley Middlings and Tailings which accounting for the remaining 53.5% of barite in that fraction.

- Ultrafine grinding testwork of the acid-washed +500 µm Mid-Grade and -500/+75 µm High-Grade products in a laboratory HIGmill® generated a signature plot for each product. The specific energy requirement to grind the coarse mid-grade product from a F80 of 89.1 µm to a P80 1.6 µm was 69.2 kWh/t. Grinding the finer high-grade product from a F80 of 58.8 µm to a P80 of 1.8 µm gave a specific energy requirement of 89.6 kWh/t. Further testing with varied conditions could be conducted to improve grinding efficiency. It should be noted that energy requirements to grind the coarse gravity concentrates to the F80's for HIGmill® testing were not measured.
- Primary acid leaching was conducted on each of four gravity upgrading products (coarser highand mid-grade and finer high- and low-grade), resulting in minor weight losses attributed to product purity. Secondary leaching of the test products following HIGMill® grinding or micronizing showed only minor upgrading of each product, serving as a polish of the products after fine grinding.
- Leached impurities included calcium and magnesium in the primary stage of acid washing and iron in both stages. The final residues were bright white in colour.
- The secondary leach products were analysed by SGS Life Services against the USP reference standards for barium salts. Each product passed requirements of impurity content, physical condition, USP 191 Identification tests, pH, and USP limits of sulphides, acid-soluble substances and soluble barium salts. Final product purities were 99.8% and 100.3% $BaSO_4$ for the coarser high- and mid-grade samples, respectively and 99.0% and 97.8% $BaSO_4$ for the finer high- and low-grade samples, respectively.
- Solid-liquid separation testing was conducted on each of the secondary acid wash products.

  Conclusions:

  - To achieve good liquor clarity proved to be difficult for this sample even at large thickener unit area and increased flocculant dosage.
  - The sample was amenable to vacuum and pressure filtration when fed to the filter in the form of a direct process discharge stream at 19% w/w solids. Test results indicated that vacuum filtration achieved a higher solids throughput than pressure filtration, however the pressure filter could produce significantly lower residual cake moisture than the vacuum filter.
  - Vacuum filtered discharged cake was generally "sticky" on the surface, whereas pressure filtered discharged cake was generally "dry-to-touch".
  - Note: The results presented in this report do not incorporate any safety or scale-up factor and they do not relate specifically to a specific type of equipment.

14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

SGS' objective was to do a database validation and mineral resource estimate on the deposit. SGS Geological Services (SGS) carried a capping study on $BaSO_4$. The reviewed mineral resource estimate was developed by SGS using the SGS Genesis software resource estimation software.

Completion of the current Mineral Resource Estimate involved the assessment of a drill hole database, which included all data for drilling, a three-dimensional (3D) grade-controlled wireframe model, a pit design, review of the classification of the mineral resource estimate (Measured, Indicated and Inferred) and review of available written reports.

Inverse Distance Squared ("ID^2") restricted to a grade-controlled wireframe model was used to Interpolate barite grades (% $BaSO_4$) into a block model. Indicated and Inferred mineral resources are reported in the summary tables in section 14.10. The Mineral Resource Estimate takes into consideration that the current Deposit will be mined by open pit mining methods.

14.2 Drill Hole Database

For the mineral resource estimation, SGS Geological Services (SGS) relied upon data that Voyageur supplied in pdf, xlsx and other formats.

All data received is in the metric system (metres, %, tonnes) and in the UTM NAD 83 coordinate system in zone 11. The final database contains 57 drill holes and 3 channels totalling 3,106.12 m. The length of the channels ranges from 2.5 to 8.4 m and the drill holes range from 18.29 to 122.53 m in length. There are 169 assays varying from 0.15 to 18.3 m in length and from 0.22 to 99.09 %$BaSO_4$. Finally, there are 100 lithology intervals.

The database was checked for errors and inconsistencies regarding coordinates interval errors, etc. Inconsistencies were detected. They were related to lithology overlaps, interval lengths, coordinates, and assay records. Everything was fixed using the data that was available in the multiple files of 5 types: databases in excel format, drawings in dxf format, laboratory certificates in pdf, technical reports in pdf formats and survey data in Excel format.

The drilling done in 1992 was not in the database. SGS never received this part of the data. The previous NI 43-101 report reported that the 1992 drilling was "drilled down the dip of the vein and was not representative" and the data "could not be verified by lab certificates" and therefore "could not be used for the resource model".

The lidar topographical surface for the Project is very detailed and was verified as being very reliable. The collars elevation for the drill holes were compared to this surface with some differences for some drill holes. For example, the drill hole FC17-18 has its collar about 23 meters above the topo surface. This drill hole does not contain any sample. It was excluded from the modeling and estimation.

The holes FC03-10 to FC03-16 (7 holes) are all in the same area of 5m x 5m and they all appeared at least 3 m too low. SGS raised them by 3m in the database. The 3 channels FC17-1, FC17-2 and FC17-3 had differences between the "recorded length" and the distance between the surveyed ends points. SGS moved the surveyed points by the minimum amount to fit the "recorded length".

A few intervals miss an analysis of $BaSO_4$ but have some field measurement using a water flask density method. Drill hole FC05-05 has 5 samples measured with the field density method. Used in the resource estimation. FC03-13 has very poor recovery from 11 to 20 m, so it was not sampled and tested by Voyageur. The mineralized zone was expected at 20-22 m. A grade of 0 was used for the model to stay on the conservative side in the zone A. The drill hole FC03-21 current holds no assays. The interval from 49 to 52 m was set to 0 %$BaSO_4$ for the estimation of the model. It is reported a 30cm sample of pure $BaSO_4$ was used as showcase. The model is conservative in this area of the zone A. The drill hole FC17-23 current holds no assays. The interval from 8.7 to 14.3 m (5.6 m) was set to 0 %$BaSO_4$ for the estimation of the model. The model is conservative in this area of the zone B1.

Some assayed intervals are very long. The list of the longest sample lengths are in the Table 14-1. Understanding the potential problem of differential recovery in the long samples it was decided to cap the samples by removing 10% of the grade of these samples. The impact on the resource is approximately a reduction of 5% of the total amount of $BaSO_4$.

There is no real reason to cap other assays since 10% of the resource is contained in the 5% most rich assay intervals. This ratio is not a concern.

Table 14-1: List of the Longest Sampled Intervals (Assays)

Hole Name	From (m)	To (m)	Sample	BaSO4	Lenght (m)
FC17-12	32	50.3	27	59.79	18.3
FC17-10	17.6	33.6	18	60.32	16
FC17-09	42.5	55.5	17	24.85	13
FC17-06	20.3	33	6	73.93	12.7
FC17-08	52.2	64.5	13	32.13	12.3
FC17-13	20.5	30.8	30	41.94	10.3
FC17-11	32.7	42.9	20	40.5	10.2
FC17-09	15	24.7	14	40.29	9.7
FC17-05	16.44	25.34	5	68.88	8.9
FC17-16	35.7	44.6	46	8.91	8.9

Hole Name	From (m)	To (m)	Sample	BaSO4	Lenght (m)
FC17-22	6	13.2	77	36.38	7.2
FC17-07	47.13	54.17	10	51.48	7.04
FC17-12	25	32	26	20.31	7
FC17-14	36.6	43.3	36	53.46	6.7
FC17-17	32.4	39	49	36.03	6.6
FC17-08	24	30.51	11	26.47	6.51
FC17-20	5	10.5	72	22.73	5.5
FC17-15	21.5	27	38	40.5	5.5
FC17-14	27.9	33.3	35	55.11	5.4
FC17-08	39	44.25	12	86.08	5.25

Table 14-2: Assays Statistics, Before and After Capping – Frances Creek Property

	BaSO4	BaSO4Cap
Count	169	169
Min	0.22	0.22
Median	42.2	42.2
Max	99.1	99.1
Mean	44.4	43.9
Len.Weighted.Avg. (m)	43.6	41.5
Sum of Len. (m)	396.7	396.7

14.3 Topography

Voyageur provided SGS with a three-dimensional (3D) lidar (Light Detection and Ranging) topography. It covers much more than the project area (see Figure 14-1). There are points gridded every 1m horizontally with centimeter precision in elevation. The verification of the surface shows a great accuracy.

In the drill holes, the depth of the overburden is not indicated. The site visit indicated that the overburden was probably about 2 m deep in most places. Therefore, a depth of 2 m vertical was applied for the entire project for the overburden.

Future drilling should include a precise measurement of the overburden for more precise resource estimation and mine planning.

The surface topography and bedrock surface models was used to cut portions of resource blocks, that extend above the bedrock surface.

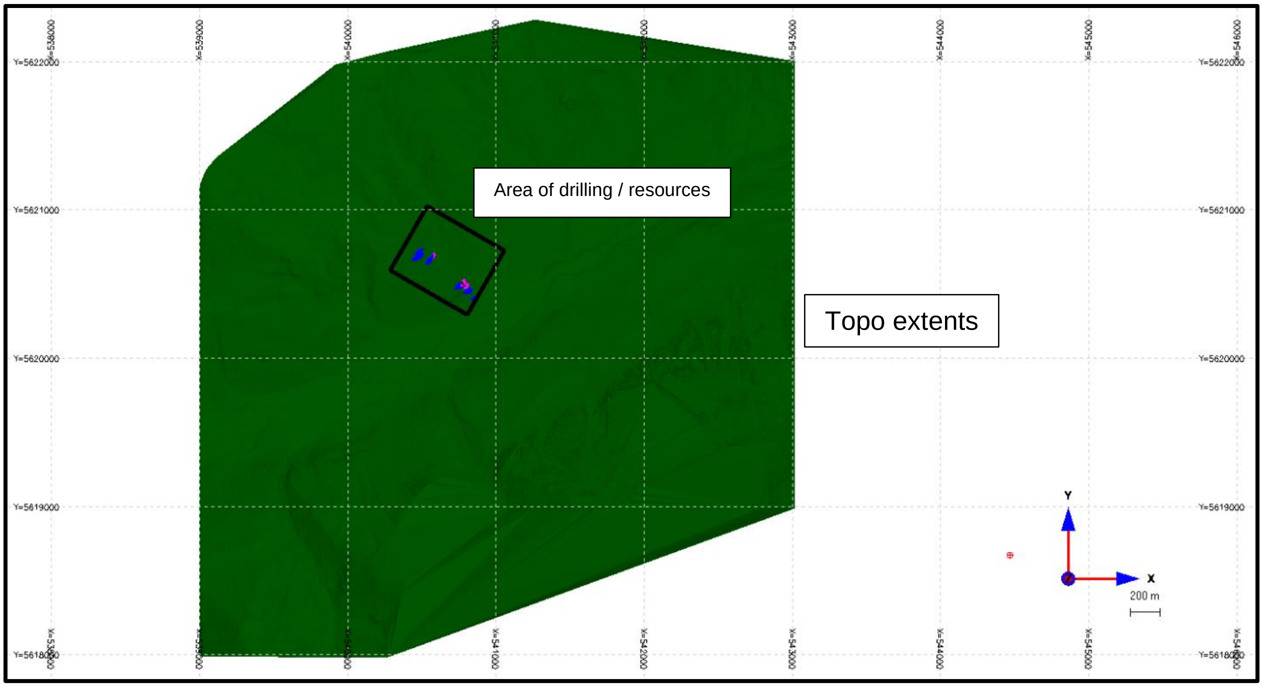


Figure 14-1: Plan View of the Frances Creek Deposit Area Showing the Topographic Surface

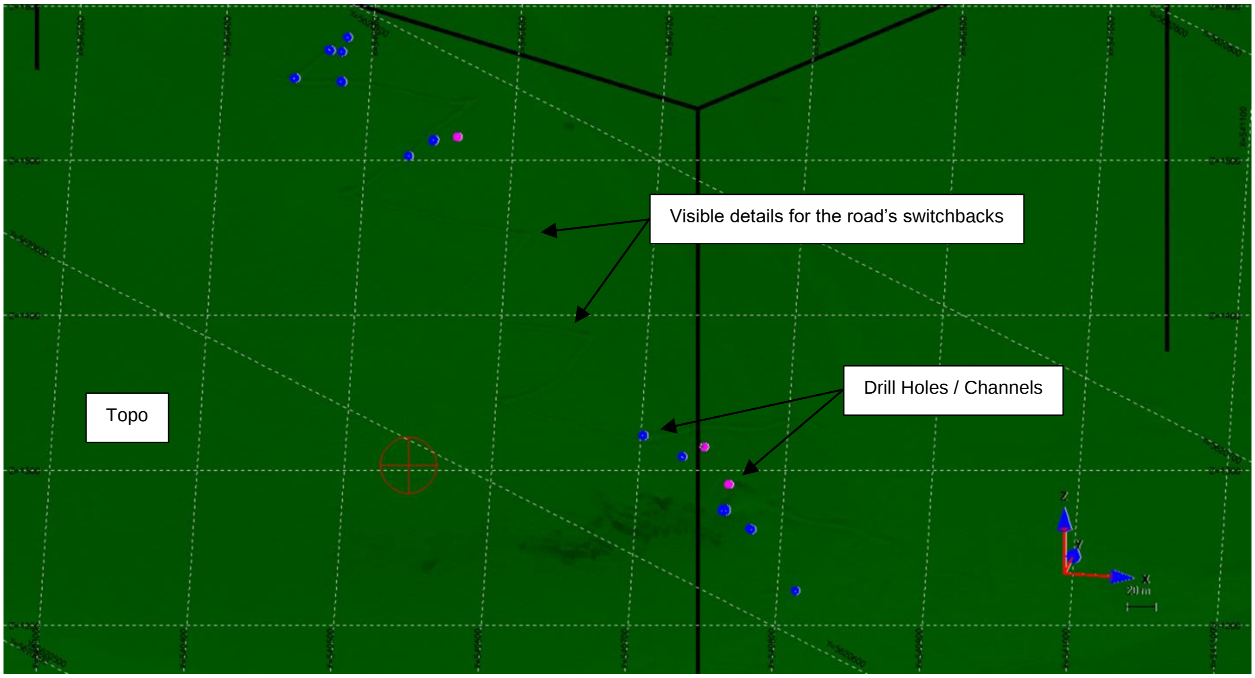


Figure 14-2: Isometric View Looking North of the Frances Creek Deposit Area Showing the Topographic Surface Including Areas of Drilling

14.4 Mineral Resource Modelling and Wireframing

As a preliminary step, the mineralized intervals were interpreted in the drill holes individually. A minimum of 2 m horizontal was applied to the modelling parameters. This added internal dilution. Only intersects of barite were retained (except internal waste and added dilution due to the 2m horizontal parameter).

The 2003-2017 drilling mineralised intersects were included into the mineralised solid. Then the results were tagged as A, B1 or B2 because that is the interpretation and they seem to be related to 3 different mineralized zones very well. There is a total of three major mineralised zones (A, B1, B2) within the deposit.

There are no interpretations on sections or on benches used. The Planar Envelopes technology was used in the Genesis software to generate the volumes directly from the mineralized intervals.

Solids were validated and adjusted until satisfactory.

The solids are shown in Figure 14-3 to Figure 14-5.

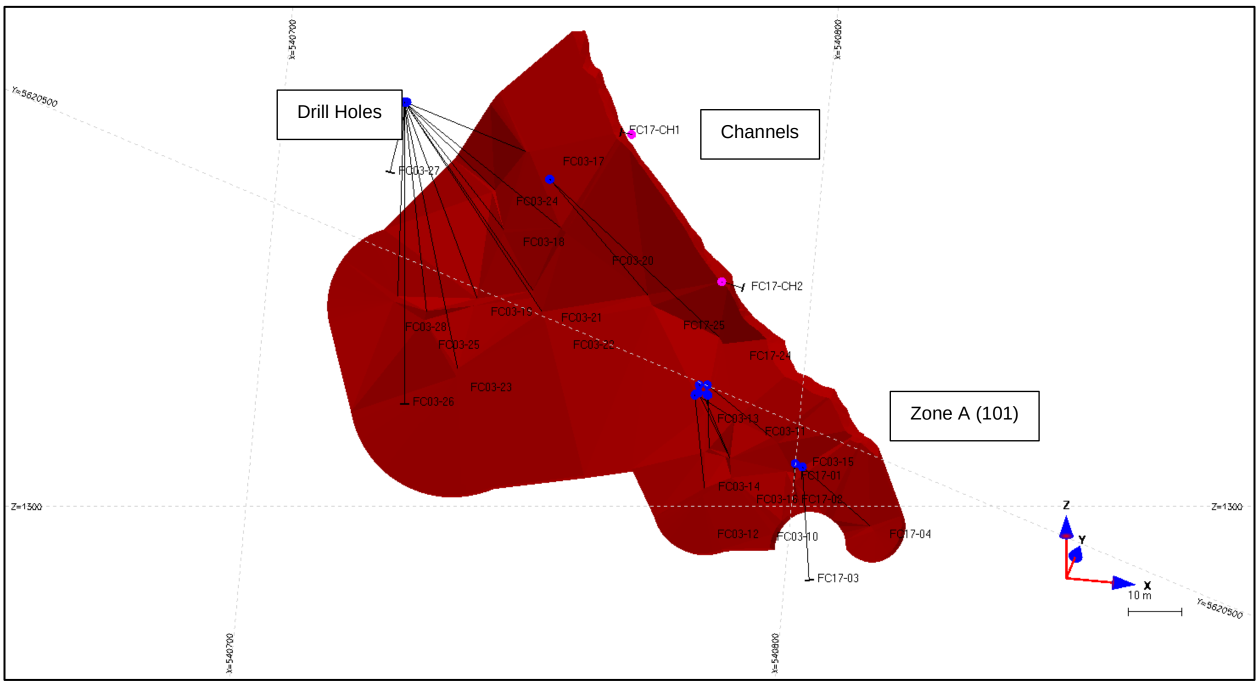


Figure 14-3: Isometric Looking North View Showing the Distribution of Drill Holes, and the Frances Creek A (101) Zone Deposit Model

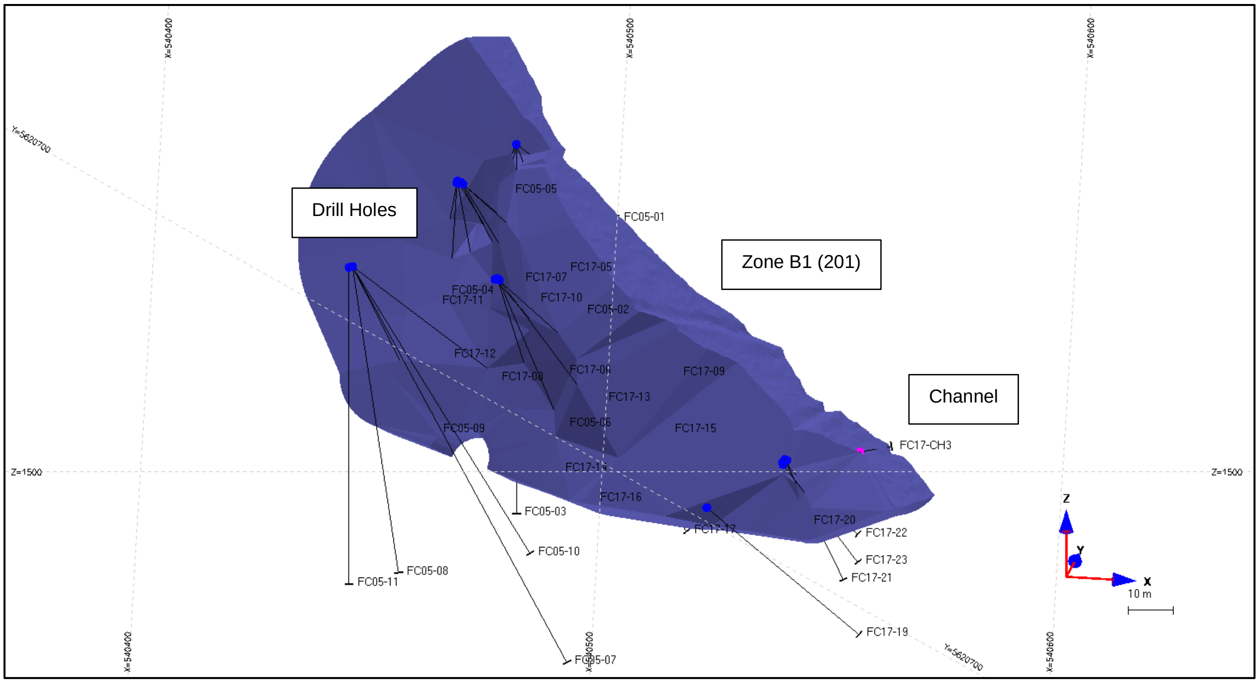


Figure 14-4: Isometric Looking North View Showing the Distribution of Drill Holes, and the Frances Creek B1 (201) Zone Deposit Model (B2 (202) is hidden behind B1 (201))

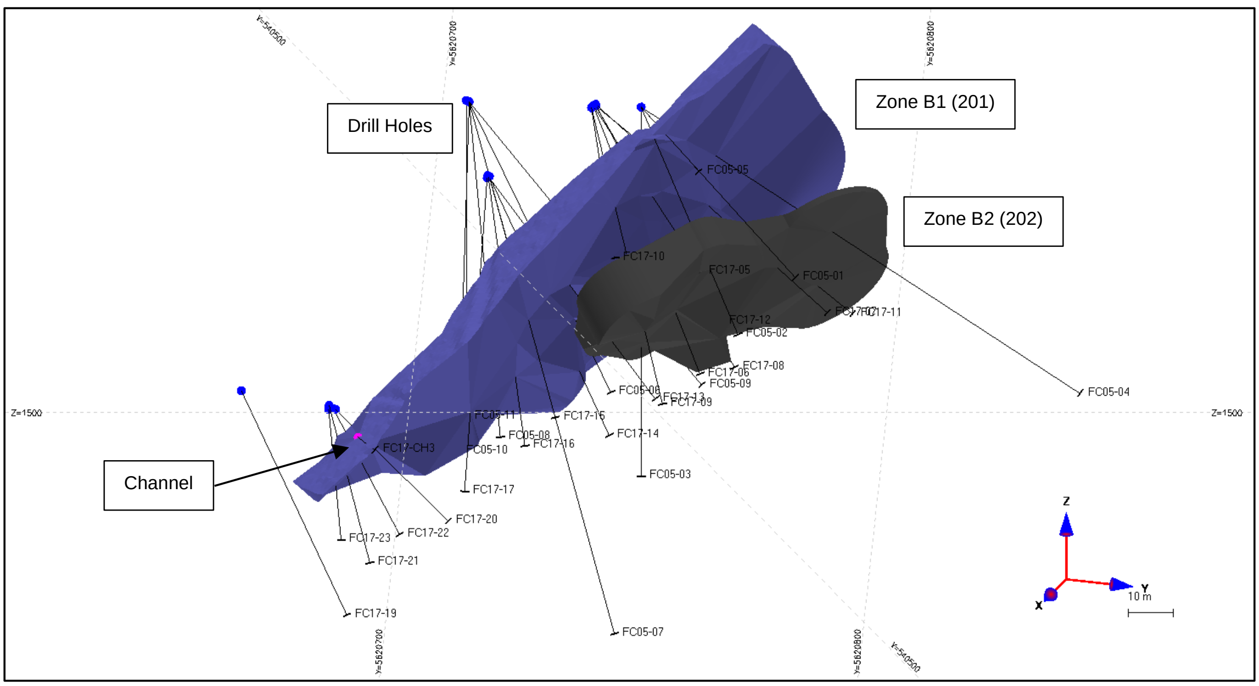


Figure 14-5: Isometric View Looking Southwest Showing the Distribution of the Drill Holes, and the Frances Creek B1 (201) and B2 (202) Zones Deposit Model

14.5 Compositing

All samples were composited to 2.5 m “calculated lengths” composites. This method of compositing makes composites as close to 2.5 m as possible but do not leave a “remainder”. A minimum of 0.25 m was considered. The actual shortest composite is of 1.52 m, the longest is of 3.33 m.

Assays range from of 0.15 m to 18.3 m with an average of 2.34 and a median of 1.34 m. Data was composited (2.5 m) and resulted in the duplication of assay values in longer assay intervals.

The 2.5 m composites were created. As explained in the Drill Hole Database section, 20 samples over 5 m length were capped by removing 10% from the original grade. A 2.5 m compositing introduced a forced continuity on assay lengths over 2.5 m (40 samples). It is of usual practice not to composite assays less than the minimum assay length. However, in this case it is quite hard to establish a true minimum size since there were no specific assay lengths used throughout the database.

The statistics of the capped composites are shown in Table 14-3.

Table 14-3: Composite Statistics – Frances Creek Property

	% BaSO4 (Capped)			
Zone	**A**	**B1**	**B2**	**Total**
Count	29	129	27	185
Min	0	0	0	0
Median	31.1	36.5	28.9	36.3
Max	77.7	97.9	78.3	97.9
Mean	34.9	37.0	31.3	35.8
Len.Weighted.Avg. (m)	36.4	36.9	30.9	36.0
Sum of Len. (m)	65.3	319.9	66.4	451.5

14.6 Specific Gravity

The density of the material is highly variable given that the country rock is about 2.8 but the $BaSO_4$ is about 4.4. The assays in the database contain both the $BaSO_4$ grade and the Specific Gravity (SG). As a way to verify the data and establish the relationship between the grade and the SG, SGS plotted the data for the different years of the drilling and cam up with the Figure 14-6. SGS estimates that the 2017 data is the most reliable to establish the relationship between the grade and the SG. Also, the established relationship is very close to a “theoretical” relationship from a two-phased material. The relationship found and used for the resource estimation is therefore:

$$SG = 2.828 + 0.0000009404*(BaSO_4)^3 - 0.000030963*(BaSO_4)^2 + 0.010623107*BaSO_4$$

This formula implies that a barren rock would have a SG of 2.828 and a 100% $BaSO_4$ rock would have a SG of 4.52. This is reasonable for the resource estimation.

For this project, the overburden was set at a density of 2 and the waste rock at 2.828.

Since density is directly linked to the $BaSO_4$ values, a formula was used for the density in the blocks after having estimated the grade:

$$SG\ (blocks) = 2.828 + 0.0000009404*(BaSO_4cap)^3 - 0.000030963*(BaSO_4cap)^2 + 0.010623107*BaSO_4cap$$

It is to be noted that the 8 samples from 2003-2005 that are below 5% $BaSO_4$ have a mean SG of 2.74 and the 2 samples from 2017 that are below 5% $BaSO_4$ have a mean SG of 2.805. The mean density for these

10 samples is of 2.755. We conclude that we may be slightly overestimate the tonnage of the waste part of the deposit by less than 2%, which is reasonable.

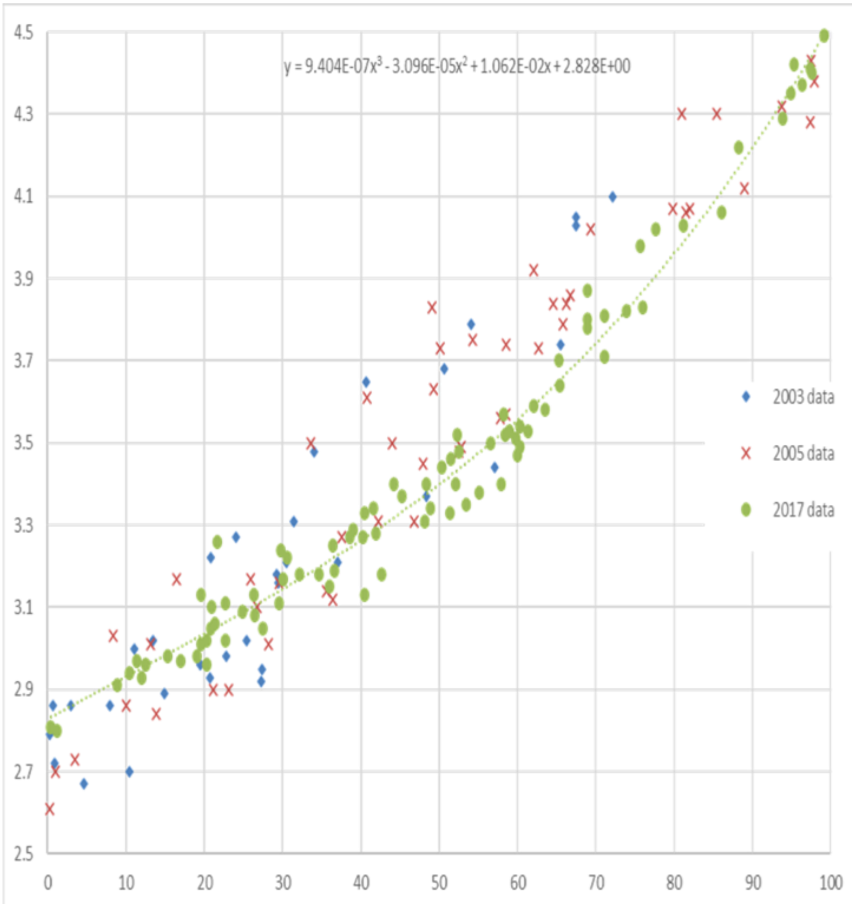


Figure 14-6: Year per Year Scatterplot for the Density vs the $BaSO_4$

14.7 Block Model Parameters

Block size used 5 x 5 x 5m. Block fractions were used so the blocks have a "percent block" variable between 0 and 1 to account for incomplete blocks partly inside the mineralized volumes. Any block touching the mineralized volumes were estimated. The block model has a rotation of 60 degrees counterclockwise to conform to the shape and orientation of the orebodies.

The chosen size of blocs considers the open pit mining method with some benches of that size.

Table 14-4: Deposit Block Model Geometry

Model Name	UH Deposit		
	X (North)	Y (East)	Z (Level)
Origin (NAD 83 / UTM Zone 11) (1, 1, 1 block center)	540800	5620300	1200
Extent (blocks count)	101	121	101
Block Size	5	5	5
Rotation (counterclockwise)	60		

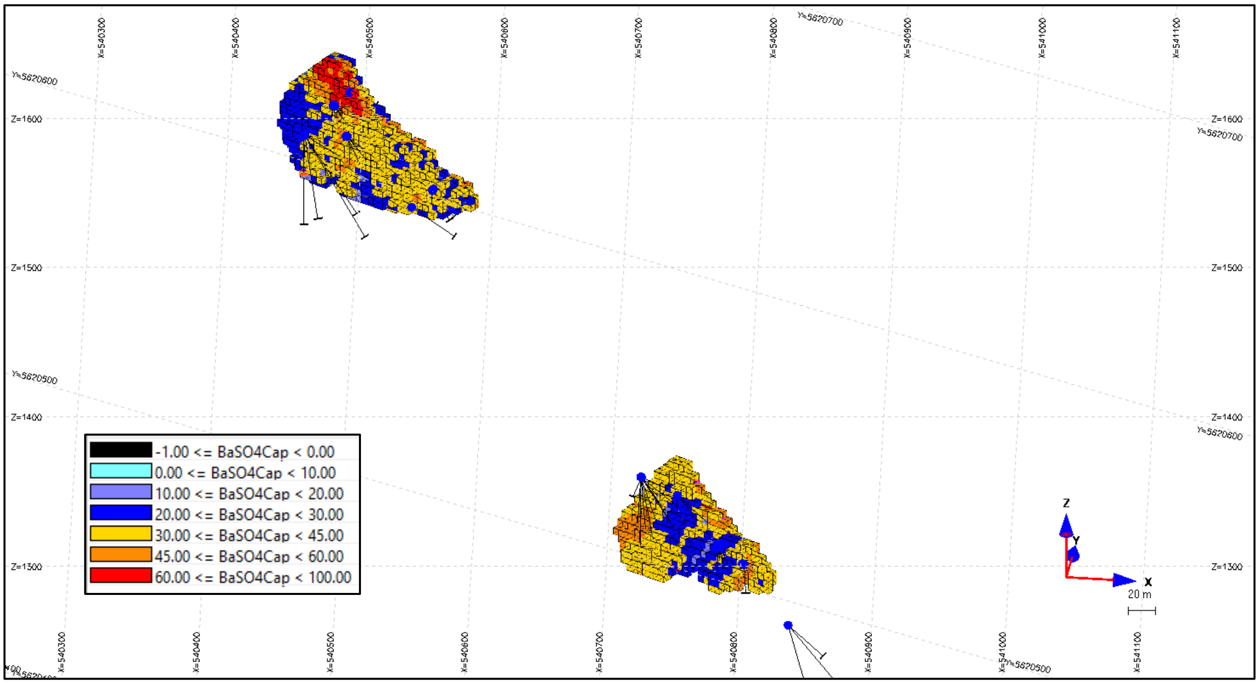


Figure 14-7: Isometric View Looking North Showing the Frances Creek Deposit Model, Mineral Resource Block Model

14.8 Grade Interpolation

Inverse Distance squared (IDS) was used to estimate the block model (BM) grades. SGS carried out a grade limited interpolation on the deposit mineralised envelope and BM using the same parameters for the 3 estimation passes: minimum number of samples: 3, maximum number of samples: 5, maximum number of samples per drill hole: 2. There were 3 successive estimation passes : pass 1 with a search ellipsoid of 20 x 20 x 5m, pass 2 with a search ellipsoid of 40 x 40 x 10m; and pass 3 with a search ellipsoid of 80 x 80 x 30m). A regular search pattern was used instead of octants. Hard boundaries were used for all 3 solids.

SGS used “variable orientation” for the orientation of the search ellipsoids to conform better to the slightly undulating (changing) dip and azimuth of the deposit. This technique results in great block models very true to the interpretation and to the drill hole information.

SGS believes that a variogram used for the kriging of the deposit would smooth the resources and possibly generate good results that could be compared to the IDS BM. However, the amount of assay values is insufficient to validate any attempt to do variography.

14.9 Mineral Resource Classification Parameters

SGS used an inferred and indicated categories for this deposit. The problems found in the database are the reason for not estimating any as measured at this stage. While the laboratory certificates are available for the database and therefore the grade is well established for the most part, there are a few possible imprecisions on the location and orientation of the drill holes and is hard to validate with available data. Also, the drilling pads are still in the field but the identified collars are not available in the field to confirm the exact location and orientation of the collars.

The Mineral Resource Estimate presented in this Technical Report was prepared and disclosed in compliance with all current disclosure requirements for mineral resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the current Mineral Resource Estimate into Indicated and Inferred is consistent with current 2014 CIM Definition Standards - For Mineral Resources and Mineral Reserves, including the critical requirement that all mineral resources "have reasonable prospects for eventual economic extraction".

Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.

Interpretation of the word 'eventual' in this context may vary depending on the commodity or mineral involved. For example, for some coal, iron, potash deposits and other bulk minerals or commodities, it may be reasonable to envisage 'eventual economic extraction' as covering time periods in excess of 50 years. However, for many gold deposits, application of the concept would normally be restricted to perhaps 10 to 15 years, and frequently to much shorter periods of time.

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

Indicated Mineral Resource

An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit.

Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.

An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

Mineralization may be classified as an Indicated Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralization. The Qualified Person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the Project. An Indicated Mineral Resource Estimate is of sufficient quality to support a Preliminary Feasibility Study which can serve as the basis for major development decisions.

Inferred Mineral Resource

An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.

An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

An Inferred Mineral Resource is based on limited information and sampling gathered through appropriate sampling techniques from locations such as outcrops, trenches, pits, workings and drill holes. Inferred Mineral Resources must not be included in the economic analysis, production schedules, or estimated mine life in publicly disclosed Pre-Feasibility or Feasibility Studies, or in the Life of Mine plans and cash flow models of developed mines. Inferred Mineral Resources can only be used in economic studies as provided under NI 43-101.

There may be circumstances, where appropriate sampling, testing, and other measurements are sufficient to demonstrate data integrity, geological and grade/quality continuity of a Measured or Indicated Mineral Resource, however, quality assurance and quality control, or other information may not meet all industry norms for the disclosure of an Indicated or Measured Mineral Resource. Under these circumstances, it may be reasonable for the Qualified Person to report an Inferred Mineral Resource if the Qualified Person has taken steps to verify the information meets the requirements of an Inferred Mineral Resource.

14.10 Mineral Resource Statement

The estimation settings and block model settings as well as the composite settings were used following CIM best practices. The numbers below are based on the entire deposit block model.

Table 14-5 describes the Frances Creek mineral deposit resources at the estimated economical cut-off grade (COG) estimated using barite price, barite mining and processing recovery and mining and processing cost.

The general requirement that all mineral resources have “reasonable prospects for economic extraction” implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade taking into account extraction scenarios and processing recoveries. To meet this requirement, the authors consider that the Frances Creek deposit mineralization is amenable for open pit extraction.

In order to determine the quantities of material offering “reasonable prospects for eventual economic extraction” by an open pit, Whittle™ pit optimization software and reasonable mining assumptions and barite recovery assumptions are used to evaluate the proportions of the block model that could be “reasonably expected” to be mined from an open pit were used. The pit optimization was completed by SGS. Based on SGS’s experience with open pit exploration projects and mining operations, the authors consider the assumptions to be appropriate reporting assumptions for the purposes of the current report.

The combined strip ratio of the 2 open pits is of 10.4:1.

The reader is cautioned that the results from the pit optimization are used solely for the purpose of testing the “reasonable prospects for economic extraction” by an open pit and do not represent an attempt to estimate mineral reserves. There are no mineral reserves on the Property. The results are used as a guide to assist in the preparation of a mineral resource statement and to select an appropriate resource reporting cut-off grade.

The 2021 Mineral Resource Estimate for the Frances Creek deposit is presented in Table 14-5 (Figure 14-8 and Figure 14-9). Highlights of the Frances Creek deposit Mineral Resource Estimate are as follows:

- The open pit mineral resource includes, at a base case cut-off grade of 10 % $BaSO_4$, 75.6 thousand tonnes of barite (contained in 214.8 thousand tonnes at an average grade of 35.2 % $BaSO_4$) in the Indicated category, and 45.4 thousand tonnes of barite (contained in 134.2 thousand tonnes at an average grade of 33.9 % $BaSO_4$) in the Inferred category.

Table 14-5: Frances Creek Deposit Mineral Resource Estimate, Base Case at a COG of 10 % $BaSO_4$, Effective Date January 11, 2022

Classification	Zone	Tonnes	% BaSO4	Density	Tonnes of BaSO4
Indicated	A	17,500	34.7	3.20	6,100
	B (B1+B2)	197,300	35.2	3.21	69,500
	Total	**214,800**	**35.2**	**3.21**	**75,600**
Inferred	A	4,700	35.8	3.21	1,700
	B (B1+B2)	129,500	33.8	3.19	43,700
	Total	**134,200**	**33.9**	**3.19**	**45,400**

(1) *Effective date for the new resources is January 11, 2022.*

(2) *The independent QP for this resources estimate is Yann Camus, P.Eng., SGS Geological Services Inc.*

(3) *The base case is reported at a cut-off grade of 10 % $BaSO_4$.*

(4) *Open pit mineral resources are reported at a base case cut-off grade of 10 % $BaSO_4$ within a conceptual pit shell. Cut-off grades are based on a barite price, barite mining and processing recovery and mining and processing cost.*

(5) *The resources are presented in-situ and without dilution.*

(6) *Block fraction was applied to the mineral resources.*

(7) *Mineral resources that are not mineral reserves do not have demonstrated economic viability. The quantity and grade of reported Inferred Resources in this Mineral Resource Estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured. However, based on the current knowledge of the deposits, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.*

(8) *This Resource Estimate has been prepared in accordance with CIM definition (2014).*

(9) *The density used for each block is based on grade and the following formula:*

$$2.828+(0.0000009404*(BaSO_4)^3) - (0.000030963*(BaSO_4)^2) + (0.010623107* BaSO_4)$$

(10) *A variable $BaSO_4$ capping grade was used by removing 10% of the grade on assay with lengths >5 m and resulting in an overall reduction of 5% of the barite content.*

(11) *Total may not add due to rounding.*

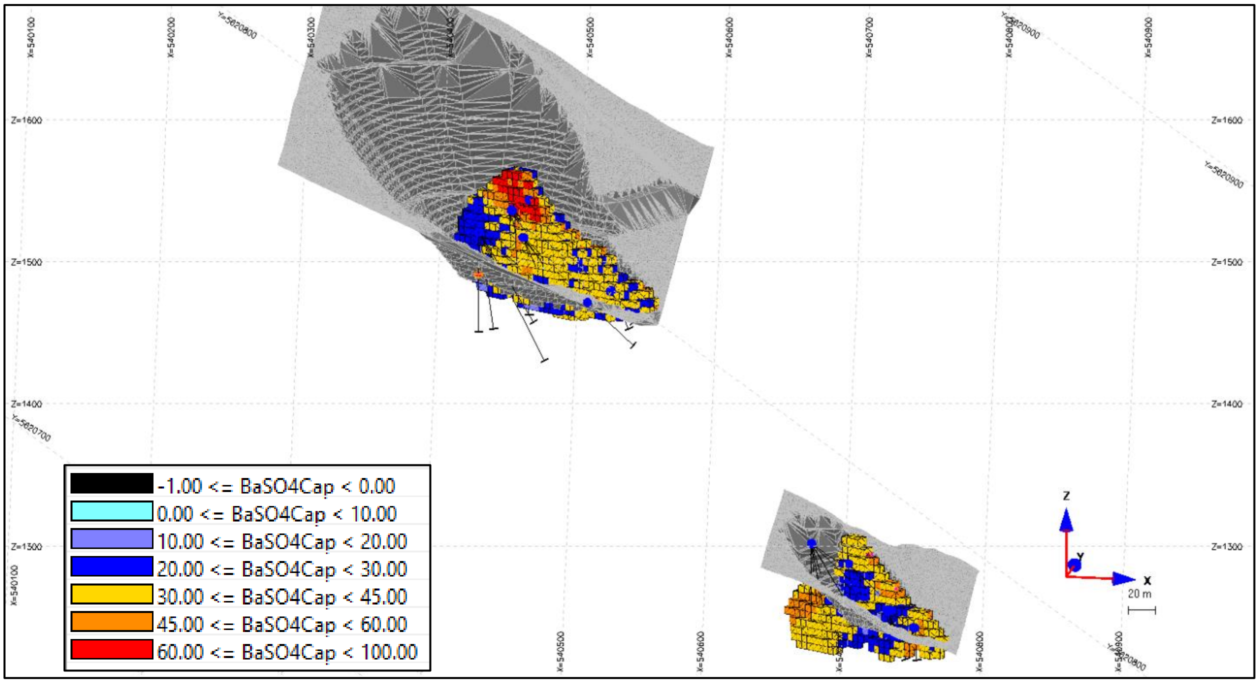


Figure 14-8: Isometric View Looking North showing the distribution of the Frances Creek Deposit Mineral Resource Blocks by Grade, and the Pit

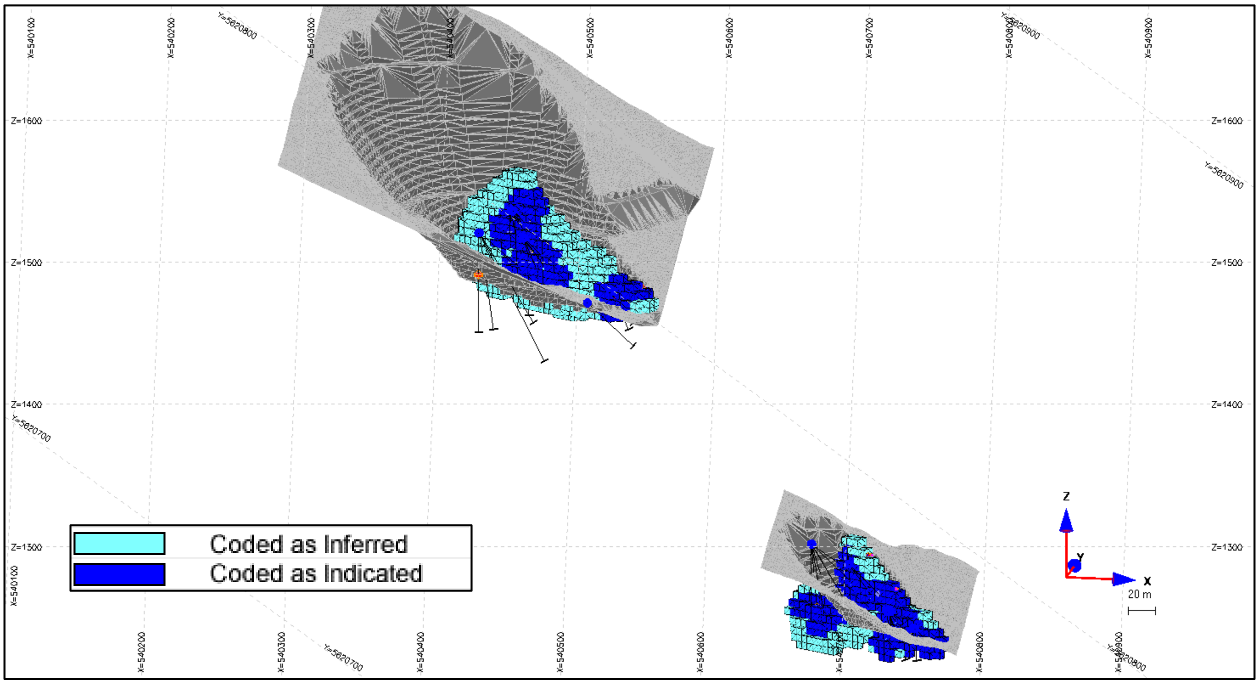


Figure 14-9: Isometric View Looking South-southeast showing the distribution of the Frances Creek Deposit Mineral Resource Blocks by Resource Category, and the Pit

14.11 Model Validation and Sensitivity Analysis

Block Model Validation Analysis

Block model validation procedures were undertaken to ensure that blocks represent both the interpreted geology and the input data and that selected interpolation methodologies do not introduce any significant biases.

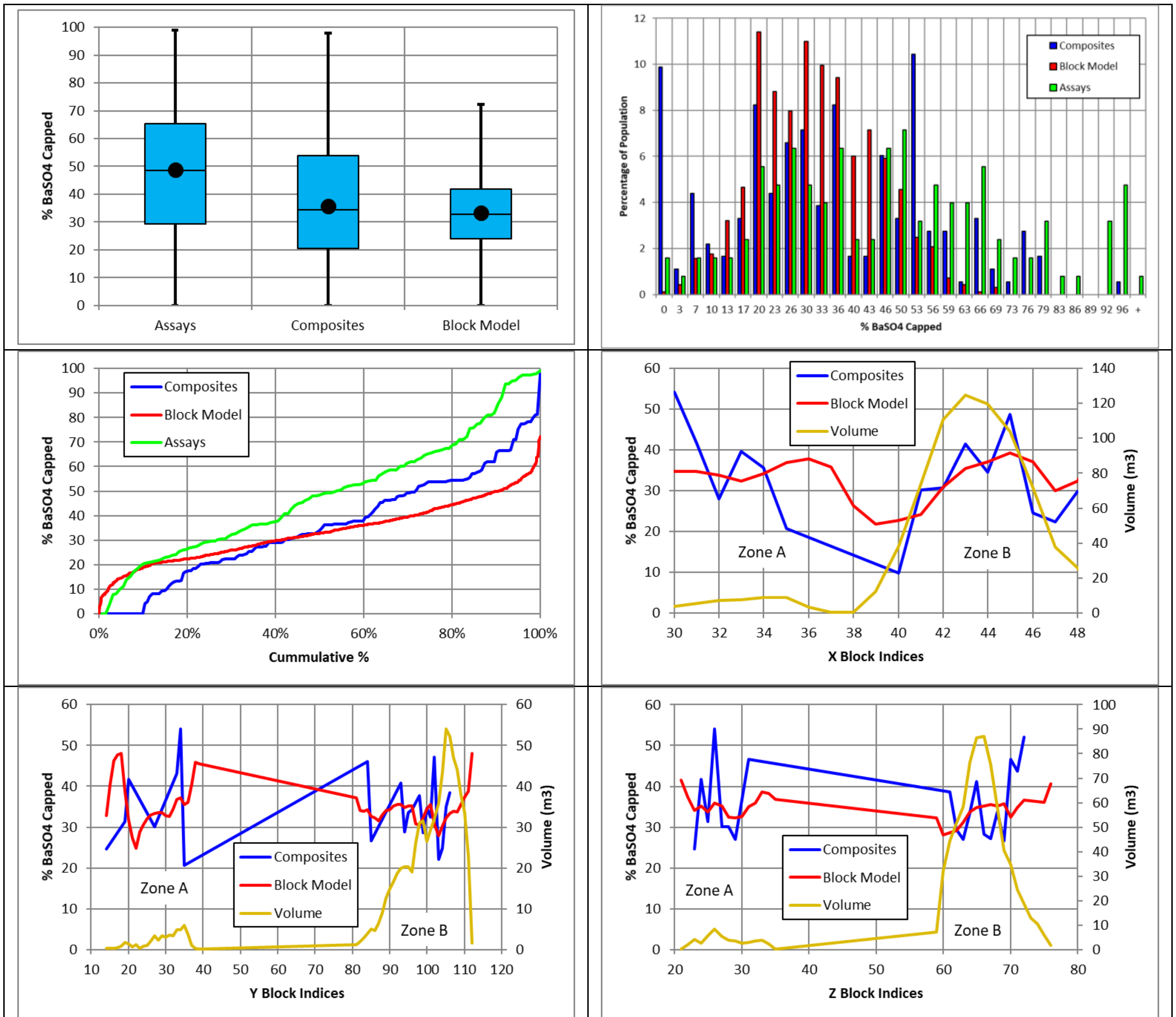
A global statistical comparison of the global means of all grade estimations method was undertaken by SGS Geological Services (SGS). In well informed domains, the difference between global means for each interpolation technique should not exceed 10%. Average grades as seen in Table 14-6 differ from block model to assays and composite values.

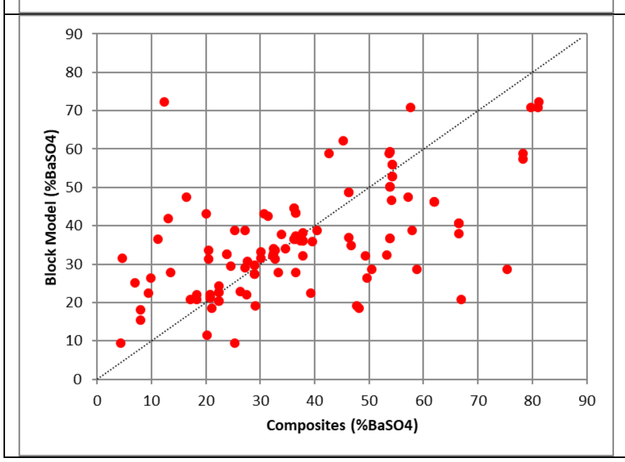
Table 14-6: Domains Summary Statistics of the Estimation Methods Used

	2_5mCalc : BaSO4	FC : BaSO4	Assays_FC_union : BaSO4
Min Value	0	0	3.5
Max Value	97.8638	76.7358	99.09
Average	37.3119	37.084	49.7041
Length Weighted Average	37.24	-1	46.5867
Sum of Length	447.67	-1	337.4
Variance	543.431	168.955	601.051
Standard Deviation	23.3116	12.9983	24.5163
% Variation	0.624776	0.350508	0.493246
Median	36.83	36.0296	48.63
First Quartile	20.7327	27.7019	29.5
Third Quartile	55.11	46.4526	67.08
Count	186	2268	116
Count Missing	0	0	0

14.11.1 Swath Plot Analysis

The following swath plot analyses were completed for validating the block grade estimation of the deposit.





- Composites have internal dilution (0% $BaSO_4$)
- Assay lenghts are widespread
- Composite length of 2.5 m have induced continuity
- Applied Capping of 10% reduction on assay lengths > 5m.
- Block vs composites shows smoothing.
- Swathplots considered to be good.
- The Boxplot graph show blocks to be smoothed both for high and low grade values.

Figure 14-10: Swath Plots, Box Plot, Histogram, Scatter Plot

14.11.2 Observations of Block Model Validation graphs

Blocks vs Composites vs Assays

The Table 14-6 describes the statistics of the blocks, composites and assays within the mineralised orebody (3D solid). We can see that the statistics of the assays and composites are similar but differ from the blocks where they are always lower. The variance of the block is lower than the composites or the assays which is what we can see in general. Without prejudice, I think the estimated grades are lower than they should however, the por quality and information of assay data as well as lithological logs are directly affecting the mineral resources grades and classification.

A, B1, B2 solids

As per Figure 14-10; (Block histograms, X-Y-Z swath plots) the block grades seam to be smoother than the input composite samples. This deposit is smoothed. There is general understanding that the average grade of the blocks following x, y or z are generally always lower that the corresponding assay grades. Where there is a higher volume, there tends to be a better agreement between the input samples and block grades estimated for each of the swath plots (debatable though). The block grades are lower than the corresponding lower grade assay or composite grades. We could say that the block values tend to be on the conservative side compared to composites and original assay values. The review of the 3D solid is recommended for added details and to take out unnecessary barren or waste areas from the model.

3D Modeling Review

SGS modelled based on available lithological data and mostly $BaSO_4$ grade values. Although this deposit could be designed as a geologically controlled solid, the available information did not permit to ascertain the geological boundaries in the model. SGS believes the deposit may be better delimited using a better description of drill hole information. The planar envelop setting was used taking into account the general trend on mineralisation and imposed extrapolation and boundary extrapolation. The topographic surface was applied on the 3D solids.

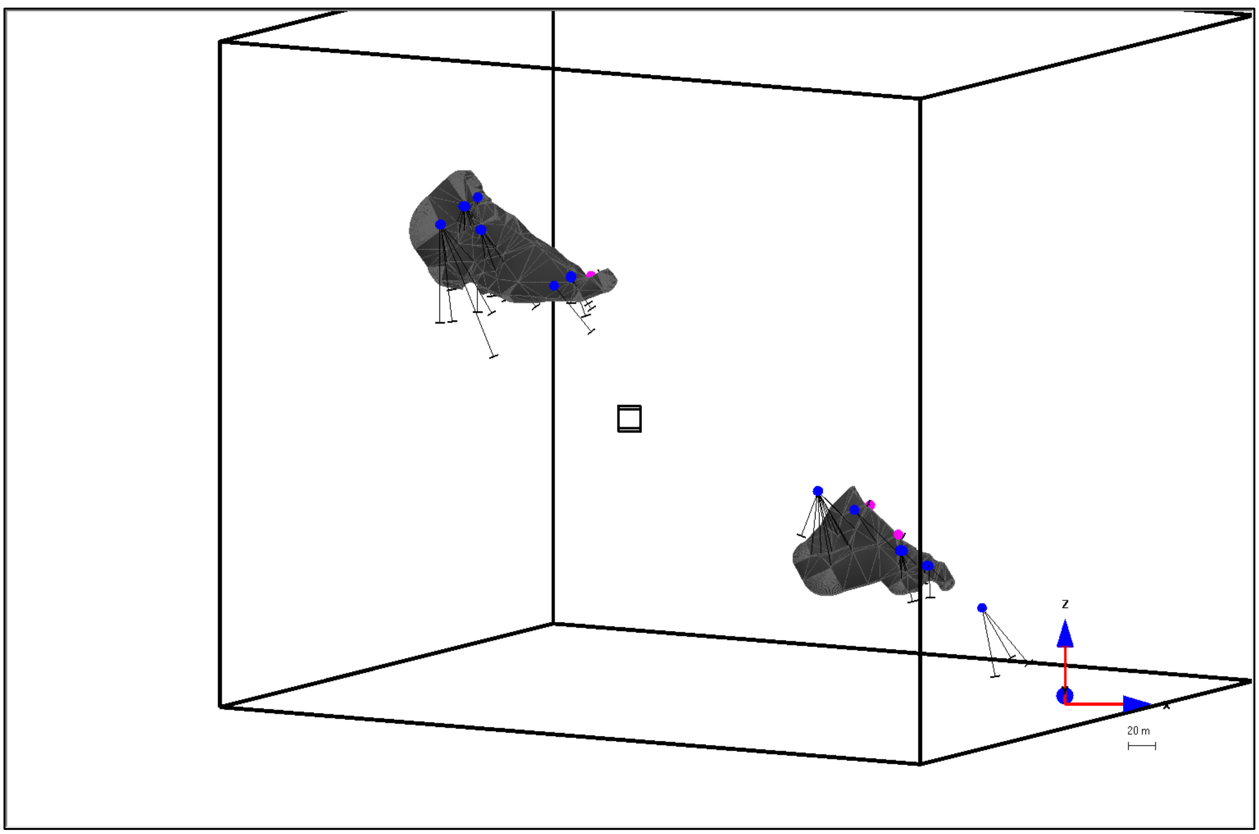


Figure 14-11: Highlights of Interpretation Issues and Block Interpolation Issues

14.11.3 Sensitivity to Cut-off Grade

The Frances Creek Deposit mineral resource has been estimated at a range of cut-off grades presented in Table 14-7 to demonstrate the sensitivity of the resource to cut-off grades. The current mineral resource is reported at a base case cut-off grade of 10 % $BaSO_4$ within the conceptual pit shells.

Table 14-7: Frances Creek Deposit Mineral Resource at Various $BaSO_4$ Cut-off Grades

COG (% BaSO4)	Classification	Name	Tonnes	% BaSO4	Density	Tonnes of BaSO4
10	Indicated	A	17,500	34.7	3.20	6,100
		B (B1+B2)	197,300	35.2	3.21	69,500
		Total	**214,800**	**35.2**	**3.21**	**75,600**
	Inferred	A	4,700	35.8	3.21	1,700
		B (B1+B2)	129,500	33.8	3.19	43,700
		Total	**134,200**	**33.9**	**3.19**	**45,400**
20	Indicated	A	16,700	35.5	3.21	5,900
		B (B1+B2)	178,200	37.3	3.23	66,400
		Total	**194,900**	**37.1**	**3.23**	**72,400**
	Inferred	A	4,500	36.7	3.22	1,700
		B (B1+B2)	114,700	36.1	3.22	41,400
		Total	**119,200**	**36.1**	**3.22**	**43,100**
30	Indicated	A	12,700	38.4	3.25	4,900
		B (B1+B2)	123,400	42.7	3.30	52,700
		Total	**136,200**	**42.3**	**3.30**	**57,600**
	Inferred	A	3,500	39.8	3.26	1,400
		B (B1+B2)	73,500	42.7	3.30	31,400
		Total	**77,100**	**42.6**	**3.30**	**32,800**

(1) *Effective date for the new resources is January 11, 2022.*

(2) *The independent QP for this resources estimate is Yann Camus, P.Eng., SGS Geological Services Inc.*

(3) *The base case is reported at a cut-off grade of 10 % $BaSO_4$.*

(4) *Open pit mineral resources are reported at a base case cut-off grade of 10 % $BaSO_4$ within a conceptual pit shell. Cut-off grades are based on a barite price, barite mining and processing recovery and mining and processing cost.*

(5) *The resources are presented in-situ and without dilution.*

(6) *Block fraction was applied to the mineral resources.*

(7) *Mineral resources that are not mineral reserves do not have demonstrated economic viability. The quantity and grade of reported Inferred Resources in this Mineral Resource Estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured. However, based on the current knowledge of the deposits, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.*

(8) *This Resource Estimate has been prepared in accordance with CIM definition (2014).*

(9) *The density used for each block is based on grade and the following formula:*

$2.828+(0.0000009404*(BaSO_4)^3) - (0.000030963*(BaSO_4)^2) + (0.010623107* BaSO_4)$

(10) *A variable $BaSO_4$ capping grade was used by removing 10% of the grade on assay with lengths >5 m and resulting in an overall reduction of 5% of the barite content.*

(11) *Total may not add due to rounding.*

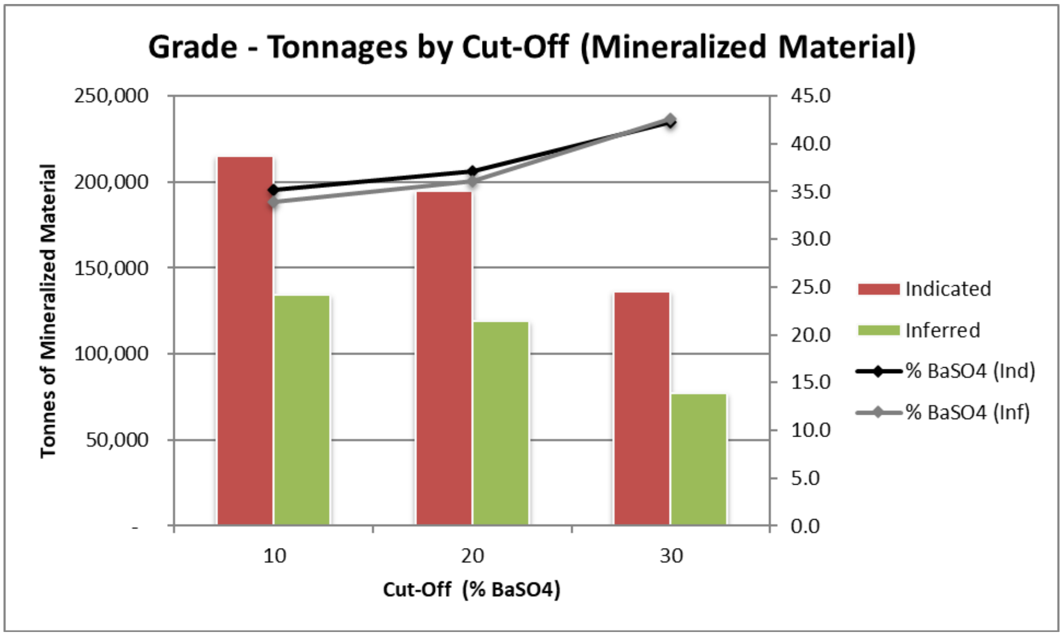


Figure 14-12: Comparison of the In-Pit Resources at Varied Cut-Off Grades (Mineralized Material)

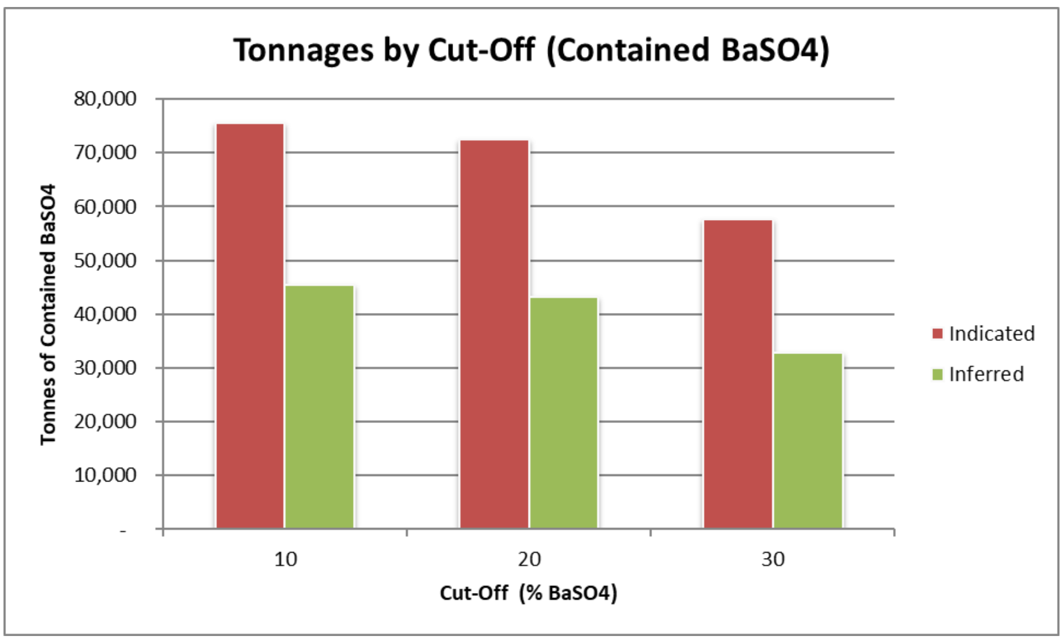


Figure 14-13: Comparison of the In-Pit Resources at Varied Cut-Off Grades (Contained $BaSO_4$)

14.12 Comparison to Previous Mineral Resource Estimate

A comparison of the current Frances Creek deposit Mineral Resource Estimate (open pit) to previous Mineral Resource Estimates is presented in Table 14-8. The current Mineral Resource Estimate compares well with the 2013 resource estimate when looking at the total of the Measured, Indicated and Inferred resources.

SGS is of the opinion that the current Mineral Resource Estimate is based on much improved and stringent 3D mineral resource wire frame modeling, a better understanding of the deposit derived from significant increases in drilling density and the belief that the Frances Creek deposit, based on deposit size and grade distribution, will be mined by open pit methods.

Table 14-8: Comparison of Previous In-Pit Frances Creek Deposit Mineral Resource Estimates to the Current Resource Estimates

Classification	Zone	2022			2020		
		Tonnes	% BaSO4	Tonnes of BaSO4	Tonnes	% BaSO4	Tonnes of BaSO4
Indicated	A	17,500	34.7	6,100	36,600	36.1	13,200
	B (B1+B2)	197,300	35.2	69,500	129,600	38.2	49,500
	Total	**214,800**	**35.2**	**75,600**	**166,200**	**37.7**	**62,700**
Inferred	A	4,700	35.8	1,700	42,900	33.1	14,200
	B (B1+B2)	129,500	33.8	43,700	152,700	36.1	55,100
	Total	**134,200**	**33.9**	**45,400**	**195,600**	**35.4**	**69,300**

(1) *Effective date for the new resources is January 11, 2022.*

(2) *The independent QP for this resources estimate is Yann Camus, P.Eng., SGS Geological Services Inc.*

(3) *The base case is reported at a cut-off grade of 10 % $BaSO_4$.*

(4) *Open pit mineral resources are reported at a base case cut-off grade of 10 % $BaSO_4$ within a conceptual pit shell. Cut-off grades are based on a barite price, barite mining and processing recovery and mining and processing cost.*

(5) *The resources are presented in-situ and without dilution.*

(6) *Block fraction was applied to the mineral resources.*

(7) *Mineral resources that are not mineral reserves do not have demonstrated economic viability. The quantity and grade of reported Inferred Resources in this Mineral Resource Estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured. However, based on the current knowledge of the deposits, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.*

(8) *This Resource Estimate has been prepared in accordance with CIM definition (2014).*

(9) *The density used for each block is based on grade and the following formula:*

$2.828+(0.0000009404*(BaSO_4)^3) - (0.000030963*(BaSO_4)^2) + (0.010623107* BaSO_4)$

(10) *A variable $BaSO_4$ capping grade was used by removing 10% of the grade on assay with lengths >5 m and resulting in an overall reduction of 5% of the barite content.*

(11) *Total may not add due to rounding.*

14.13 Disclosure

All relevant data and information regarding the Project are included in other sections of this Technical Report. There is no other relevant data or information available that is necessary to make the technical report understandable and not misleading.

The authors are not aware of any known mining, processing, metallurgical, environmental, infrastructure, economic, permitting, legal, title, taxation, socio-political, or marketing issues, or any other relevant factors not reported in this technical report, that could materially affect the Mineral Resource Estimate.

15 MINERAL RESERVE ESTIMATES

There are no current Mineral Reserve estimates stated on this Property. This Item does not apply to the Technical Report.

16 MINING METHODS

16.1 Introduction

The proposed mining method is conventional open-pit truck and loader mining. Mineralized rock and waste would be ripped with a dozer, loaded by a loader into off-highway articulated dump trucks and hauled to the crushing, grinding, and sizing plant, ROM stockpile and waste rock dumps.

The basis for the pit design work was the mineral resource block model that was developed by WellDunn Consulting Inc. as part of a NI43-101 compliant mineral resource statement estimates (refer Item 14) and SGS work on the review and confirmation of the block model. The following data/files were provided by the SGS team of Geologists:

- 03-FinalSGSgigLIDAR_csv_Center_HiRez
- 3Dsolids
- BM_FC_final4whittle
- FinalSGSbigLIDAR-csv_Center_HiRez_Min_OVB
- Report20-4.xls

The resource model identifies two distinct zones, classed as Upper and Lower. This PEA will focus on the extraction of the Upper Zone only. SGS prepared the mineralized wire frames and the drill holes were loaded into the Vulcan geology and mine planning software and was used as the basis for the design of the pit.

16.2 Geotechnical and Hydrological Considerations

A PEA level geotechnical slope design report had been provided by GCI Geotech Consulting Inc. For the current work an overall average pit slope angle of 52º was used. The authors recommend that during the next phase of work to support a PFS, geotechnical work be undertaken to refine the pit slope design and hydrological work be undertaken to characterize the surface and ground water regimes as they pertain to ground stability and pit pumping requirements.

The report recommends for an overall slope height of 100 m, 63° slope angle for a Factor of Safety of 1.2 and slope angle of 53° is recommended for a factor of safety of 1.5. Table 16-1 illustrates the slope angle for different Factor of Safety.

Table 16-1: Slope Angles for different Factors of Safety

Factor of Safety	Slope Angle (°)
1.2	63
1.5	53

The report further recommends that “the overall slope angle to be chosen depends on the risk that the decision-maker is prepared to take. The flatter/shallower the angle, the higher the Factor of Safety, and the lower the risk of highwall/multiple bench failure. It is recommended that the final wall geometry comprises several smaller and manageable benches.”

16.3 Bulk Sample Pit

The Frances Creek Barite deposit exhibits potential (Item 19, Marketing Studies) as a source of pharmaceutical grade Barium Sulphate. As such, one of the recommendations is to conduct an exploration bulk sample to assess processing assumptions, market penetration of products and product revenue. Under existing exploration guidelines, a bulk sample of up to 10,000 tonnes of mineralized material may be taken. The location of this material was identified and removed from the analysis of this PEA.

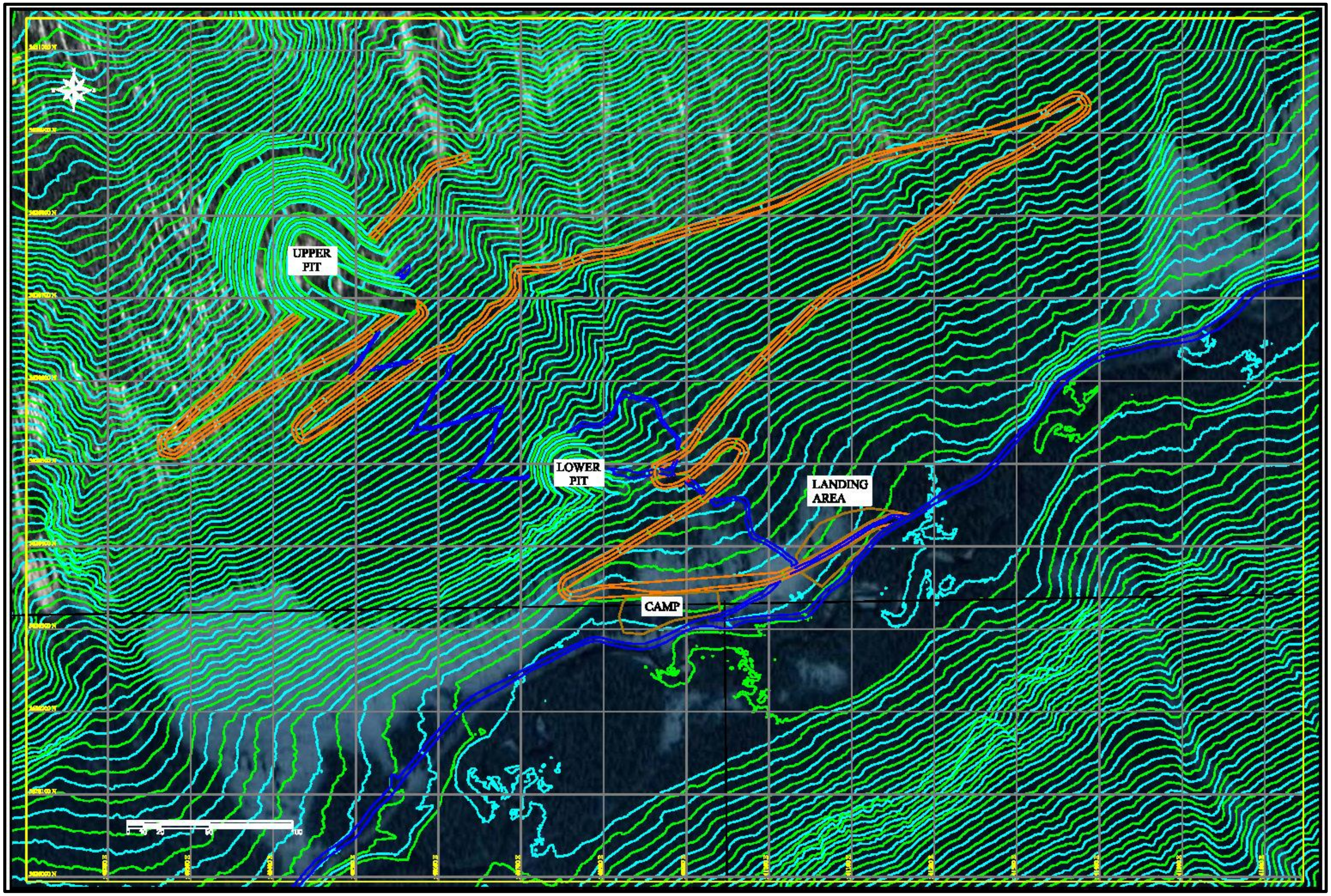


Figure 16-1: Frances Creek Property Site Layout

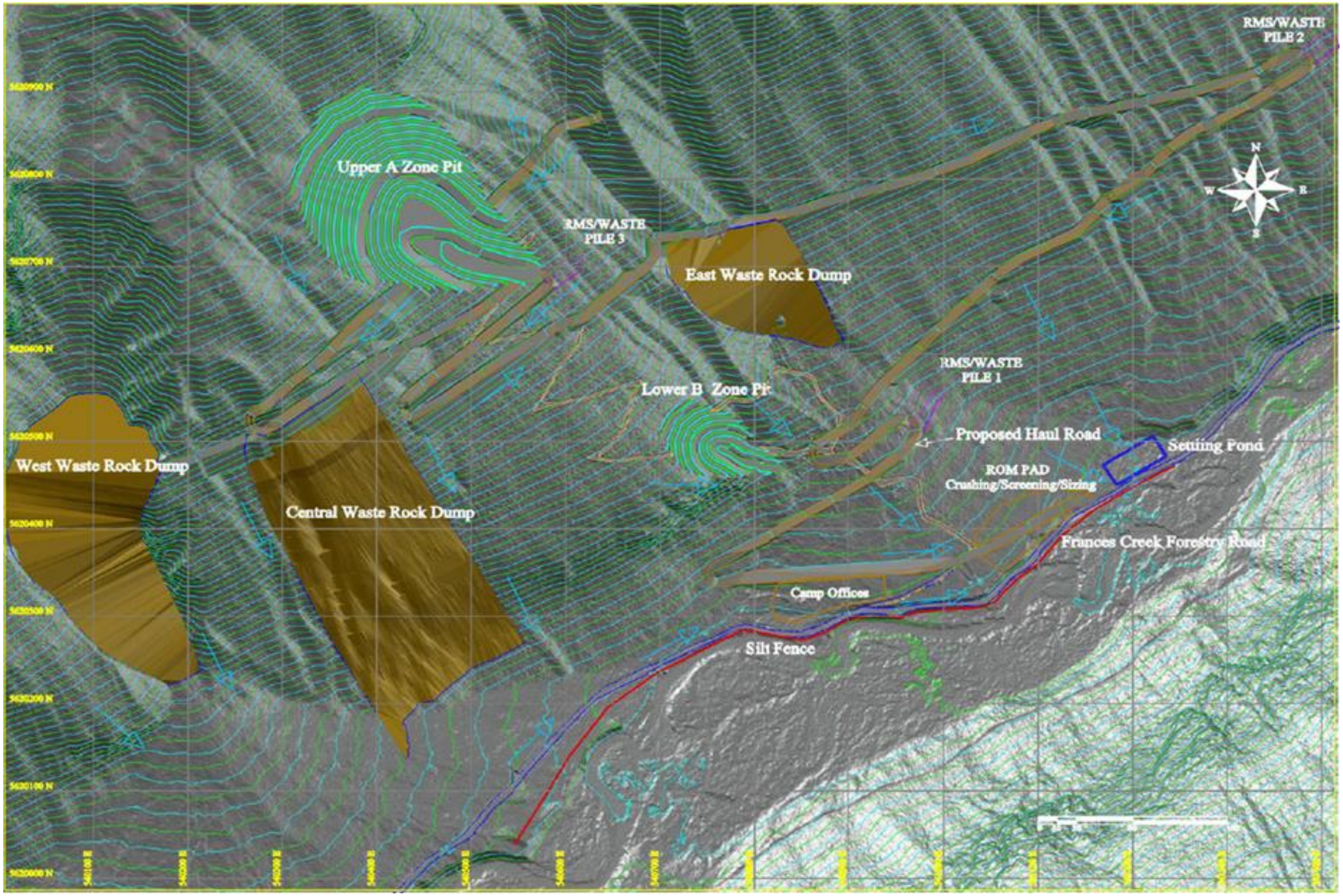


Figure 16-2: Frances Creek Property Site Layout

16.4 General Arrangement: Mine Layout

The topography of the property can be characterized as steep, rugged, forest covered mountains, drained by a small intermittent stream. In finalizing the mine site layout due consideration was given to the topography of the area with generally steep slopes, the location of the two pit areas, constituting the mining areas, the location of the storage dumps and associated haulage distances between the pits, and the beneficiation plant. Figure 16-3 shows the site layout of the Frances Creek Property.

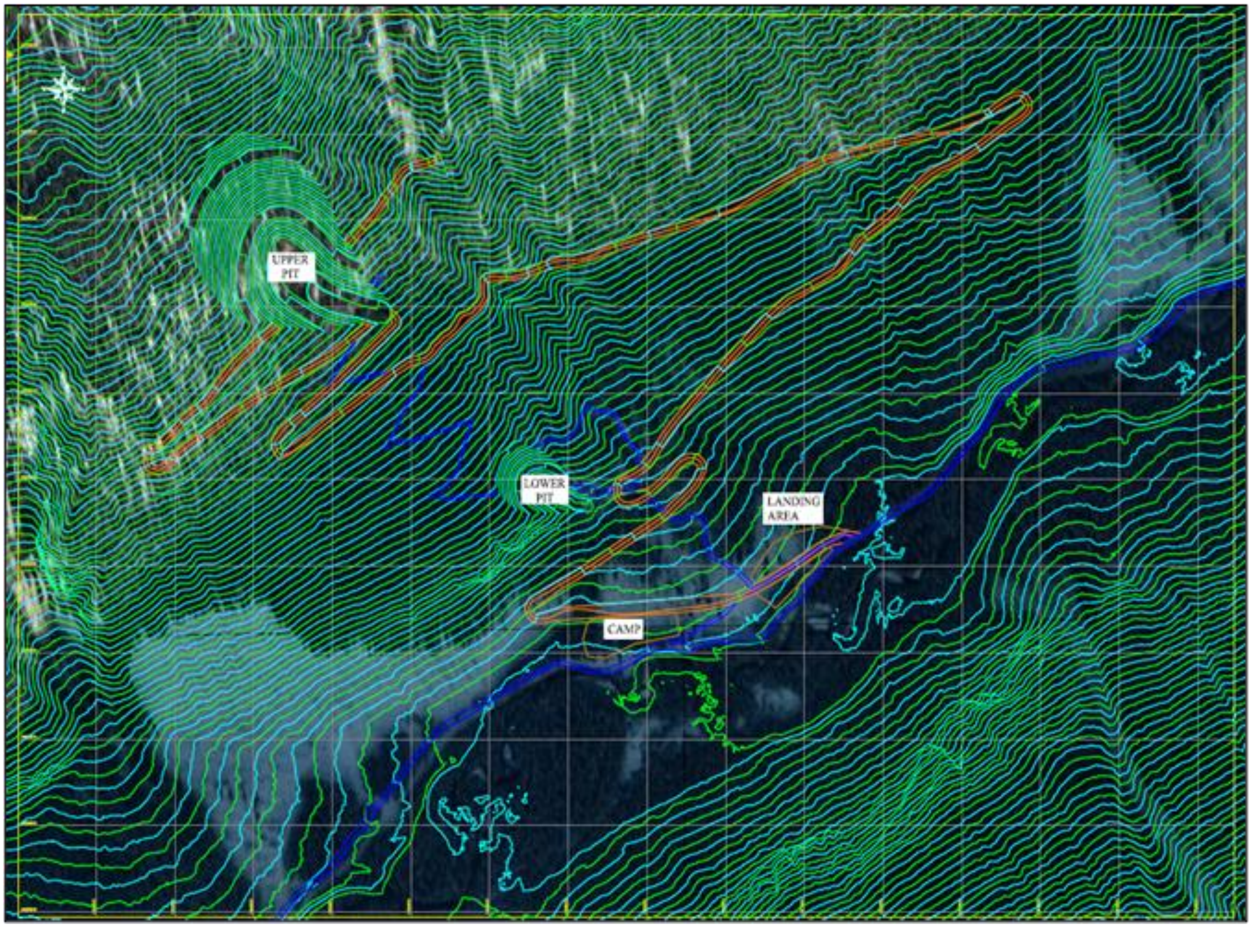


Figure 16-3: Frances Creek Mine Layout

16.5 Pit Design

The pit design for the Life of Mine was built around the Upper A Zone presented in Figure 16-4 falling within the defined wireframe or shells with the use of the Vulcan Software. To guide the author to create the pit design, the drill points were loaded into the open pit design software, together with the mine design criteria presented in Table 16-2 and the mineralized wireframe created by SGS Geologists.

There is a high efficacy of visual distinction between barite mineralized material and waste for the entire mineralized zones within the defined wireframe or shell and waste can be mined separately without grade control through block mining practices.

As the pit will provide mineralized material on an as needed basis for the final supply of pharmaceutical products, the block model was used directly for the pit design with a nominal cut-off grade of 10% $BaSO_4$ applied. Cut-off grades are discussed in section 21.5 Operating Costs.

The ROM material resulting in the following ROM tonnages in Upper A zone pit by Bench.

Table 16-2: ROM Material Upper A zone by Bench

	Total Mined Material	Waste	Mineralized Material	$BaSO_4$ Grade	$BaSO_4$ Mined
Bench	Tonnes	Tonnes	Tonnes	Volume	Tonnes
1670	26	-	-	-	-
1665	920	-	-	-	-
1660	3,772	-	-	-	-
1655	8,484	-	-	-	-
1650	15,050	-	-	-	-
1645	24,453	-	-	-	-
1640	36,817	-	-	-	-
1635	47,409	-	-	-	-
1630	58,151	-	-	-	-
1625	68,568	-	-	-	-
1620	79,882	-	-	-	-
1615	95,060	-	-	-	-
1610	109,444	-	-	-	-
1605	122,359	-	-	-	-
1600	132,475	-	-	-	-
1595	140,681	-	-	-	-
1590	147,463	-	-	-	-
1585	152,820	-	-	-	-
1580	154,633	-	-	-	-
1575	157,725	324	266	41%	108
1570	159,564	928	980	34%	335
1565	159,323	1,446	2,279	33%	742
1560	159,809	1,822	4,260	32%	1,349
1555	157,392	2,317	7,307	31%	2,292
1550	154,051	2,884	12,033	32%	3,879
1545	149,705	3,966	16,062	30%	4,807
1540	144,014	5,257	20,757	33%	6,825
1535	138,094	7,049	29,056	32%	9,412
1530	134,851	10,044	36,354	33%	11,946
1525	131,199	10,158	39,853	33%	12,992
1520	126,275	10,462	39,460	32%	12,657
1515	118,978	9,524	35,233	31%	10,771
1510	104,937	7,382	25,564	27%	6,842
1505	70,678	5,126	19,725	26%	5,201
1500	55,022	4,887	16,726	27%	4,468
1495	32,704	1,883	6,686	25%	1,671
	3,552,793	85,457	312,600	31%	96,297

Table 16-3: Mine Design Criteria

Production Target	
ROM tonnes Per year	10,000 - 15,000

Pit Design	
Pit slope angle	52º
Batter angle	80º
Bench height	5 m
Berm width	3 m
Ramp width	10 m
Ramp gradient	10 %

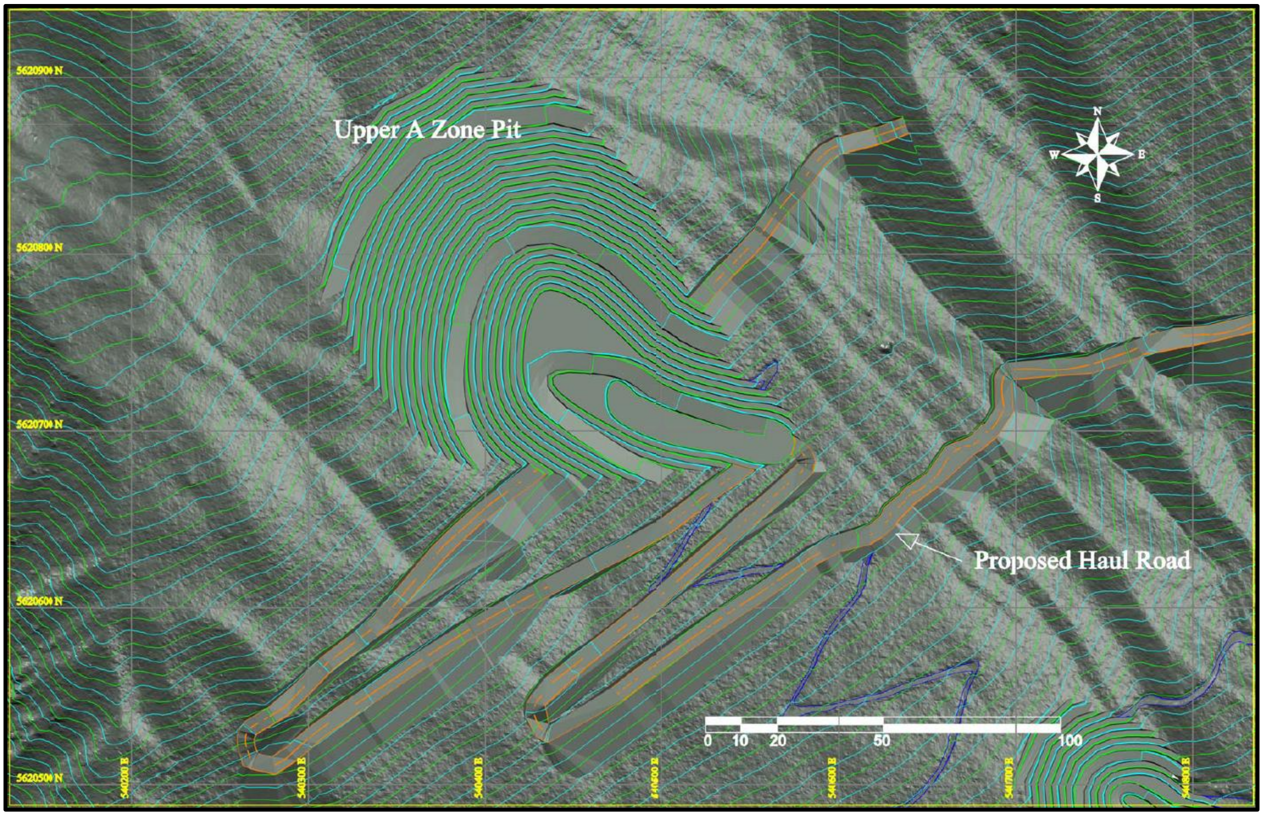


Figure 16-4: Upper A Zone LOM

16.6 On-Site Processing

Voyageur Pharmaceuticals Ltd. has conducted limited test work on the use of an Allgaiers / Mogensen Screening and dry sorting system. This system has the capacity to sort up to 80 mm sized material at rates up to 220 tonnes per hour.

Material is fed onto a vibrating screen feeder with oversize rejected. Material larger than 80 mm will be collected separately and sent for shipping to the Calgary process facility for further grinding. As the mineralized material is primarily clay, material over 80 mm is assumed to be minimal, however a 93% recovery factor is applied on the mined material for shipping.

Thus, the final recovered on-site production is assumed to be 89,557 tonnes of $BaSO_4$, with 7% dilution for a final concentrate of 96,298 tonnes at 93% $BaSO_4$.

16.7 Production Schedule

A combined Life of Mine (“LOM”) together with production schedules were developed. The LOM schedule was based on providing a feed supply of material sufficient to match the targeted processing rate 10,500 tonnes per year for pharmaceutical products and high purity $BaSO_4$. Processed reject material is assumed to be marketed as lower quality Barite drilling mud.

Mining will proceed as needed for the supply and will be conducted for 6 to 8 months per year. The feed rate of $BaSO_4$ ranges from 4,000 tonnes per year up to a maximum of 21,800 tonnes per year. Waste Mining is estimated at 4,800 tonnes per day with very short hauls to several waste piles built along the haulage road, while mineralized material is estimated at 1,580 tonnes per day to the process pad and Allgaiers sorting facility. A LOM of 9 years is planned, with processing finishing 1 year after mining is completed.

Table 16-4 below shows the planned mining schedule.

Table 16-4: Mining Schedule

	Year									
Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Totals**
Total Tonnes Mined	568,175	753,858	311,481	325,646	176,678	567,753	298,968	317,681	232,556	3,552,795
Waste Tonnes Mined	534,370	729,216	259,401	280,489	159,450	554,513	223,243	317,681	181,831	3,240,194
Resource Tonnes Mined (diluted)	33,805	24,641	52,080	45,157	17,228	13,240	75,725	-	50,724	312,601
Diluted Grade	31%	33%	32%	32%	33%	32%	29%	-	29%	31%
Mine Recovered $BaSO_4$	10,534	8,105	16,720	14,655	5,636	4,294	21,749	-	14,605	96,298
$BaSO_4$ Tonnes Recovered (AllGaiers Processed)	9,796	7,538	15,550	13,629	5,241	3,993	20,227	-	13,583	89,557
$BaSO_4$ Concentrate Tonnes Shipped	10,534	8,105	16,720	14,655	5,636	4,294	21,749	-	14,605	96,298

16.8 Waste Rock / Storage Areas

The waste rock dump (WRD)/RMS (reclamation material stockpile) storage areas will be established along the haul road switchbacks as well as in dedicated piles close to the pit, but away from the Lower Zone B deposit as shown in Figure 16-5 and Figure 16-6. In designing the WRD's, the hauling distance was taken into consideration with truck short haul distance from the pit to the WRD. The calculated in situ volumes for each of the WRD are as follows:

- West Waste Rock Dump – 792 812 m^3
- Central Waste Rock Dump – 187 157 m^3
- East Waste Rock Dump – 126 516 m^3

With the designed haul road, there will be 6 switch backs where in the different storage stockpiles will be located. The ROM stockpile will be built within the vicinity of the crusher/sizing equipment located at crushing/screening landing pad.

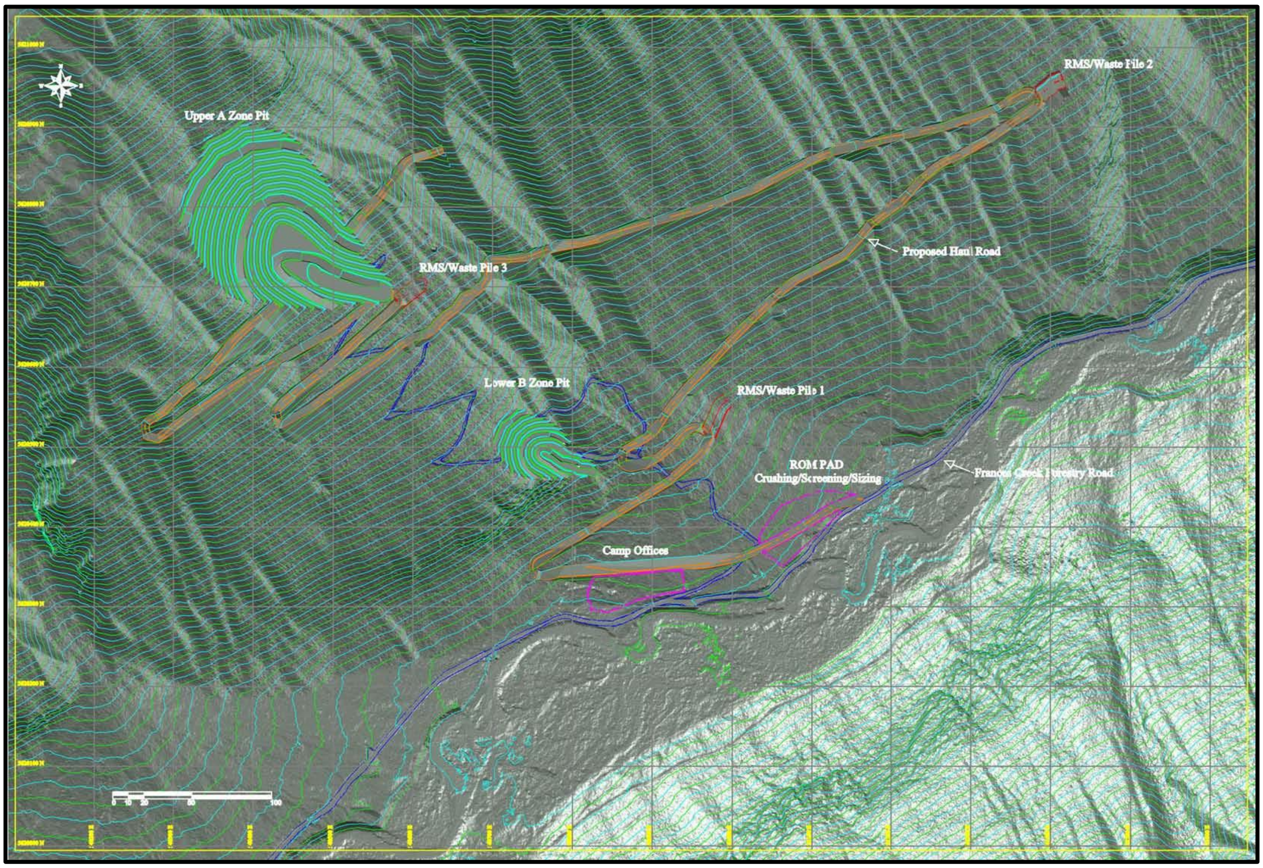


Figure 16-5: Waste Rock Dump / RMS / ROM Stockpile

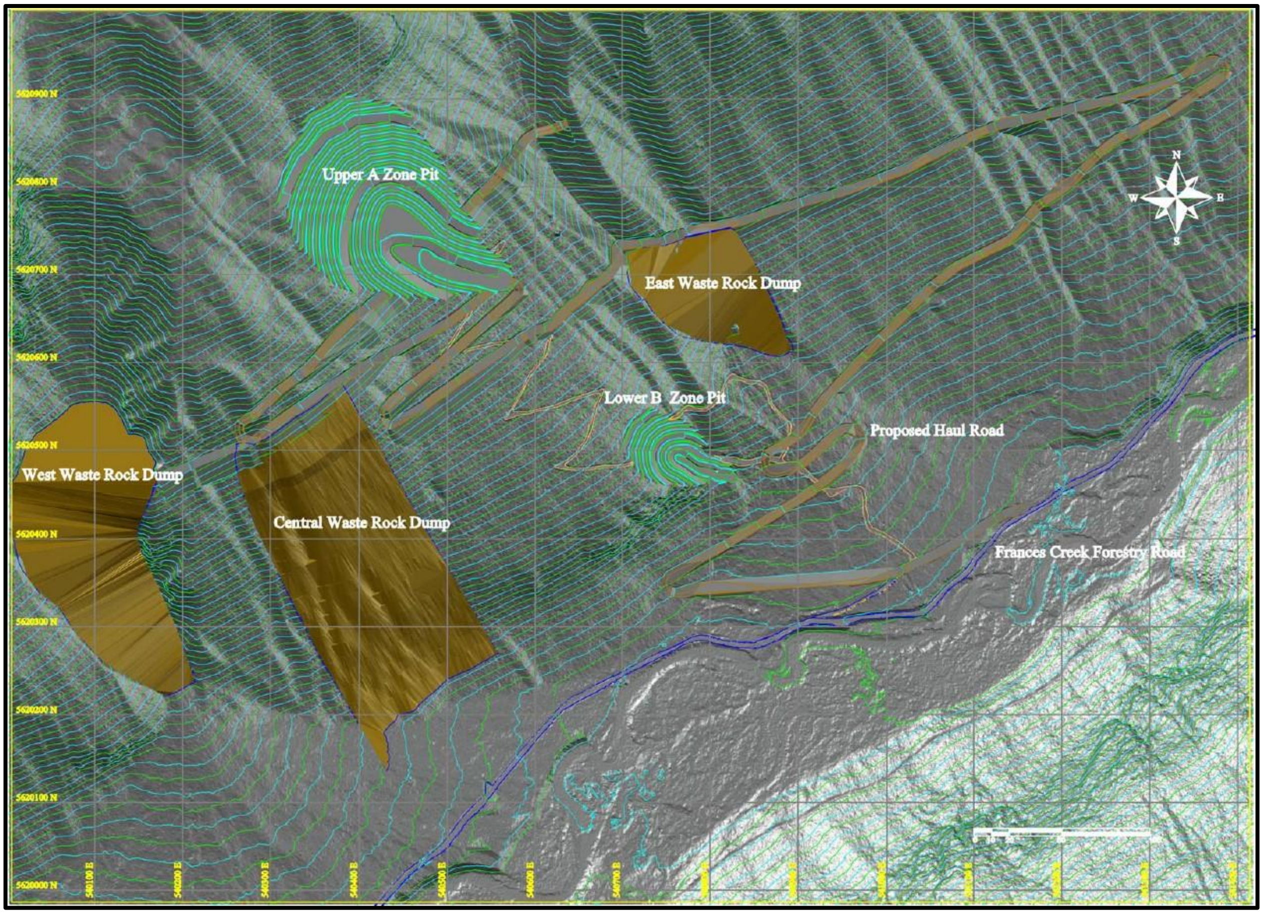


Figure 16-6: Waste Rock Dump

16.9 Equipment Fleet

The equipment fleet has been designed and selected around the volume requirements and pit design parameters to provide an optimal solution which maximizes equipment utilization. The fleet is expected to be contractor sourced and will be mobilized / demobilized as required for sporadic mining operations.

The resource is generally understood to be a Barite clay, primarily hosted in weathered / faulted rocks along the mountain slopes above Frances Creek. For the purposes of this PEA, it is assumed that drill and blast methods are not required for material extraction, with most material being free digging. Where required, dozer ripping would be used along rock breaker attachments on the primary excavator for larger oversize rocks.

The parameters and assumptions used for equipment selection are reflected in Table 16-5. Cognizance was taken of similar operations in selecting and matching equipment.

As the mining periods are relatively short, minimal equipment requirements are assumed. Support equipment has been minimized to just direct mining equipment In selecting the main equipment fleet, the pit design criteria were relied upon to calculate haul distances, ramp gradients and match the required volumes of waste and barite resource with equipment capabilities and required pay-loads. Table 16-6 presents the typical equipment list. All equipment on site will all be rental/contractor based.

Table 16-5: Equipment Selection Parameters

Parameter	Waste	Resource
Bucket Fill Factor	90%	85%
% of Rated Truck Payload (weight)	98%	96%
Speed Limit	25 kmph	25 kmph
Machine Availability	85%	85%
Operator Efficiency	90%	90%
Working time Efficiency	85%	85%
Actual Working Hours per day	10	10
Material Bank Density	2.828	3.4 (average)
Swell Factor	1.30	1.30
Material Loose Density	N/A	N/A
% of rated truck payload (weight)	98%	96%
Bench Height (meters)	5.0	5.0

Table 16-6: Typical Equipment List

Description	No.	Task	Proposed Make
Primary Equipment			
Hydraulic Excavator	1	Over-Burden Loading	CAT 365/374
Articulated Dump Truck (28 ton)	3	Material Haulage	CAT ADT (730C2)
Sizing Equipment	1	Barite Sizing	Allgaier Morgensen D-Table
Ancillary Equipment			
Front-End Loader	1	Barite Rehandling	CAT Loader 966
Track Dozer (40 ton)	2	Pit and Dump Maintenance	CAT Dozer D8 with Ripper
Road Grader	1	Road, Pit & Dump Maintenance	CAT Grader
Telehandler	1	Concentrate Loading, Gen. Yard Work	CAT or Equivalent
Light Vehicles	3	Personnel Mov't, SUPV., & Deliveries	Ford F550 or Equivalent
Service Truck	1	Fueling in Pit Service	Ford F550 or Equivalent
Emergency Response Vehicle	1	First Aid & Ambulance	Ford F550 or Equivalent
Feeder/Screens	1	On-Site Processing	Morgenson Vibrating Feeder
Particle Sorting	1	On-Site Processing	Allgaiers G19 Particle Sorter
Diesel Generator	1	On-Site Power	CAT or Cummins 900 kW Gen Set

17 RECOVERY METHODS

17.1 Introduction

17.1.1 Project Definition

Voyageur Pharmaceuticals selected SGS Bateman to conduct a Preliminary Economic Assessment (PEA) Study of the Frances Creek Barium Project located in Alberta in Canada.

The new facility will be processing barite (barium sulphate) ROM from the open pit mine after it has been crushed and sorted by a third party (Tomra) to less than 2 mm. It is envisaged that the plant should be able to treat sorted barium sulphate product by further concentration of barium sulphate using shaking tables due to the differences in density between the mineral of interest and gangues. The main impurities are silica (SiO_2), strontium sulphate ($SrSO_4$), lime (CaO), magnesium oxide (MgO) and hematite (Fe_2O_3) which must be removed by either gravity separation and / or acid leach, dewatering and filtration and produce barium sulphate concentrate product.

The new facility will be a complete greenfield project consisting of the following unit operations: primary grinding, gravity separation, secondary grinding (micronizing), acid wash using 10% HCl solution, concentrate dewatering (solid liquid separation), concentrate drying and packaging and tailings filtration. Reagent make-up and storage and utilities distribution will be provided.

Note**:** *The flow sheet described below was based on flow diagram and the available test work results provided by SGS Lakefield. A detailed mass balance was generated using Metsim softwar*e.

17.1.2 Process Abbreviations & Acronyms

Table 17-1: Abbreviation and Acronyms

Abbreviation / Acronym	Definition
Ba	Barium
Sr	Strontium
Al	Aluminium
Fe	Iron
Ca	Calcium
Co	Cobalt
Si	Silica
Mg	Magnesium
K	Potassium
BFD	Block Flow Diagram
CRO	Control Room Operator
g/L	Grams per litre
ppm	Part per million
kg	Kilogram

Abbreviation / Acronym	Definition
km	Kilometre
kPag	Kilopascals gauge (pressure)
m	Metre
m^3/h	Cubic Metres per Hour (Volumetric Flow)
PDC	Process Design Criteria
PFD	Process Flow Diagram
PLS	Pregnant Leach Solution
%	Percentage
ppm	Parts per Million
t/a & kt/a	Tonnes/annum & kilo tonnes (Thousand tonnes) per annum
t/h	Tonnes per hour (mass flow)
TDS	Total Dissolved Solids
TOC	Total Organic Content
tonne	Metric Ton (=1000 kg)
TSF	Tailing Storage Facility
TSS	Total Suspended Solids

17.1.3 Process Summary

The proposed plant will be designed to treat an average of 5t/h of crushed and sorted barium sulphate product containing the components in the Table 17-2.

Table 17-2: Plant Feed Composition

Components	Composition (%)
$BaSO_4$	88.36
$SrSO_4$	2.32
SiO_2	3.32
Al_2O_3	0.23
Fe_2O_3	0.26
CaO	1.73
MgO	0.92

The process plant will mainly consist of the following:

- Primary feed grinding
- Primary gravity separation
- Coarse gravity separation
- Secondary grinding / 10 µm Micronizing

- Acid wash
- Concentrate solid liquid separation
- Tailings solid liquid separation
- Drying / Product packaging
- Reagents (Hydrochloric acid and natural gas)
- Utilities (Process water, fire water, potable water, plant air, steam, compressed air)

The process is depicted simplistically in the block flow diagram. Details are available through Voyageur Pharmaceuticals Ltd.

Crushed barium sulphate concentrate will be brought to the plant by a third party and stockpiled for processing at the new facility. The throughput is 5 metric tons per hour.

The crushed material will be ground, wet screened on a double deck screen to separate the feed to gravity separation into three fractions namely: -1.7mm to +500 micron, +500 to 75 micron and -75 micron. The last portion (-75micron) will be discarded and pumped to the tailings feed tank.

The two remaining streams (-1.7mm to +500 micron, and +500 to 75 micron) will be subjected to gravity separation to produce concentrate, middling and tailings.

The tailings from the above-mentioned streams will be also pumped to the tailings filter feed tank.

Barium sulphate concentrate and middling slurry will be combined and pumped to a HIG mill for further grinding (micronizing) to less than 10 micron. HIG mill product will be acid washed in the leach tanks at 90ºC for 24 hours. 10% hydrochloric acid solution will be dosed into the leach tanks to dissolve impurities such as Fe, Sr, Mg, Ca etc. Steam will be used to heat the acid wash reactors. Barium sulphate will not dissolve and will remain as solid in the slurry.

Acid wash product (barium sulphate concentrate slurry) will be filtered on the filter press and then dried to reduce the moisture.

The following detailed process description covers all the above-mentioned areas.

17.2 Reference Drawings

17.2.1 PFDS

This process description must be read in conjunction with the metsim process flow diagrams. Details are available through Voyageur Pharmaceuticals Ltd.

17.3 Detailed Process Description

17.3.1 Primary Feed Grinding

Crushed barium sulphate ROM will be brought to the plant and stockpiled for processing at the new facility. The throughput is set at 5 metric tons per hour.

Crushed barium sulphate ROM material will be loaded into a hopper (10-HOP-001) and transferred to the mill feed silo (10-SIL-001) using a bucket elevator (10-BEL-001). The material will be dry ground in the primary mill (10-MIL-001) and conveyed (10-CVR-001) to a primary mill product silo (10-SIL-002). Dust will be collected in the baghouse (10-BGH-001) and discharged onto the mill discharge conveyor (10-CVR-001) by a rotary valve placed at the bottom of the baghouse. The target PSD after the first grinding is minus 1.7mm. Primary ground material will be conveyed (10-CVR-002) to the primary gravity separation area.

17.3.2 Primary Gravity Separation

17.3.2.1 Primary Gravity Separation (Area 15)

Primary gravity separation consists of the separation screen, vibrating table feed tanks, shaking table, tailing tank, concentrate sump and their associated equipment.

Milled material will be screened on the primary gravity screen (15-SCR-101) to separate the feed in three different fractions which are the oversized (+500µm), middling (-500µm, +75µm) and undersized (-75µm). Water will be added to each fraction of the feed preparation tank in order to obtain a slurry of 30% solids by mass. The oversize slurry will be collected in the tank (15-TNK-001) and be feed to a shaking table to separate the concentrate from the tailings.

The middling (-500µm, +75µm) will be re-slurred in the middling tank (15-TNK-002) and subjected to the gravity separation. The undersize (-75µm) will be collected in the tailings tank (15-TNK-003) and transferred to the tailings belt filter feed tank(45-TNK-001). The tailings will be pumped to the belt filter feed tank for dewatering.

17.3.2.2 Coarse Gravity Separation (Area 25)

Coarse gravity separation consists of vibrating table feed tanks, shaking table, coarse tailing tank, coarse concentrate sump, concentrate mixing tank, and their associated equipment

Milled coarse product (-1.7mm/+500micron) from the primary gravity screen (15-SCR-001) will be further processed and produced three different fractions which are the oversized concentrate, middling, and tailings). Water will be added to the feed preparation tank (oversize coarse tank 25-TNK-001) in order to obtain a slurry of 30% solids by mass. The resultant slurry will be fed to a shaking table (25-STB-001) to separate the coarse concentrate from the tailings. The tailings will be collected in the tailings sump (25-SMP-002) and transferred to the belt filter feed tank (45-TNK-001) for dewatering whilst the concentrate and the middling will be diverted to the concentrate sump (25-SMP-001) from where it will be pumped to the concentrate mixing tank (30-TNK-001).

Spillages within this area are directed into oversize coarse tank (25-TNK-001)

17.3.3 Secondary Grinding, 10µm Micronizing (Area 30)

HG grade concentrate slurry from the coarse and middling gravity separation will be pumped in the second mill (High Intensity Grinding mill, known as HIG Mill) for further grinding prior to hydrochloric acid leach.

The HG concentrate slurries from 15-SMP-001 and 25-SMP-002 and will be received in the concentrate mixing tank (30-TNK-001). The slurry density will be adjusted to 50% solid in the settling tank (30-TNK-002). The underflow from the settling tank will be transferred to the HIG mill feed tanks (30-TNK-003) which feeds HIG mill (30-MIL-001) for fine grinding (D50=10 µm average particle size). The mill product will be discharged in the mill discharge sump (30-SMP-001) which will feed the acid leach (known as acid wash) tanks (35-TNK-001/002/003).

This area will be provided with a spillage sump pump which pumps the spillage into the concentrate mixing tank (30-TNK-001).

17.3.4 Acid Wash / Leach (Area 35)

The acid wash consists of five leach reactors (tanks) with agitators and transfer pumps. This area will be separated from the neutral process areas such as gravity separation and grinding.

Micronized concentrate slurry from the HIG mill discharge sump (30-SMP-001) will be pumped into the acid leach tanks (35-TNK-001/002/003) where 10% hydrochloric solution will be added to wash out impurities from the concentrate (Impurities removal).

The acid wash reactors will be heated with steam through immersed coils to increase the temperature from ambient to 90oC as indicated in the test works.

Acid washed slurry will be pumped to the solid-liquid separation section (area 40) into the filter press feed tank (40-TNK-001).

The following are the potential chemical reactions which may occur during acid wash (leach):

1. $1\ CaO + 2\ HCl = 1\ CaCl_2 + 1\ H_2O$
2. $1\ MgO + 2\ HCl = 1\ MgCl_2 + 1\ H_2O$
3. $1\ Fe_2O_3 + 6\ HCl = 2\ FeCl_3 + 3\ H_2O$
4. $1\ Al_2O_3 + 6\ HCl = 2\ AlCl_3 + 3\ H_2O$
5. $1\ K_2O + 2\ HCl = 2\ KCl_2 + 1\ H_2O$
6. $1\ Na_2O + 2\ HCl = 2\ NaCl_2 + 1\ H_2O$
7. $1\ Cr_2O_3 + 6\ HCl = 2\ CrCl_3 + 3\ H_2O$
8. $1\ MnO + 2\ HCl = 1\ MnCl_2 + 1\ H_2O$
9. $1\ BaSO_4 + 2\ HCl = 1\ BaCl_2 + 1\ H_2SO_4$
10. $1\ SrSO4 + 2\ HCl = 1\ SrCl2 + 1\ H_2SO_4$
11. $2\ Cu + 4\ HCl + 1\ O_2 = 2\ CuCl_2 + 2\ H_2O$
12. $2\ Zn + 4\ HCl + 1\ O_2 = 2ZnCl_2 + 2\ H_2O$
13. $4\ Y + 12\ HCl + 3\ O_2 = 4\ YCl_3 + 6\ H_2O$
14. $2\ TiO_2 + 4\ HCl = 2\ TiCl_2 + 2\ H_2O + 1\ O_2$
15. $2\ SiO_2 + 4\ HCl = 1\ SiCl_2 + 2\ H_2O$
16. $2\ Co + 4\ HCl + 1\ O_2 = 2\ CoCl_2 + 2\ H_2O$
17. $2\ Ni + 4\ HCl + 1\ O_2 = 2\ NiCl_2 + 2\ H_2O$
18. $2\ Pb + 4\ HCl + 1\ O_2 = 2\ PbCl_2 + 2\ H_2O$
19. $2\ Sb + 12\ HCl + 3\ O_2 = 4\ SbCl_3 + 6\ H_2O$
20. $2\ Cd + 4\ HCl + 1\ O_2 = 2\ CdCl_2 + 2\ H_2O$

21. $4\ Ag + 4\ HCl + 1\ O_2 = 4\ AgCl + 2\ H_2O$

22. $4\ P_2O_5 + 12\ HCl + 9\ O_2 = 4\ H_3PO4 + 12\ ClO$

23. $4\ U + 12\ HCl + 3\ O_2 = 4\ UCl_3 + 6\ H_2O$

17.3.5 Leached Concentrate Solid-Liquid Separation, Filtration (Area 40)

Leached concentrate slurry filtration consists of the filter press feed tank (40-TK-001), concentrate filter press (40-FIP-001/002), concentrate filtrate tank (40-TNK-002) and concentrate cake conveyor blet (40-CVR-001).

Acid leach (washed) concentrate slurry will be pumped from the filter feed tank (40-TNK-001) and filtered onto the filter press (40-FIP-001/002). The filtrate liquor will be collected in the filter press filtrate tank (40-TNK-002) and pumped out to the effluent treatment plant (third party scope of work).

The filter cake product (barium sulphate) will be dropped on the conveyor belt (40-CVR-001) and transported to the dryer feed bin (Vendor package).

17.3.6 Tailing Solid-Liquid Separation, Filtration (Area 45)

Tailings solid-liquid separation will consist of the belt filter tailings feed tank (45-TNK-001), tailings belt filter (45-FIB-001), tailings filtrate tank (45-TNK-002) with associated pumps, tailings cake conveyor belt (45-CVR-001).

The tailings belt filter will be provided with all ancillary equipment such as vacuum pumps, moisture trap, filtrate receiver etc.

Tailings received from primary gravity screen, low-grade tailing sump and coarse tailing sump will be received in the tailings belt filter feed tank (45-TNK-001) and then filtered on the tailings belt filter (45-FIB-001). The belt filter cake will be transported to tailings storage facility.

Tailings belt filter filtrate liquor will be collected in the filtrate tank (45-TNK-002) and re-used on the plant provided that no acidic solution is fed to the belt filter.

17.3.7 Product Drying

Barium sulphate product from the filter press (40-FIP-001/2) will be conveyed to the dryer (50-KLN-001). The dryer will be heated by a direct heated air unit to reduce the free moisture in the concentrate cake. Air will be heated in the burner using natural gas at controlled flow rate to maintain the temperature around 650^{o}C. Residence time in the dryer will be controlled by varying the speed of the dryer drive. Dried barium sulphate concentrate will exit the dryer rotating drum onto a conveyor belt (50-CVB-001) then it will be stored in a dryer concentrate bin. Exhaust gases would be directed to a dust cyclone and dust baghouse.

There will be provision for a dust collection fan and a stack.

The dryer with all the accessories which includes the burner, baghouse, fan, stack, packaging etc. will be a vendor package.

17.3.8 Reagents

17.3.8.1 36% Hydrochloric Acid

Hydrochloric acid is required for selective leaching of impurities such as Fe, Ca, Mg, Sr etc while leaving barium sulphate (BaSO4) as solid in the concentrate slurry.

36% hydrochloric acid solution will be supplied to the plant and stored in HCl 36% storage tank (60-TNK-001). This acid solution will be pumped to 10% hydrochloric acid mixing tank (60-TNK-002) where it will be diluted by adding water before it is dosed to the acid leach tanks (35-TNK-001/002/003). The diluted hydrochloric acid strength is 10%.

Hydrochloric acid spillage will be pumped to 10% acid wash tank (35-TNK-001/002).

A safety shower is provided in case of emergency.

17.3.8.2 Natural Gas

Natural gas will be used to heat the dryer and it will be piped and supplied by the municipality to the plant.

17.3.9 Utilities

17.3.9.1 Raw Water

The raw water will be supplied by the client.

17.3.9.2 Fire Water

The fire water system will be size for 2 hydrants and 2 hours residence time (to be confirmed by fire water consultant since this plant is relatively small). The fire water pumps will draw the water from the bottom of tank (60-TNK-003) and supply various area of the plant. An audible alarm will be trigged if the fire water pumps are running. The estimated fire water flow rate is 167m^3/h. The fire water pumping station will consist of three pumps (an electric driven pump, diesel pump and a jockey pump). The role of the jockey pump will maintain system pressure at 700 kPa and it will ensure that the main pumps do not start unnecessarily.

17.3.9.3 Potable Water

A provision has been made for potable water tank (60-TNK-004) of capacity 27.5 m^3 supply potable water to the various end-users – including the plant safety showers.

In order to ensure a guaranteed uninterrupted supply of water to the safety showers, the potable water pumps will be backed-up with emergency power.

17.3.9.4 Process Water

Process water will be stored in the process water tank (60-TNK-005) and pumped to various area of the plant where required.

17.3.9.5 Boiler

The boiler will supply steam to the acid leach (acid wash) tank to heat the reactors at 90ºC. Potable water will be fed to the boiler to generate the steam.
The boiler is a vendor package.

17.3.9.6 Plant & Instrument Air

Plant and instrument air will be provided by two compressors (duty & standby). Plant air will have a dedicated receiver separate from the instrument air. Plant will be used mainly for filtration

The instrument air will be filtered, dried and the stored in the air receiver before being distributed throughout the plant.

18 PROJECT INFRASTRUCTURE

The mine, the preliminary beneficiation plant and major mine site related infrastructures will be located at the Frances Creek mine site property and is located within a 50 km radius of the town of Radium Hot Springs, BC. Radium Hot Springs is located 144 km (straight line) SW of Calgary, Alberta. Access from Calgary to Radium Hot Springs is 151 km westward on the Trans-Canada Highway to Hwy 93 turnoff, then southwards on Hwy 93 for 94 km to Radium Hot Springs. The entire distance to Radium Hot Springs is on paved all weather highways. Access to the Frances Creek property from Radium Hot Springs is via unpaved logging roads. First, travel 9 km west on the "Horsethief Creek Road"; then 25 km north northwest on the "Westside Road"; then, turn west-southwest for 1.8 km on the "Lead Queen - Frances Road"; then turn west on the Frances Creek Forestry road and travel 6 km to the site (travel time ~ 45 minutes). Over many years, the timber industry has constructed an existing network of well-maintained haul roads in the project area. Access roads to the property are already constructed, but they will require some delayed maintenance attention prior to initiation for mining activity. A large logging landing was recently constructed at the lower entrance to the property. In the lower elevations of the deposits, there is ample room available to construct mine site facilities. The nearest barite mill is in Lethbridge, AB, some 225-straight line km SE of the Project Area.

18.1 Summary

The infrastructure required for the Frances Creek Project will be:

- A landing area site for the Allgaiers Sorting Plant;
- Office, temporary shop, wash car, security/first aid and generator house
- Site development and access;
- Haul Road (Main Ramp).

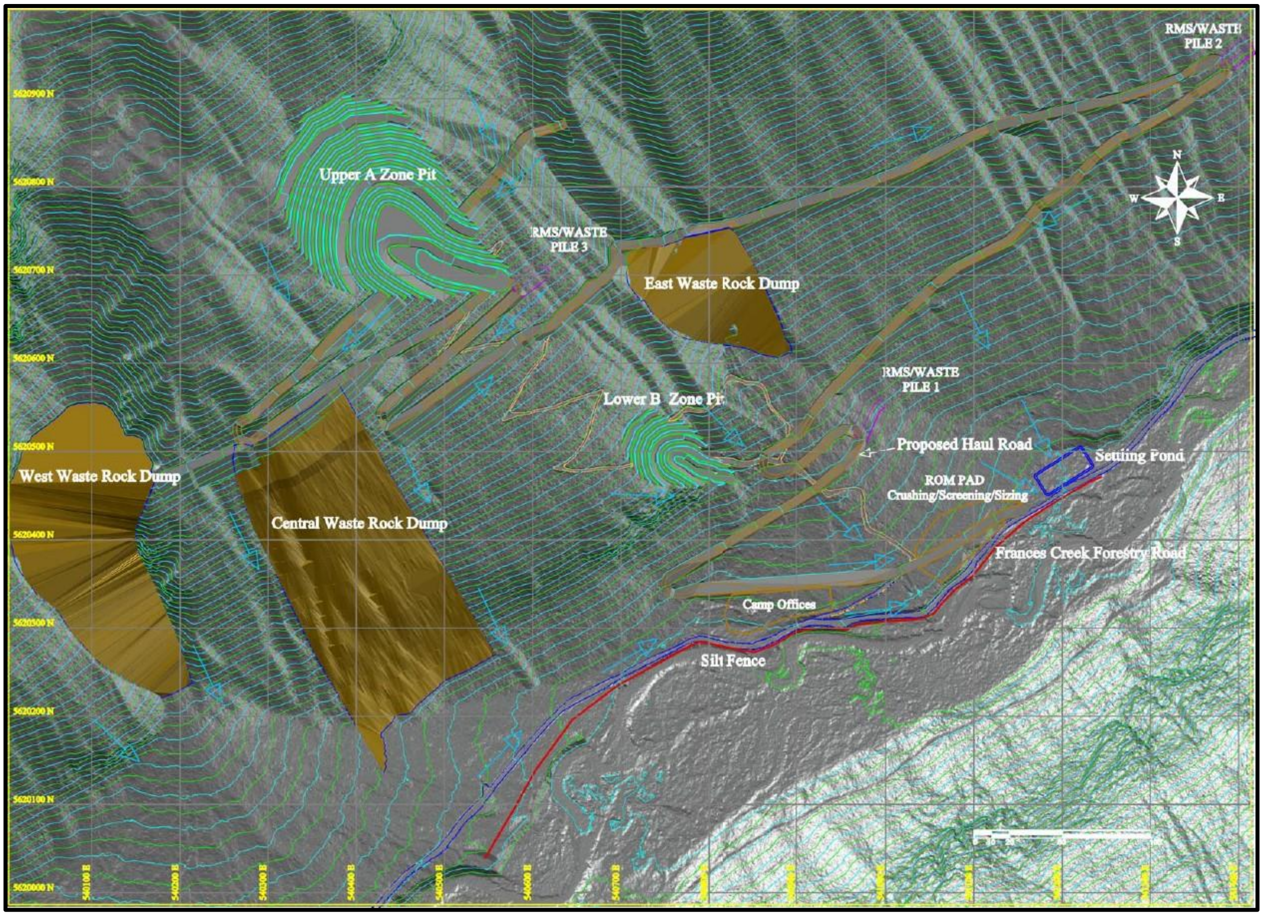


Figure 18-1: Frances Creek Project Site

18.2 Frances Creek General Site Plan

A Site Layout plan has been produced for the project: Site Layout for the PEA represents the overall area where the mining project is to be constructed. The drawing shows the main haul road, open pits, beneficiation (screening, and sizing) plant, maintenance shop & office, and related services for reclamation material stockpile (RMS), waste rock storage areas, and worker's camp.

18.2.1 Crushing Landing Area

The crushing pad is located at the corner of Frances Creek Forestry road and proposed haul road at the foot of the hill side. The area for the proposed crushing landing site is 4,382 m^2 is approximately 226 m from the proposed camp site. The upper zone pit is approximately 3.5 kilometers away from the crushing area, while .8 k distant south east of Lower B zone pit. It will contain ROM pad, a mobile office and dry, warehouse, maintenance, crushing & sizing equipment, the Allgaier Morgensen D-Table equipment with cyclone and mobile safety office/first aid.

The layout of crushing facilities has been optimized to take advantage of topography, and to reduce the earthworks.

18.2.2 Site Development and Access

The main access road to the crushing facility/open pits from the town of Radium Hot Springs is via unpaved logging roads. First, travel 9 km west on the "Horsethief Creek Road"; then 25 km north-northwest on the "Westside Road", then turn west-southwest for 1.8 km on the "Lead Queen- Frances Road"; then turn west on the Frances Creek Forestry road and travel 66 km to the site (travel time approximately 45 minutes). To this point, the roads, which are traveled regularly by logging trucks, can be navigated be a 2-wheel drive vehicle during non-snow/non-mud conditions. The forestry road would be upgraded to all season highway road for the delivery of concentrate for final processing to Calgary with contractor trucks. Presently, the outcrop zone of the Frances Creek barite deposit is found from elevation 1332 m to 1600 m along an erosional spur which is located on the SE face of Horeb Mountain. Access to the outcrop zone is via a steep switchback road constructed by a backhoe. This road was upgraded in Q-2, 2017 to allow access for a drill rig and is now summer accessible either by a 4X4 pickup truck or preferably, by a quad off terrain vehicle. The lower elevations of this property can be accessed year-round when logging is operational. However, snow clearance is required in the winter months when there is no logging activity. The upper elevations of the property are inaccessible from November through mid - May. There will be a 6 km (unpaved road upgrade) to be suitable for transporting of the processed material from the mine to south of Calgary for final processing. The required upgrading requirement shall be determined at the next level of study.

18.2.2.1 Haul Road

The main haul road was designed based on the following parameters:

- Truck Model – CAT ADT (730C2) 28 tonnes (17.5 m^3)
- Single Haul Road Total Width Calculation (see Figure 18-2)
- Optimal Loader/Truck Pass Matching

Truck	A Operating Width m	Tire	Tire Dia. m	B Berm Height m	C Berm Width	D Drain Width	E Minimum Pavement	F Total Width m
CAT ADT 730C2	3.70	29.5R25	1.86	0.93	3.618	1	5.55	10.168
Cat 740B	4.16	29.5R25	1.86	0.93	3.618	1	6.24	10.858

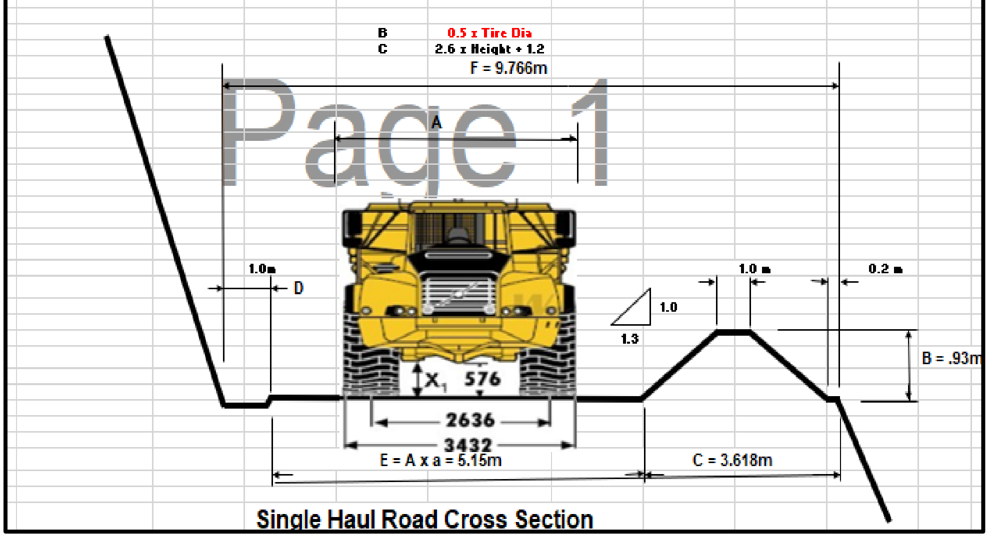


Figure 18-2: Single Haul Road Calculation

18.2.3 Overall Water Management Plan

Water supply for the crushing plant and camp will be determined in the next level of study but can mainly be sourced from local spring sources within the limits of water supply through government environmental regulations and can be stored in mobile storage tanks. Due to the large amounts of snow received each year, the Project Area has abundant water resources which can support mining. Several large perennial streams drain the near vicinity of the property. Trucking of water can be an option from Radium Hots Springs.

Surface runoff from the open pits and plant site will be collected in a settling pond as presented in Figure 18-3 be located at the foot of the start of the haul road, in a natural low area to enable gravity feed where possible and to minimize earthworks. Run-off collected from areas that are not able to gravity feed to the small pond will be pumped. The settling pond will be lined with a 60 mil HDPE liner, and will be equipped with a subdrain system to anticipate groundwater in this area. In the pond, collected area water will be pumped to either the crushing area or the water treatment plant as required. If treated water will be discharged, a 4-inch diameter HDPE pipes to the environment following procedures from the Ministry of Environment shall be reviewed in the next level of study.

There are no planned long-term utilities as most of the equipment will be mobilized and demobilized as needed for sporadic mining operations. The only permanent structures on site will be the security shack (Seacan) and the shop structure (Seacans with Fabric roof). Spill containment systems will be provided for the fuel storage facility and the generator set.

A water management plan has been developed and includes the following elements:

- The mine’s facilities are planned to be designed to minimize the effects on the environment that need to be mitigated to the maximum extent practicable.
- Natural runoff is planned to be away from, and around, areas disturbed by the mining and crushing activities.
- Detention storage is planned to be provided for runoff from disturbed areas to allow suspended particles to settle out. The water will then be discharged under a permit or recycled. Compliant water may also be used for dust control.
- Waters that contain, or potentially contain, elevated dissolved metals when precipitation meets mined materials are planned to be collected in water quality control ponds and recycled for reuse in the plant.
- Recycling of all mine waters is planned to be maximized, thereby minimizing the need for make-up from surface and/or groundwater.
- Provide treatment of stored waters requiring discharge to meet applicable discharge and receiving water standards, as necessary.

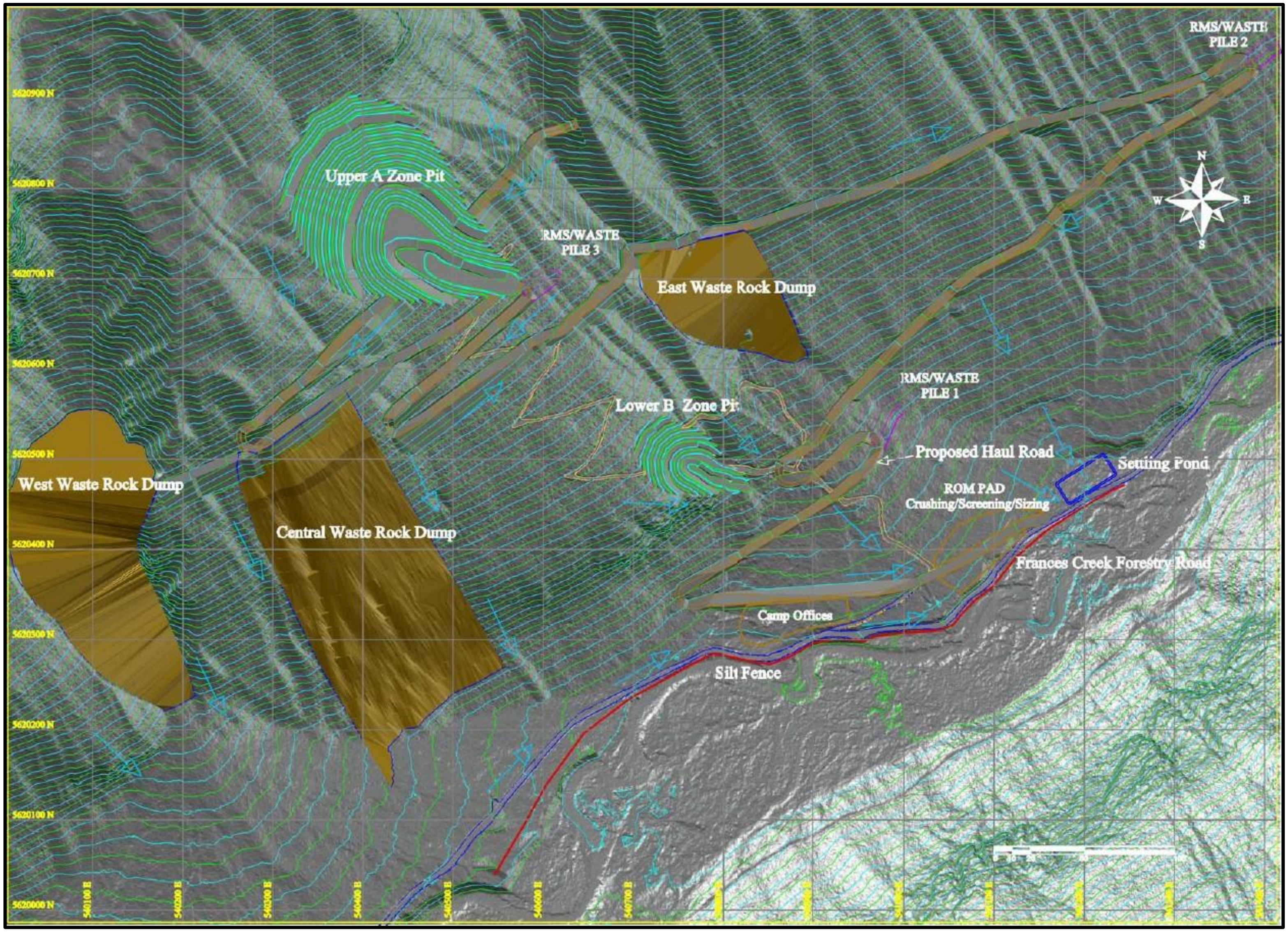


Figure 18-3: Overall Water Management

18.2.4 Waste Rock Pile

Waste rock will be stored in the areas designated for waste rock stockpile. A portion of the waste materials will be used as a fill material for building the haul road from the crushing landing area to the Upper A zone pit.

Waste from the sizing equipment will report to the waste stockpile area. Based on the haul road design and cut and fill calculation, waste rock required as a fill material is approximately 61,653 cubic meters.

18.2.5 Open Pit

The excavation of mine rock and the development of the open pits will result in the rock face of the pit walls being exposed to atmospheric conditions. No blasting of the rock is being planned which typically results in a “damaged zone” of rock that consists of shallow fractures that extend into the bedrock from the face of the pit wall. The mining will be done with the dozer with ripper to loosen the material before loading into trucks. Contact water, generated from water-rock interactions (i.e., from direct precipitation, groundwater inflow and runoff from the open pit catchment area) at the pit wall surface, will contain constituents of the exposed rock. Pit-wall contact water will report to the pit sump and affect the quality of the sump water.

The contact water from the open pits will report to a small RW Pond to be located near the landing area.

18.2.6 Power Generation

Diesel power generation is to be used as the primary power during construction and mine site operational power source.

The intent is to install one 1000 kW, 600V diesel generator. The generator will be installed in a substation near the crusher/grinding plant for pre-production and operations. A main power supply will be by Generator set, C1000DRG-6980 (Engine -QST30-GS) with Prime Power Rating of 900 kW.

18.2.7 Site Wide Communications

Site communications will be conducted via handheld and truck mounted portable radios. Cell service may be available but is unlikely to be reliable. Longer term satellite internet access may be available in the area but wasn’t allowed for in this study.

18.2.8 Warehouse, Offices, Facilities and Services

Warehouse, offices, facilities, and services will include the following:

- Gate house and First Aid Building (40’ Seacan);
- One-bay heavy and light vehicle truck shop;
- Fuel storage and dispensing;
- Auxiliary equipment fleet;
- Generator set housing; and,
- Site access road.

19 MARKET STUDIES AND CONTRACTS

The Company has conducted marketing studies and sales forecasts on pharmaceutical grade Barium Sulphate prepared by Dash Consulting, LLC (Dash) and GSN Dreamworks Inc (GSN). Dash Consulting, LLC is a firm that provides scientific and consulting research services, while GSN Dreamworks provides market analyses over a range of industries, primarily in the health services sector. The reports provided by these companies are summarized in this section and are categorized as reliance on third party experts.

Approximately 77% of the total mined and milled barite worldwide is used as a weighting agent for drilling fluids in oil and gas exploration. There is only one operating barite mine in Canada (Fireside, BC) for oilfield barite production. The Fireside mine material is not suitable for pharmaceutical use owing to metal contamination and so, it is not suitable to be used in a chemical process for upgrading.

Because barite is heavy, soft, chemically inert, and relatively inexpensive, its largest use is as a weighing agent in oil and gas drilling muds. Due to its light colour and brightness, it is also used as a filler and extender, mainly in paints and plastics. It is also used as a filler in rubber and friction materials, and sound deadening carpet backing. Since it absorbs gamma radiation, it is used as radiation shielding in concrete nuclear reactor buildings, whereas pharmaceutical grade "high purity" barite is used as a radiographic contrast medium for X-Ray and CT-Scans. Barite also serves as flux, oxidizer and decolourizer in glass making. The major grades of barite sold commercially are drilling fluids, glass, paint and chemical (for the production of high purity barium sulphide [BaS] and barium carbonate). Drilling mud is the least expensive grade, and the blanc fixe (precipitated) grade is the most expensive.

Pharmaceutical grade barium sulfate is used as a radiographic contrast agent to help diagnose or find problems in the esophagus, stomach, and bowels. Contrast agents are used to create a clear picture of the different parts of the body and are used globally in widespread and mature medical diagnostic methodologies.

Although there are numerous deposits of low-grade barite that could provide feedstock to the pharmaceutical market, it is very costly to take low/normal grade barite and turn it into GMP pharmaceutical grade. This kind of initiative would only be possible if one had market monopoly to control the price points of products. The only other mine in the world with GMP pharmaceutical grade barite is located in China and they are only allowed to sell 5% of mineral production to the world market and must keep 95% of their USP grade barite for domestic use. This has led existing barium contrast companies to experience periods without stock for some customers and rely on high-cost synthetic barium sulfate supply – costs which are passed on to hospitals and clinics.

19.1 Contrast Media Pharmaceutical Products

Global contrast media sales are expected to grow at a CAGR of 7.7% throughout the period 2021-2027, representing an opportunity of US$4.7 billion in 2021 and US$7 billion by 2027. Of this, the North America demand accounts for the largest market share with 40% of the total market size with US$1.9 billion in 2021 (USA, Canada, and Mexico). Procedurally, CT scanning has been identified as a consistent growth area, in part due to the increased elderly population, continuous increase of clinical trials requiring CT images worldwide and prevalence of chronic diseases needing the information provided by CT data sets requiring contrast media.

The contrast media market globally is dominated by 4 companies: Bracco (Italy), GE Healthcare (USA), Bayer (Germany) and Guerbet (France). Of these, only Bracco and Guerbet sell barium-based CM products. Bracco currently has a monopoly in the US and Canadian markets.

The monopolistic position that Bracco enjoys in the market has translated in a lack of engagement with customer needs and overall lack of product development, leaving many customers within the radiology market dissatisfied with current product offering.

Manufacturing barium sulfate CM from a high-quality source of raw material offers a significant business opportunity to initially service the North American market, breaking the Bracco monopoly with competitively priced quality products and a robust supply chain.

Since the Bracco acquisition of E-Z-EM in 2008 there has been little to no investment in product development for the barium sulfate range, whereas imaging technology has advanced significantly in the intervening years. As such, there is room for further innovation and product differentiation.

Advances in CT technology over the last 25 years have out-paced oral barium sulfate CM due to lack of focus on this application, as vendors focused on developing their intravenous CM used in CT, fluoroscopy, MRI, and Ultrasound. However, barium sulfate continues to be considered as gold standard contrast media solution, particularly for Abdominal CT studies. Meanwhile, the equipment manufacturers have advanced the speed of scanning, inclusive of the Chest-Abdomen-Pelvis, thereby allowing reduction in radiation exposure to patients, due in large part to the sensitivity of the computer's ability to differentiate soft tissue of the body. This in turn requires lower concentrations of CM to maintain image quality, compared to CM formulated 35 to 40 years ago. This has also led to a need for lower density intravenous contrast for the same reason, i.e., conforming to CT and computing advances.

Speed of image acquisition and increased computer power allow blocks of data to be acquired, managed, and manipulated. Physicians can view patient anatomy "in isolation" and independent of surrounding organs, often as complex 3D images, giving much more information for the medical diagnosis.

There is little product/company loyalty in this market segment, as this market is mostly driven by price point with little product differentiation among producers due in part, to the lack of investment on developing new products.

19.2 Well Defined Market with Growing Demand

Currently, natural barium sulfate is procured from China. Opportunity exists to acquire a meaningful portion of this market by way of production of pharmaceutical grade Barium Sulfate, which will streamline the supply chain, resulting in high quality products at lower costs. Mine production in Canada will also eliminate the need for synthetic barium processing used by competitors, intermediaries, and transport costs from other jurisdictions.

19.3 Main Competition in Canada

Barium sulfate ($BaSO_4$) is obtained as a precipitate from barite, the mineral source of barium. Barite is a colorless or white mineral; often tinged with yellow, red, brown, and sometimes blue. The crystalline system is rhombic. Currently, there is no medical barite mining in Canada. E-Z-EM Canada operated the Brookfield mine in Nova Scotia. The total production from the Brookfield deposit from the early 1980's to 2005 was around 125 000 t of >97.5% purity barite. E-Z-EM processed the barite into a USP product using gravity separation and chemical processing. The Brookfield mine allowed E-Z-EM Canada to be one of the most competitive contrast companies in the world and was acquired by Bracco SpA in 2008 for 240 million US$.

Currently, Bracco buys high-cost barium precipitate from a US company who process barium carbonate into barium sulfate. Synthetic barium sulfate manufacturing is expensive. The most common method to create barium precipitate is using the Black Ash process where barite is heated to 1200oC, flashed, and then dissolved in sulphuric acid containing free sulphur trioxide. The resulting solution is then precipitated of barium sulfate in water. The precipitate is filtered and evaporated to get a crystalline substance, the barium sulfate. Because the barite-siderite deposit of Colchester County is now spent and the mine ceased operating, Bracco continues to import barite into Canada to manufacture barium sulfate contrast products out of Montreal, from a legacy facility that was commissioned to process barite from the Brookfield barite mine that ran out of resources in 2005. For this, Bracco imports barium from the USA.

19.4 Product Line

Company research and development has focused on 13 barium sulfate products to address various imaging needs. Table 19-1 summarizes the state of readiness of the 5 products used for market penetration forecasts. Regulatory approval for these 5 products in Canada was received in 2021. Applications for use in the United States is underway, with approval by the United States Food and Drug Administration anticipated within the next two years.

Table 19-1: Barium Products

Voyageur Products	Characteristics/use	Target markets	State of readiness	Expected launch date
HDX (High Density Barium Sulphate for Suspension Dry Powder)	Intended to displace Bracco's E-Z-HD for use in double-contrast fluoroscopic radiographic examinations of the esophagus, stomach, and duodenum to visualize the gastrointestinal (GI) tract	98 % oral suspension in 340 g bottles for a total of 334 g barium per bottle	NPN 801108077 issued by Health Canada on February10, 2021	Q1 2023
LDX (Low Density Barium Sulphate for Suspension Dry Powder)	Intended to displace Bracco's E-Z-PAQUE for use in single contrast fluoroscopic radiographic examinations of the esophagus, stomach, duodenum, and small bowel to visualize the gastrointestinal tract (GI) in adult and pediatric patients	96 % oral suspension in 199 g bottles for a total of 169 g barium per bottle	NPN 80109041 issued by Health Canada on March 31, 2021	Q1 2023
Smooth X (Barium sulphate Suspension-Liquid) two flavors	Intended to displace Bracco's READI-CAT 2 SMOOTHIE for use in computed tomography (CT) of the abdomen to delineate the gastrointestinal (GI) tract in adult and pediatric patients.	2 % oral suspension in 450 ml bottles for a total of 9 g barium per bottle	NPN 80108081 issued by Health Canada on February 10, 2021	Q1 2022
Multi X Thin (Barium sulphate Suspension-Liquid)	Intended to displace Bracco's LIQUID E-ZPAQUE for use in single contrast fluoroscopic radiographic examinations of the esophagus, stomach, and small bowel to visualize the gastrointestinal (GI) tract in adult and pediatric patients.	60% oral suspension in 1500 ml bottles for a total of 900 g per bottle Barium	NPN 80109511 issued by Health Canada on April 26, 2021	Q4 2022
Multi X Thick (MultiSX) (Barium sulphate Suspension-Liquid)	Intended to displace Bracco's Liquid Polibar Plus indicated for fluoroscopic radiographic visualization of the gastrointestinal tract	105% oral or rectal suspension in 1500 ml bottles for a total of 1575 g per bottle Barium	NPN 80109788 issued by Health Canada on May 10, 2021	Q4 2022

19.5 Regulatory Approvals

Regulatory approval for barium contrast media varies across jurisdictions (Table 19-2).

Table 19-2: Regulatory Environment

Country/area	Natural Health Products	Medical Devices	Drugs
Canada	✓		
USA		✓	
EU, UK, Japan, and multiple other jurisdictions			✓

19.5.1 Canada

In Canada, barium sulfate products as CM are deemed natural health products and fall under the Natural Health Products Regulations which are administered by Health Canada.

19.5.2 United States

In the USA, barium sulfate CM were originally regulated as medical devices until a change in legislation meant they became regulated as pharmaceuticals, attracting significantly higher administrative charges being levied by the FDA for new product submissions. However, this was recently challenged (Genus Medical Technologies v. FDA), with the outcome that the Court of Appeals ruled that FDA cannot regulate a medical product – in this case, the radiographic contrast agent barium sulfate – as a drug when the product meets the definition of a device.

19.5.3 Other Jurisdictions

In parallel, Voyageur is building a master drug dossier for SmoothX for regulatory applications in Europe, Japan, and other countries that classify barium CM as a drug. Much of the same evidence, laboratory results, batch testing and filing requirements necessary for the device application with the FDA are also needed for the drug applications. Hence, once the FDA device applications are complete, Voyageur expects to follow up with other countries for drug licenses.

19.6 Detailed Product Descriptions

19.6.1 HDX

HDX is a high-density barium sulfate (98% w/w) powder formula to support double contrast fluoroscopic radiography of the proximal gastrointestinal (GI) tract to include: Esophagus, Stomach and Duodenum. For use as an oral radiological contrast medium in upper GI procedures using fluoroscopic X-Ray guidance for interrogation of anatomy. Formula includes an anti-foaming agent to minimize bubble artifact on mucosa surface for improved diagnostic accuracy.

19.6.2 LDX

LDX is a barium sulfate (96% w/w) powder formula to support fluoroscopic radiographic examination of the gastrointestinal (GI) tract. It is used in single contrast radiographic examinations of the esophagus, stomach, duodenum, and small bowel to visualize the GI tract in adult and pediatric patients. LDX is designed to work in the GI tract to blend with HDX to complement enhancement, allowing uniformity and stability of suspension for Bi-Phasic exams of the upper GI and small bowel follow through.

19.7 Multi X Thin

MultiXThin is a barium sulfate (60% w/v) oral suspension intended for use in single contrast fluoroscopic radiographic examinations of the esophagus, stomach, and small bowel to visualize the gastrointestinal (GI) tract in adult and pediatric patients.

19.8 Multi X Thin (MultiSX)

MultiXThick is a barium sulfate (105% w/v) liquid suspension intended to visualize the gastrointestinal (GI) tract in adult and pediatric patients. It is administered for oral use in single contrast fluoroscopic radiographic examinations of the esophagus, stomach, and small bowel, and rectal use for double contrast examination of the colon.

19.9 Market Penetration and Pricing of Contrast Media

Market penetration expectations used in this PEA are based on conservative projections for the North American and European markets.

Without counting for growth in the market, as indicated by both Dash and GSN, forecasts used in this PEA allowed for a ramp up of penetration in the North American market starting at 7.5% to 15% and ultimately to 30%. Penetration in the European market is forecasted to commence at 1.5% and ramping up over 6 quarters to 15%.

Current pricing of the Barium Sulphate contrast Media (Dash) products is estimated as shown in Table 19-3.

Table 19-3: Regulatory Environment

Product	Sale (CA$)
SmoothX	$5.00
HDX	$7.50
LDX	$6.50
MultiXthin	$22.50
MultiXthick	$19.50

19.10 Chemical Grade Barium Sulphate

The current supply of Barium Sulphate from China is available at a cost of $4,760 (USD) or $5,950 (CAD) per tonne. Barium Sulphate produced but not used for pharmaceutical products is expected to receive this price during the life of the Project.

19.11 Chemical Grade Barium Sulphate

Recovery of 98.3% Barium Sulphate at the process plant may result in a tailings product with a Barium Sulphate content in excess of 93%. Current market pricing for bulk barite used in drilling fluids is based on a Barium Sulphate content of 91%. This material is currently sold in Alberta for $360 to $390 (CAD) per tonne. The lower value of $360 (CAD) is used in this PEA.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

Voyageur currently has a permit to conduct exploration activities for the Frances Creek Property delivered by Ministry of Energy and Mines of British-Columbia. The permit (MX-5-519 Mine# 1630108) is currently in year five of a 5-year Multi-Year Area-Based Permit. Voyageur plans to reapply for a new 5-year permit. See section 4.3 for detailed information. There are no other permits required until Voyageur will apply for an industrial mineral quarry mining permit. After completion of the bulk sample, Voyageur will have to complete an industrial mineral quarry application and then an environmental and social impact study will be required.

20.1 Archaeological Assessment

A Preliminary Field Reconnaissance Report have been carried out in 2018 by Tipi Mountain Eco-Cultural Services Ltd. (TMECS) for the Frances Creek barite exploration project. On May 17th, 2018, a non-permit archaeological assessment was completed on the Frances Creek property.

The mineral exploration claim was designed to facilitate exploratory drilling and on-site mineral processing for barite. The project involved at that time clearing and preparing of terrain for eight new drill sites, upgrades to two existing trails, and expansion of an existing forestry landing for use as the mineral processing area.

The potential for precontact archaeological resources (predating AD 1846) was previously addressed through an Archaeological Overview Assessment (AOA) of Landscape Unit 28 of the Invermere Forest District (Choquette 1997). Landform-based archaeological potential polygons were delimited on Crown land within the landscape unit through aerial photo analysis, and assessed using criteria derived from precontact land and resource use models developed for the southern Rocky Mountain Trench.

A desk top review completed for Voyager Minerals Ltd. in 2017 (Heinrichs, 2017) identified two proposed drill sites as being located within AOA polygon I28-02.

Previous archaeological assessments within or adjacent to Polygon I28-02 include an archaeological impact assessment (AIA) conducted for a routine forestry project in 2014 (Plante and Liddy 2015); this assessment was conducted in low to mid elevation terrain in polygon I28-02.

The non-intrusive reconnaissance comprised pedestrian traverses that covered the central and northwestern portions of AOA polygon I28-02 including two proposed drill sites, the southern portion of drill trails, and the proposed mineral processing area. Visual inspection of fortuitous exposures occurred to determine the presence or absence of artifacts and considerations for archaeological potential based on the composition and condition of the underlying sediment matrix (e.g. soil development and parent material[s]).

The proposed drill locations, access trails and mineral processing area were within previous industrial disturbance (i.e. forestry cutting and landing, old drill pads and existing road grades), or steep (10°-20°) southeast trending slope. The assessment concluded that archaeological potential within the project area is low due to previous industrial activities having severely impacted the landform, and generalized slope and rocky substrate being noted throughout the study area.

TMECS recommended that no additional inspections, investigations or archaeological resource management work are required for the proposed exploration areas, provided that development plans are not altered to extend beyond the areas assessed under their study.

It is also recommended that the proponent inform all staff and contractors that archaeological remains predating AD 1846 located on both public and private lands, and sites containing rock art or human burials, are automatically protected within the Province of British Columbia from both intentional and inadvertent disturbance by the Heritage Conservation Act (RSBC 1996, Chapter 187). In the event that any precontact cultural material is encountered or suspected to have been exposed during the implementation of this development, Voyageur must be aware of the following:

- All ground disturbance in the immediate vicinity of the suspected find(s) must be suspended at once,
- The Ministry of Forest, Lands and Natural Resource Operations, Archaeology Branch (250-953-3334) must be informed as soon as possible of the location of the archaeological remains and the nature of the disturbance.

20.2 Acid Drainage Testing

In June 2017, Voyageur sent a total of six samples to Maxxam Analytics for acid drainage testing. A total of four samples (AC#1 to AC#4) composed of dry coarse rock were analyzed for Acid Base Accounting (ABA) testing, for Aqua Regia Metals testing, and MEND SFE testing. The results did not show a potential for acid rock drainage for theses samples.

21 CAPITAL AND OPERATING COSTS

This PEA, including the mine plan, is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the results of this PEA, including this mine plan, will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

Capital and operating costs for both the mine and processing facilities were developed based on first principle calculations, factored estimates, project benchmarking, vendor quotes and conceptual scheduled production/equipment hours where available. The qualified persons have reviewed these costs and concluded they are reasonable for inclusion in this PEA. Capital and operating costs are estimated within +/- 40% at a Preliminary Economic Assessment level of accuracy. Process capital costs include a 15% contingency, while mining costs are based on current rental quotes, contractor rates and first principle calculations.

Mining and infrastructure costs, as well as primary processing of the $BaSO_4$ product was conducted by SGS, while capital and operating costs for the Pharmaceutical products was provided by AVL through the client.

A summary of Mine and Process capital costs are presented in Table 21-1 below.

Table 21-1: Mine and Process Capital Costs

Description	Capital
Mining and On-Site Processing	3.82M
Process plant	13.18M
Process Plant Infrastructure	5.36M
Bottling Facility	2.96M
Subtotal Direct Costs	25.3M
Indirects	1.85M
Engineering and project management	3.70M
Provisions and Owners' costs	1.31M
Contingency	4.26M
Subtotal Indirect Costs	11.2M
Grand Total Project Capital	**36.4M**

21.1 Basis of Estimate

The operational expense profile was built using current costs applicable to each aspect as far as possible. Machine and Equipment costs were built on an operating hour basis. Aspects considered included operating hours, fuel consumption, maintenance allowances, track and tyre life cycles and oils, filters, and lubricants allowances.

Manning numbers and associated labour costing were based on number of personnel required, prevailing industry rates and includes provisions for an annual 13th cheque, annual induction training and personal protective equipment ("PPE").

Fuel – current fuel cost for delivered fuel as received from an existing mining project in the general area of operations was used.

A Contractor margin of 10% was allowed for on mining charges, which is deemed reasonable, given that equipment rates were sourced from rental.

This PEA uses the following general parameters for operating and capital cost estimates (Table 21-2).

Table 21-2: Operating and Capital Cost Estimates Parameters

Item	Units	Value	Source
Foreign Exchange	USD: CAD	$0.80 : $1.00	Company Guidance
Diesel Fuel Cost	$CAD /litre	$1.00	Estimated Industrial Rate
Power Cost	$CAD/kWh	$0.1368	Alberta Power Providers Average
Process Water Cost	$CAD/cubic metre	$2.38	City of Calgary (Consumption and Monthly Charge)
Mine Operations	Hours Per Day	12 / 10.25	Pay Hours / Effective Work Hours
Mine Operations	Days per Week	7	Company Guidance
Plant Operations	Hours Per Day	8	Company Guidance
Plant Operations	Days per Week	5	Company Guidance

21.2 Capital Cost Estimates

This study assumed a 10-year life of project, based on the resource of the Upper Zone at Frances Creek, and company projections of market penetration for the pharmaceutical products. The objective of the Study was to develop a capital cost estimate with an accuracy of +/-40%.

21.2.1 Capital Cost Estimates

The Voyageur Pharmaceuticals Ltd. Frances Creek mining operation will employ minimal capital through the use of contractor-based mining equipment and services, and rentals of on-site processing equipment. As mining will be conducted as needed to supply Barite feed to the off-site process plant, life of mine site facilities are kept to a minimum for security and safety reasons.

The on-site Allgaiers/Mogensen feeder and Densimetric Sorter account for approximately 93% of the mining capital. No contingency is applied as these were provided as a detailed quote by Allgaiers.

Capital expenditures for mining are assigned in Table 21-3 below.

Table 21-3: Capital Expenditures for Mining

Item	Cost	Source
Mine Site Permitting, Baseline Studies	$400k	Allowance
Shop / Warehouse (Seacans and Fabric Structure)	$87k	Benchmarking Study
Gatehouse (Seacan)	$10k	Benchmarking Study
First Aid / Emergency Response (Seacans and Fabric Structure)	$65k	Benchmarking Study
Water Settling Ponds	$50k	Allowance
Containment Berms for Fuel Storage	$10k	Allowance
Generator Set Housing (Seacan)	$5k	Benchmarking Study
Allgaiers / Mogensen Sizer and Feeder	$146k	Allgaiers Quote
Allgaiers / Mogensen Densimetris Table and Feeder	$1088k	Allgaiers Quote
Allgaiers Electrical, Hoppers, Conveyors	$1060k	Allgaiers Quote
Allgaiers Spare Parts	$229k	Allgaiers Quote
Allgaiers Transport to Site	$253k	Allgaiers Quote
Allgaiers Site Set up	$417k	Allgaiers Quote
Total Mine Capital	$3,820k	

21.3 Processing Capital Cost Estimate

A summary of the initial pre-production capital costs for the process plant and associated infrastructure is shown in Table 21-4. This table includes direct costs, indirect costs, and a 15% contingency. This capital cost was based on equipment cost and multiplied by factors for installation.

Table 21-4: Summary Process Plant - Initial Capital Cost for 833 Tonnes per Month Process Plant

Barium Sulphate Concentration & Leach – Conceptual Study					
SUMMARY FACTORED COST ESTIMATE WORKSHEET			Project No:	523-01	
	Factored Cost Estimate		Revision:	P3	
			Date:	December 7, 2021	
	Description	Purchased Equipment Costs	Method / Factor	Installed Cost (USD)	Installed Cost (CAD)
	DIRECT COSTS				
	Process Plant:				
	Area 10 - Primary Feed Grinding	962,000	Equipment Cost x 1.40	1,346,800	1,683,500
	Area 15 - Primary Gravity Separation	120,500	Equipment Cost x 1.40	168,700	210,875
	Area 25 - Coarse Gravity Separation	62,000	Equipment Cost x 1.40	86,800	108,500
	Area 30 - Secondary Grinding, Micronizing (D50=10 μm product)	1,266,000	Equipment Cost x 1.40	1,772,400	2,215,500
	Area 35 - Concentrate Acid Wah / Leach	1,917,500	Equipment Cost x 1.40	2,684,500	3,355,625
	Area 40 - Leached concentrate Solid - Liquid Separation (Filtration)	707,500	Equipment Cost x 1.40	990,500	1,238,125
	Area 45 - Tailings Filtration & Transfer	644,500	Equipment Cost x 1.40	902,300	1,127,875
	Area 50 - Product Drying & Handling	1,220,800	Equipment Cost x 1.40	1,709,120	2,136,400
	Area 55 - Clean Room Product Storage & Packaging	30,000	Equipment Cost x 1.40	42,000	52,500
	Area 60 - Reagents & Utilities	598,500	Equipment Cost x 1.40	837,900	1,047,375
	Installed Equipment Cost	**7,529,300**	**Installed Equipment Cost**	**10,541,020**	**13,176,275**
	General Site Development		(5% of Purchased Equipment Costs)	376,465	470,581
	Buildings (process and non-process)		(32% of Purchased Equipment Costs)	2,409,376	3,011,720
	Electrical power distribution on site		(20% of Purchased Equipment Costs)	1,505,860	1,882,325
	Site Development Cost			**4,291,701**	**5,364,626**

Barium Sulphate Concentration & Leach – Conceptual Study					
	Infrastructure:				
	Off-Site Allowance	EXCLUDED	(0% of Purchased Equipment Costs)	-	
	Infrastructure Cost			-	
	TOTAL DIRECT COSTS			**14,832,721**	**18,540,901**
	PLANT INDIRECT COSTS				
	EPCM		(20% of Direct Cost)	2,966,544	3,708,180
	Construction Indirect Costs incl:		(10% of Direct Cost)	1,483,272	1,854,090
	Construction Supervision				
	Equipment Rental				
	Field Office Expense				
	Mobilization / Demobilization				
	Owner's Costs	EXCLUDED	(0% of Direct Cost)	-	
	Spare Parts		(5% of Purchased Equipment Cost)	376,465	470,581
	Initial Fill & Reagents		(1% of Direct Cost)	148,327	185,409
	Equipment Insurance & Freight Cost		(7% of Purchased Equipment Cost)	527,051	658,814
	TOTAL INDIRECT COSTS			**5,501,660**	**6,877,074**
	TOTAL DIRECT AND INDIRECT			**20,334,381**	**25,417,976**
	CONTINGENCY- 15%		15% of Direct and Indirect	3,050,157	3,812,696
	TOTAL CAPITAL			**23,384,538**	**29,230,672**

21.3.1 Direct Costs

The direct capital costs were based on the following list of documents prepared by SGS:

- Design criteria
- Equipment list
- Process Flowsheet
- Mining cost service source quote data for minor equipment
- SGS engineering equipment database for recent similar projects
- Budget quotations from vendors for major equipment
- Miscellaneous: Engineering drawings performed by SGS

The direct costs exhibited in this estimate include, but are not limited to, labor, equipment and materials for the detailed construction activities set forth below:

21.3.2 Equipment Costs

An equipment list was developed and incorporated into the cost estimate. The estimate for equipment was developed from the following sources:

- Written or e-mailed budgetary estimates from vendors for major equipment.
- Historical data and budget costs from recent similar projects for miscellaneous equipment.

The cost for “Installed equipment” was estimated using a factor of forty percent (40%) of purchased equipment costs. This factor reflects typical costs to install equipment and covers labor, concrete foundations, steel, and other services and construction materials associated with equipment foundations, erection, and placement.

21.3.3 Site Development

General site development costs include minor site preparation required for a pre-developed industrial site in Calgary, Canada. No specific site has been defined as of this writing. The initial construction site development cost was estimated using a five percent (5%) factor of the purchased plant equipment cost.

21.3.4 Buildings (Process and Non-Process)

Building costs include materials, labor, and other miscellaneous costs associated with erecting covered structures within the project site. The initial construction building cost was estimated using a 32% factor of the purchased plant equipment cost. The factor was selected to reflect the projected costs of the buildings based on building type and square footage. The project will require the following buildings:

- Product receiving area
- Grinding and gravity separation area
- Leaching area
- Product drying and packaging area

- Product storage
- Reagent storage area
- Facilities area (steam, water storage, and back-up generator)
- Control rooms and offices
- Tailings filter area

21.3.5 Electrical Power Distribution at Process Plant

Electrical distribution costs include transformation, wiring, cable tray, instrumentation, lighting, and grounding within the process plant. The initial electrical cost was estimated using twenty percent (20%) of purchased equipment costs. The factors were selected based on preliminary equipment power requirements of 6 MW and latest National Electric Code (NEC) standards. The project will require the following electrical power distribution items:

- 4.16 kV distribution on site (switchgear, distribution lines)
- Pad-mounted distribution transformers
- Medium voltage (4160 V) switchgear
- Low voltage (480 V) motor control center
- Back-up diesel generators

The Main substation transformers and circuit protection will be provided by the utility.

21.3.6 Electrical Main Power Supply

The main electrical power supply will be from the municipal supplier in Calgary, Canada. The costs required by the utility are not included in the estimate.

21.3.7 Offsite Costs

No offsite costs are included in the estimate.

21.3.8 Water Source

Delivery of water from the water utility is not included. Distribution within the process plant is included in the process plant estimate.

21.3.9 Indirect Costs

Certain indirect costs exhibited in this estimate include, but are not limited to, labor, equipment and materials for the detailed activities set forth below:

- EPCM for the process facilities and associated infrastructure was estimated using 20% of the direct costs and includes the following:
    - Feasibility study

    - Detailed engineering
    - Procurement
    - Construction management
- Construction indirect costs for the initial construction and mill expansion were estimated using a ten percent (10%) factor of the total direct costs and includes:
    - Construction supervision
    - Equipment rental
    - Field office expenses
    - Mobilization / demobilization
    - Consumables
- Owners cost for the plant are not included.
- Spare parts costs were estimated using a five percent (5%) factor of the purchased plant equipment cost.
- Initial fill and reagents costs were estimated using a one and one-half percent (1.0 %) factor of the total direct costs.
- Equipment insurance and freight costs were estimated using a seven percent (7%) factor of the purchased plant equipment costs.

21.3.10 Process Plant Contingency and Accuracy

The SGS crushing and process plant portion of the cost estimate includes a 15% contingency for project unknowns and identified risks. Contingency is a necessary part of the cost estimate and is based on the fact that less than three percent (< 3%) of the engineering is completed to date. SGS believes the estimated contingency amount will be spent during the construction period of the plant site and associated infrastructure for identified risks and unknown items.

While SGS has not performed a statistical analysis of the crushing plant and process plant accuracy of the capital cost estimate, SGS has a confidence, based on previous experience with similar projects, that the accuracy of the process portion of the PEA capital cost estimate will end up between minus twenty-five percent and plus thirty-five percent (-25 / +35%) of the SGS capital cost estimate.

21.3.11 Exclusions from Process Plant Cost Estimate

SGS has excluded the following cost items from the process plant estimate and assume these are included in other sections of the report:

- Owners cost
- Geotechnical
- Utility connections and metering to site
- Offsite costs
- Mining
- Downstream processing
- Reclamation and closure
- Metallurgical testing

- Property acquisition
- Permitting
- Environmental
- Permits, royalties and licenses
- Taxes, duty and import fees
- Local sales and import taxes
- Hazardous waste removal
- Other consultants

21.4 GMP Bottling Facility

The GMP Bottling facility is a relatively small footprint facility and is assumed to be constructed as an addition to the Planned barite processing facility. This facility will accommodate filling of 144 bottles per minute or up to 70,000 bottles per day, depending on the product made.

Table 21-5: Capital Estimate by AVL

Area	Capital Estimate (by AVL) ($CAD)
Equipment	
Reverse Osmosis Water System	$370k
Air Compressor and Receiver	$140k
Product Piping	$25k
Filling Line, Conveyor, Capping Line	$290k
Labelling, Boxing	$310k
Lab Equipment	$450k
Forklift	$15k
Pallet Handling	$20k
Cleaning Equipment	$30k
HVAC Units	$50k
Total Equipment	**$1,700k**
Installation	
Building Additions	$300k
Plumbing / HVAC	$900k
Temperature Control	$50k
Total Installation	**$1,260K**
Total Direct Capital Bottling Facility	**$2,960k**
Contingency (15%)	**$444k**
Total Capital with Contingency	**$3,404k**

21.5 Operating Costs

Operating Costs were developed from first principle calculations, vendor quotes, and conceptual scheduled hours. Processing costs were developed from conceptual flow sheets for $BaSO_4$ processing and pharmaceutical bottling.

Table 21-6: Capital Expenditures for Mining

Item	Cost
Mining Per tonne (All tonnes)	$ 4.28
Allgaiers On-Site Processing Per Tonne Resource	$ 8.20
Concentrate Shipping per tonne $BaSO_4$	$ 57
Off-Site Processing per Tonne $BaSO_4$	$ 273
G&A per Tonne $BaSO_4$ Final	$ 278

21.5.1 Mining Costs

Mining of the Frances Creek deposit is assumed to be conducted by contractor personnel, and only for sporadic periods as required to provide material for the off-site processing. As the deposit is exposed at surface, minimal capital outlays are expected, and capital requirements for clearing & grubbing, haul road development and site levelling are costed as part of the contractor's operations.

Clearing and grubbing operations are contained within waste stripping costs, with the expectation that reclamation materials will be stockpiled at the closest waste pile location.

Hourly operating costs for mining equipment is based on monthly rental rates divided by 176 hours per month (vendor quotes). The vendor quoted rates include capital repairs and replacement, including tires. Periodic maintenance (fuel and lubricants) are factored at 5% and 10% of the rental costs respectively.

Primary Mining Equipment costs are listed in Table 21-7 below.

Table 21-7: Primary Mining Equipment Costs

Description	Proposed Make	Hourly Operating Costs (non manpower)	Total Project Cost
Hydraulic Excavator	CAT 365/374	$ 151.75	$ 1,418,559
Articulated Dump Truck (28 ton)	CAT ADT (730C2)	$ 97.28	$ 2,727,980
Track Dozer (40 ton)	CAT Dozer D8 with Ripper	$ 114.00	$ 2,131,344
Road Grader	CAT Grader 16M	$ 150.20	$ 1,404,070

Mine support equipment is listed in below. Allowances for rental and monthly fuel consumption are included.

Table 21-8: Mine Support Equipment

Description	Monthly Costs	Total Project Cost
Service Truck	$3,500	$ 147,000
First Response Vehicle	$3,500	$ 147,000
Half Ton Trucks/ LV	$1,800	$ 352,944
Office / Geology / Wash Car	$2,150	$ 123,900

Personnel required for mine operations are presented in Table 21-9 below. Security costs are assumed for off shift times as well as times when the mining operation is on care and maintenance (unattended).

Table 21-9: Personnel required for Mine Operations

Position	Number	Cost Per Hour	Total Project Cost
Site Manager (Company)	1	$ 58	$ 671,370
Geologist (Company)	1	$ 58	$ 671,370
Surveyor (Company, half time)	0.5	$ 43	$ 251,481
Safety Coordinator / First Response	1	$ 42	$ 485,241
Security (for OffShifts Only)	1	$ 42	$ 1,249,842
Heavy Duty Mechanic / Millwright	2	$ 56	$ 1,289,476
Mine Supervisor	1	$ 57	$ 662,460
Shovel Operator	1	$ 53	$ 609,294
Truck Driver	3	$ 49	$ 1,721,551
Dozer Operator	2	$ 49	$ 1,147,701
Grader Operator	1	$ 49	$ 573,850
Process Operators	2	$ 49	$ 683,155
General Labourer	1	$ 34	$ 316,713

21.5.1.1 AllGaiers On-Site Processing

The Allgaiers sorting system consists of the following equipment:

- Mogensen SEL 2066 C5 Sizer
- Mogensen RV 20 Vibrating Feeder
- Mogensen GSort G19 Densimetric Table

- Mogensen RV 12 Vibrating Feeder
- Storage Hopper, Conveyor Feeder, Conveyor Belts

The Allgaeirs / Mogensen Screening system is a dry sorter system with minimal input for operation other than power. Voyageur Pharmaceuticals Ltd. has conducted test work on limited mineral samples to assess the suitability of this unit for processing, indicating a concentrate produced of 93% $BaSO_4$. Input costs for the system include diesel power generation, operating labour and replacement spare parts (included in initial capital) as the overall amount of material processed is quite low for the quoted unit.

Maintenance labour is captured under mine site indirects with an allowance for two tradespeople on site, which will be a mix of heavy-duty mechanics, electricians and millwrights as needed.

Support equipment for the Allgaiers on-site sorting includes a Cat Telehandler (or equivalent) at $28.55 per hour, a Cat 966 Loader (or equivalent) at $96.18 per hour and a Cat 1000 kW generator at $156.13 per hour. The Cat generator was assumed to be running at a duty cycle of 50% as the Allgaiers sorting system requires approximately 176 kW. The generator is sized to provide other ancillary power for the other site facilities (shops, office trailer, wash car, security shack, first aid).

Overall operating cost, including labour, for the Allgaiers system is estimated at $8.20 per tonne Run of Mine material processed.

Once processed, the concentrate material, estimated at 93% $BaSO_4$, will be shipped to the Calgary processing centre. Haulage quotes obtained indicate costs of $57 per tonne for this haulage.

21.5.2 General and Administration

General and administration expenses include a mix of on-site expenses, as well as off-site processing expenses and corporate overheads.

The mine site includes a monthly environmental allowance for water sampling and regulatory compliance, during site operations and during care and maintenance between mining periods.

Rental equipment is expected to be mobilized and de-mobilized as needed for the mining periods. These allowances are $2,500 for each piece of equipment for mobilization and demobilization.

Table 21-10 presents the estimated G&A monthly and for the total project.

Table 21-10: G&A Monthly and for Total Project

Direct G&A Costs	Monthly Cost	Total Project Cost
Monthly Environmental Allowance	$5,000 per month during Mining $1,500 per month during Care and Maintenance	
Monthly Wastewater Disposal (On-Site)	$ 1,200	
Site Closure Costs		$ 150,000
Calgary Land Lease	$ 8,333	$ 958,333
City of Calgary Annual Land Taxes	$ 10,167	$ 1,169,167
Mobilization Allowances		
Mine Equipment	$ 17,500	$ 245,000
Wash Car	$ 2,950	$ 41,300
Total G&A Direct Costs		**$ 2,911,200**
G&A Corporate Costs		
Payroll	$ 60,750	$ 6,986,250
Insurance	$ 17,400	$ 2,001,000
General	$ 17,650	$ 2,029,750
Investor Relations	$ 10,000	$ 1,150,000
Professional Fees	$ 10,000	$ 1,150,000
Other	$ 500	$ 57,500
Total Off-Site G&A	**$ 116,300**	**$ 13,374,500**
Grand Total G&A		**$ 16,285,700**

21.5.3 Process Operating Costs

Process operating costs were developed from the conceptual process flow sheet, and include allowances for water supply, labour, reagents, power, grinding media, mobile equipment, tailings handling and concentrate dispatch. A contingency allowance of $10 per tonne processed is also included.

Bottling costs of the final pharmaceutical product is assigned separately, as the direct mixtures are intellectual property of the Company. As the company is in the process of receiving Health Canada approval for use of the $BaSO_4$ in the diagnostic materials, the exact formulation is not available for publication. The company has provided cost allowances for mixing and bottling the pharmaceutical products.

The conceptual flowsheet assumed nominal production of 10,000 tonnes per year of concentrate. Cost build ups were based on this, achieving an overall average cost of $272.98 per tonne of concentrate.

The overall process recovery, resulting in 98.3% $BaSO_4$ is 65.2%.

Table 21-11 shows the annual total cost summary for the process plant, and the breakdown per tonne processed.

Table 21-12 shows the cost of goods sold for the bottling line.

Table 21-13 shows the manpower for the process and bottling lines.

Table 21-11: Annual Total Cost Summary for the Process Plant

Description	Annual Cost (CAD)	Cost Per Tonne Processed (CAD)	Contribution %
Make-up Water	$58,092	$5.81	2.13%
Power	$119,557	$11.95	4.38%
Operating labour	$1,167,500	$116.74	42.76%
Maintenance Labour	$240,000	$24.00	8.79%
Reagents	$372,717	$37.27	13.65%
Grinding Media	$47,938	$4.79	1.76%
Maintenance	$316,584	$31.66	11.60%
Laboratory	$131,850	$13.18	4.83%
Mobile equipment	$123,753	$12.37	4.53%
Tailings Handling	$12,501	$1.25	0.46%
$BaSO_4$ Concentrate & Dispatch	$14,567	$1.46	0.53%
Contingency	$125,000	$12.50	4.58%
Totals	$2,730,059	$273	100%

Table 21-12: Cost of Goods Sold for the Bottling Line

Pharmaceutical Product	Total Cost of Goods Sold
Smooth X (ReadiCat Smoothie) (retail $4/bottle USD)	$216,895,708
Barium sulfate 98% HDX ($6/bottle retail)	$3,378,241
Barium sulfate 96% w/w LDX ($4 usd/bottle)	$2,715,473
MultiXthick	$229,087
MultiXThin	$152,033
Total COGS	$223,370,543

Table 21-13:Manpower for the Process and Bottling Lines

Position	Number	Annual Compensation (Including Benefits)
$BaSO_4$ Processing		
Plant Foreman	1	$120,000.00
Shift Supervisor	1	$80,000.00
Control Room Operator	1	$64,000.00
Mill Attendant	2	$64,000.00
Mill Product Storage Attendant	1	$64,000.00
Filter Press Operator	1	$64,000.00
Filtration Attendant	1	$64,000.00
Drying Operator / Attendant	1	$64,000.00
Tailings Handling and Services Operators	2	$64,000.00
Front-End Loader Driver	1	$64,000.00
Reagents Operator and Sampling Attendant	1	$64,000.00
Instrument Technician	1	$64,000.00
Instrument Mechanical	1	$64,000.00
Electricians	1	$64,000.00
Bottling and Shipping		
Warehouse manager	1	$54,000
Warehouse assistant	1	$43,000
Label clerk	1	$43,000
QC lab analyst	2	$48,000
QC lab manager	1	$58,000
Production supervisor	1	$48,000
Production assistant	4	$43,000

22 ECONOMIC ANALYSIS

The economic analysis of the Voyageur Frances Creek project is conducted in a PEA basis using designs, costs and assumptions listed previously in this report. The reader is cautioned that this is not a pre-feasibility or feasibility study and reserves have not yet been delineated for the Project. While the underlying economic assumptions are believed to be reasonable, additional information may change operating cost, capital cost, or metallurgical recovery parameters and this would have an impact on the analysis. All costs are in Q4 2021 Canadian constant dollars.

22.1 Model Parameters

Financial Parameters used for this economic analysis are presented in Table 22-1 below.

Table 22-1:Financial Parameters

Economic Assumptions	
$USD: $CAD Exchange Rate	$0.80: $1.00
Discount Rate	8%
Corporate Tax Rate	25%
Gross Overriding Royalty	3.5% on Bulk $BaSO_4$ Sales Revenue
Depreciation Fixed Asset	10% per year declining balance
Depreciation Mining	Depreciated against Resource

The Voyageur Frances Creek project is unique in that there are currently no other North American providers of $BaSO_4$ (98.3%) pharmaceutical materials, and there is only one company providing the pharmaceutical products mentioned in this PEA in North America. The reader is directed to Item 19 Marketing Analysis for further discussions on the marketing strategy and market penetration that Voyageur Pharmaceuticals Ltd. can reasonably expect.

The resource contains sufficient material to satisfy the market for long periods. This PEA focussed on extraction, processing and sales of the Upper Frances Creek zone only, providing a life of mine of 9 years, and a processing life of 10 years.

Based on the marketing studies conducted, Voyageur Pharmaceuticals Ltd. has directed that this economic analysis investigate market penetration rates of 30% (Base Case) in the North American market with 15% penetration in the European markets, and 50% (Case 1) penetration in the North American market and 15% in the European market.

Processing products include the following:

- Smooth X (Readicat Smoothies)
- Barium Sulfate 98% HDX
- Barium Sulfate 96% LDX
- MultiXThick
- MultiXThin
- $BaSO_4$ Bulk Product

- $BaSO_4$ Drill Product

Current pricing of 98.3% $BaSO_4$ available from China has a delivered price of $4,760 USD per tonne, or $5,960 CAD per tonne. This pricing is used for bulk sales of $BaSO_4$, not used in the formation of pharmaceutical products.

The process rejects will be relatively high-quality Barite which is assumed to be suitable for drilling mud products and is assumed to be sold as drill mud in bulk.

Revenue assumptions are listed in Table 22-2 below.

Table 22-2:Revenue Assumptions

Product	Sales Revenue
Smooth X (ReadiCat Smoothie) (retail $4/bottle USD)	$5.00
Barium sulfate 98% HDX ($6/bottle retail)	$7.50
Barium sulfate 96% w/w LDX ($4 usd/bottle)	$6.50
MultiXthick	$22.50
MultiXThin	$19.50
$BaSO_4$ (98.3% Pure) Product Bulk per Tonne	$5,950.00
$BaSO_4$ Drill Product Bulk Per Tonne	$360.00

Table 22-3:Market Penetrations

North American 30%, European 15%		**Year**										
Product	Units	1	2	3	4	5	6	7	8	9	10	Totals
Smooth X (ReadiCat Smoothie) (retail $4/bottle USD)	Bottles	5,600K	15,000K	18,000K	18,000K	18,000K	18,000K	18,000K	18,000K	18,000K	10,500K	157,100K
Barium sulfate 98% HDX ($6/bottle retail)	Bottles	95K	210K	360K	360K	360K	360K	360K	360K	360K	210K	3,035K
Barium sulfate 96% w/w LDX ($4 usd/bottle)	Bottles	79K	175K	300K	300K	300K	300K	300K	300K	300K	175K	2,529K
MultiXthick	Bottles	1K	4K	8K	9K	9K	9K	9K	9K	9K	5K	69K
MultiXThin	Bottles	1K	2K	5K	6K	6K	6K	6K	6K	6K	4K	47K
$BaSO_4$ (98.3% Pure) Product	Tonnes	4K	6K	6K	6K	6K	6K	6K	6K	6K	3K	55K
$BaSO_4$ Drill Product	Tonnes	3K	4K	4K	4K	4K	4K	4K	4K	4K	2K	38K

North American 50%, European 15%		**Year**										
Product	Units	1	2	3	4	5	6	7	8	9	10	Totals
Smooth X (ReadiCat Smoothie) (retail $4/bottle USD)	Bottles	8,267K	19,000K	22,000K	22,000K	22,000K	22,000K	22,000K	22,000K	22,000K	12,833K	194,100K
Barium sulfate 98% HDX ($6/bottle retail)	Bottles	148K	290K	440K	440K	440K	440K	440K	440K	440K	257K	3,775K
Barium sulfate 96% w/w LDX ($4 usd/bottle)	Bottles	124K	242K	367K	367K	367K	367K	367K	367K	367K	214K	3,146K
MultiXthick	Bottles	2K	5K	9K	10K	10K	10K	10K	10K	10K	6K	79K
MultiXThin	Bottles	1K	3K	6K	7K	7K	7K	7K	7K	7K	4K	55K
$BaSO_4$ (98.3% Pure) Product	Tonnes	4K	6K	6K	6K	6K	6K	6K	6K	6K	3K	55K
$BaSO_4$ Drill Product	Tonnes	3K	4K	4K	4K	4K	4K	4K	4K	4K	2K	38K

22.2 Financial Results

The Base Case economics for the Voyageur Pharmaceuticals Ltd. Frances Creek Project indicates a pre-tax NPV of $465M CAD and IRR of 172%, while the post tax NPV is $344M with an IRR of 140% at a discount rate of 8%. The project assumes a pre-production period of 2 years for equipment delivery and installation, which also allows time for mine permitting. The payback period under the base case is 11 months, thus cash flow positive within the first year of production.

The Case 1 economics for the Voyageur Pharmaceuticals Ltd. Frances Creek Project indicates a pre-tax NPV of $544M CAD and IRR of 197%, while the post tax NPV is $405M with an IRR of 160% at a discount rate of 8%. The payback period under Case 1 is 6 months, thus cash flow positive within the first year of production.

Table 22-4:Project Economics and Market Penetration

	Base Case 30% NA Market Penetration		**Case 1 50% NA Market Penetration**	
	Pre-Tax	AfterTax	Pre-Tax	AfterTax
Cash Flow	$839,097,415	$626,329,975	$978,706,204	$731,036,567
NPV	$464,306,622	$344,247,738	$544,388,240	$404,308,951
IRR	168%	137%	192%	157%

Table 22-5 to Table 22-8 presents the production physicals and cash flow programs for each of the Base Case and Case 1.

Table 22-5: Base Case Production Physicals Program

	Year										
Frances Creek Mining	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Total Tonnes Mined	568.2K	753.9K	311.5K	325.6K	176.7K	567.8K	299.0K	317.7K	232.6K		3,553K
Waste Tonnes Mined	534.4K	729.2K	259.4K	280.5K	159.4K	554.5K	223.2K	317.7K	181.8K		3,240K
Resource Tonnes Mined (diluted)	33.8K	24.6K	52.1K	45.2K	17.2K	13.2K	75.7K	0.0K	50.7K		313K
Diluted Grade	31%	33%	32%	32%	33%	32%	29%	0%	29%		31%
$BaSO_4$ Tonnes Mined	10.5K	8.1K	16.7K	14.7K	5.6K	4.3K	21.7K	0.0K	14.6K		96K
On-Site Concentrating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Tonnes Processed	33.8K	24.6K	52.1K	45.2K	17.2K	13.2K	75.7K	0.0K	50.7K		313K
$BaSO_4$ Tonnes Recovered	9.8K	7.5K	15.5K	13.6K	5.2K	4.0K	20.2K	0.0K	13.6K		90K
Concentrate Grade	93%	93%	93%	93%	93%	93%	93%	0%	93%		93%
$BaSO_4$ Concentrate Tonnes Shipped	10.5K	8.1K	16.7K	14.7K	5.6K	4.3K	21.7K	0.0K	14.6K		96K
Calgary Processing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Concentrate Tonnes Processed	7.0K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	5.6K	96.3K
$BaSO_4$ Recovered (98.3%)	4.2K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	3.4K	58.4K
Projected Sales Profile	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
$BaSO_4$ Pharma Tonnes	96	239	344	348	348	348	348	348	348	203	2,970
$BaSO_4$ (98.3% Pure) Product Tonnes	4,136	6,109	6,004	6,000	6,000	6,000	6,000	6,000	6,000	3,173	55,421
$BaSO_4$ Drill Products Tonnes	2,747	4,121	4,121	4,121	4,121	4,121	4,121	4,121	4,121	2,191	37,907

Table 22-6: Base Case Cash Flow Program

	Year											
Forecasted Costs	**-2**	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Capital Costs	**$5M**	**$15M**	**$16M**										**$36M**
Frances Creek Mining			$3M	$4M	$3M	$3M	$1M	$3M	$4M	$1M	$3M		$23M
BaSO4 Upgrade Processing			$2M	$3M	$3M	$3M	$3M	$3M	$3M	$3M	$3M	$2M	$26M
G&A			$2M	$2M	$2M	$2M	$2M	$2M	$2M	$2M	$2M	$1M	$16M
$BASO_4$ Pharma Products COGS			$8M	$21M	$26M	$26M	$26M	$26M	$26M	$26M	$26M	$9M	$217M
Gross Overriding Royalty			$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$12M
Total Costs	**$5M**	**$15M**	**$32M**	**$31M**	**$34M**	**$34M**	**$33M**	**$34M**	**$35M**	**$33M**	**$34M**	**$12M**	**$331M**
Revenue			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Pharma Sales			$29M	$78M	$95M	$95M	$95M	$95M	$95M	$95M	$95M	$55M	$827M
$BaSO_4$ Product Sales			$25M	$36M	$36M	$36M	$36M	$36M	$36M	$36M	$36M	$19M	$330M
Drill Product Sales			$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$14M
Total Sales			**$55M**	**$116M**	**$132M**	**$132M**	**$132M**	**$132M**	**$132M**	**$132M**	**$132M**	**$75M**	**$1171M**
Cash Flow	**-2**	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Pre-Tax Cash Flow	-$5M	-$15M	$23M	$85M	$98M	$98M	$100M	$98M	$97M	$100M	$98M	$63M	$839M
After Tax Cash Flow	-$5M	-$15M	$14M	$65M	$74M	$74M	$75M	$74M	$74M	$75M	$74M	$48M	$626M

Table 22-7: Case 1 Production Physicals Program

	Year										
Frances Creek Mining	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Total Tonnes Mined	568.2K	753.9K	311.5K	325.6K	176.7K	567.8K	299.0K	317.7K	232.6K		3,553K
Waste Tonnes Mined	534.4K	729.2K	259.4K	280.5K	159.4K	554.5K	223.2K	317.7K	181.8K		3,240K
Resource Tonnes Mined (diluted)	33.8K	24.6K	52.1K	45.2K	17.2K	13.2K	75.7K	0.0K	50.7K		313K
Diluted Grade	31%	33%	32%	32%	33%	32%	29%	0%	29%		31%
$BaSO_4$ Tonnes Mined	10.5K	8.1K	16.7K	14.7K	5.6K	4.3K	21.7K	0.0K	14.6K		96K
On-Site Concentrating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Tonnes Processed	33.8K	24.6K	52.1K	45.2K	17.2K	13.2K	75.7K	0.0K	50.7K		313K
$BaSO_4$ Tonnes Recovered	9.8K	7.5K	15.5K	13.6K	5.2K	4.0K	20.2K	0.0K	13.6K		90K
Concentrate Grade	93%	93%	93%	93%	93%	93%	93%	0%	93%		93%
$BaSO_4$ Concentrate Tonnes Shipped	10.5K	8.1K	16.7K	14.7K	5.6K	4.3K	21.7K	0.0K	14.6K		96K
Calgary Processing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Concentrate Tonnes Processed	7.0K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	10.5K	5.6K	96.3K
$BaSO_4$ Recovered (98.3%)	4.2K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	6.3K	3.4K	58.4K
Projected Sales Profile	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
$BaSO_4$ Pharma Tonnes	146	314	419	348	348	348	348	348	348	246	3,213
$BaSO_4$ (98.3% Pure) Product Tonnes	4,086	6,034	5,929	6,000	6,000	6,000	6,000	6,000	6,000	3,129	55,178
$BaSO_4$ Drill Products Tonnes	2,747	4,121	4,121	4,121	4,121	4,121	4,121	4,121	4,121	2,191	37,907

Table 22-8: Case 1 Cash Flow Program

	Year											
Forecasted Costs	**-2**	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Capital Costs	**$5M**	**$15M**	**$16M**										**$36M**
Frances Creek Mining			$3M	$4M	$3M	$3M	$1M	$3M	$4M	$1M	$3M		$23M
BaSO4 Upgrade Processing			$2M	$3M	$3M	$3M	$3M	$3M	$3M	$3M	$3M	$2M	$26M
G&A			$2M	$2M	$2M	$2M	$2M	$2M	$2M	$2M	$2M	$1M	$16M
$BASO_4$ Pharma Products COGS			$12M	$27M	$31M	$31M	$31M	$31M	$31M	$31M	$31M	$10M	$268M
Gross Overriding Royalty			$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$12M
Total Costs	**$5M**	**$15M**	**$36M**	**$36M**	**$40M**	**$40M**	**$38M**	**$40M**	**$41M**	**$38M**	**$40M**	**$14M**	**$383M**
Revenue			1	2	3	4	5	6	7	8	9	10	Totals
Pharma Sales			$43M	$99M	$116M	$116M	$116M	$116M	$116M	$116M	$116M	$68M	$1022M
$BaSO_4$ Product Sales			$24M	$36M	$35M	$35M	$35M	$35M	$35M	$35M	$35M	$19M	$326M
Drill Product Sales			$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$1M	$14M
Total Sales			**$69M**	**$136M**	**$153M**	**$153M**	**$153M**	**$153M**	**$153M**	**$153M**	**$153M**	**$87M**	**$1361M**
Cash Flow	**-2**	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Totals**
Pre-Tax Cash Flow	-$5M	-$15M	$33M	$100M	$113M	$113M	$114M	$113M	$112M	$115M	$113M	$73M	$979M
After Tax Cash Flow	-$5M	-$15M	$21M	$76M	$85M	$86M	$86M	$85M	$85M	$86M	$85M	$55M	$731M

22.3 Sensitivity Analysis

A sensitivity analysis was conducted on capital costs, operating costs and revenue in 10% increments from 60% of base values to 140% of base values (+/- 40%).

Figure 22-1 to Figure 22-4 show the results for the Base Case as well as Case 1 for Pre-tax and post tax NPV's.

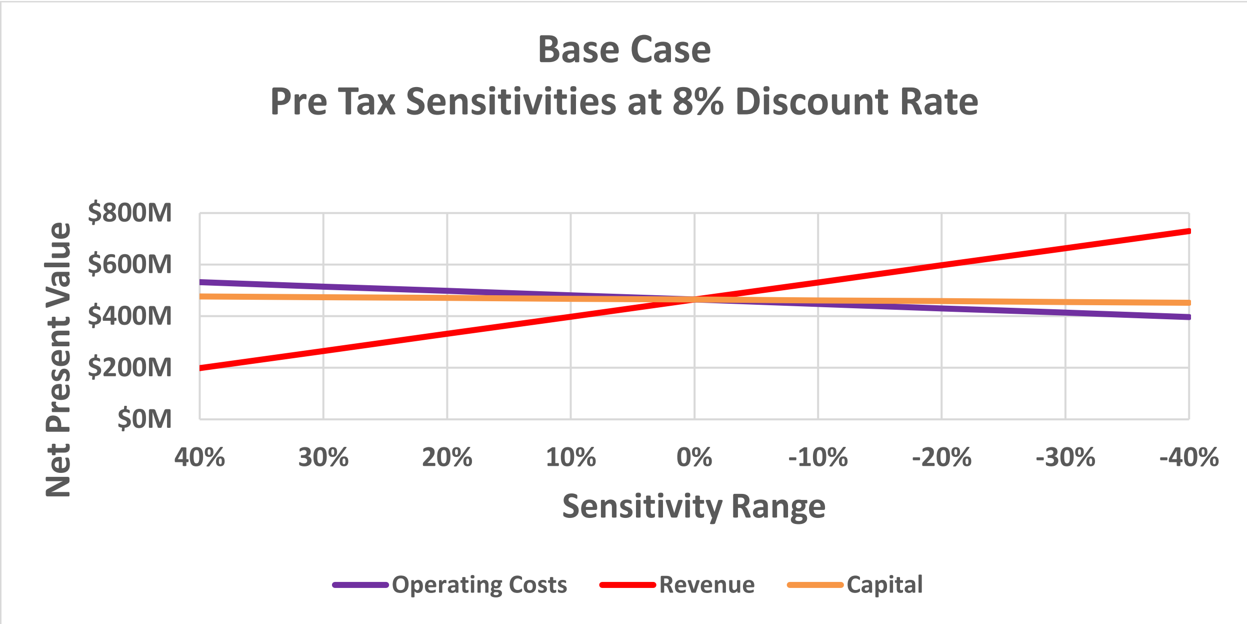


Figure 22-1: Base Case - Pre Tax Sensitivities at 8% Discount Rate

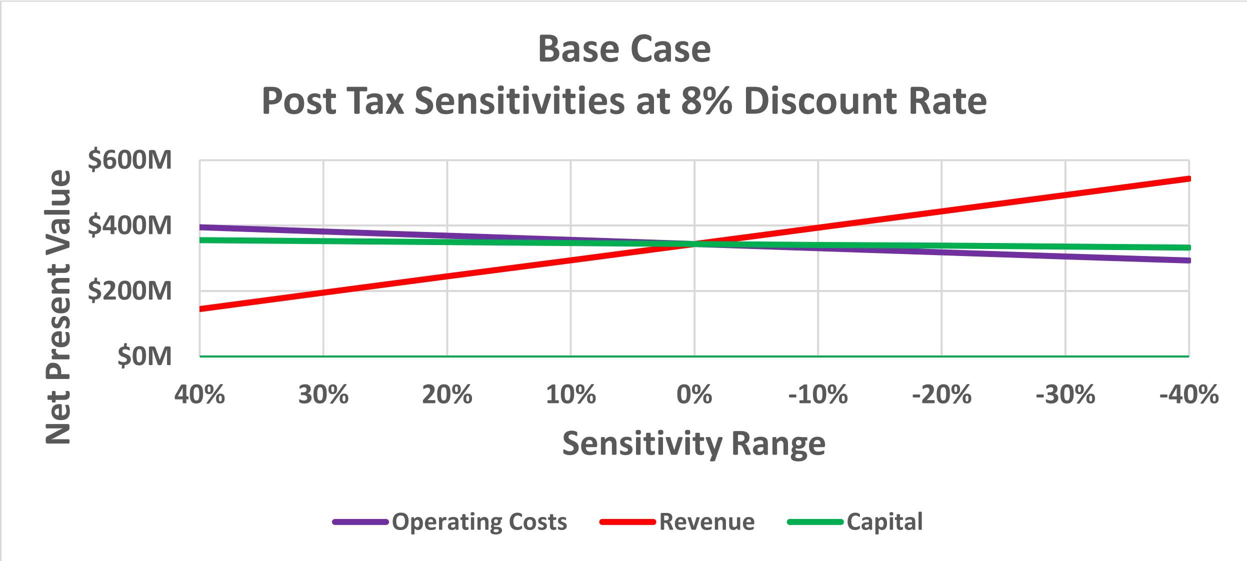


Figure 22-2: Base Case - Post Tax Sensitivities at 8% Discount Rate

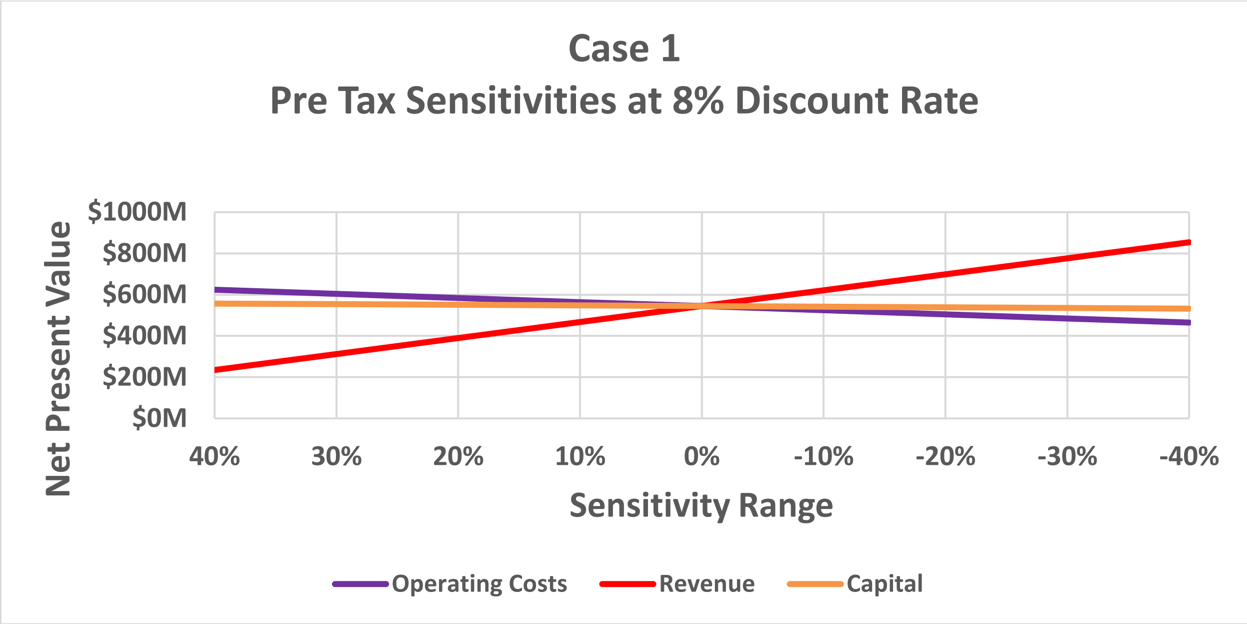


Figure 22-3: Case 1 - Pre Tax Sensitivities at 8% Discount Rate

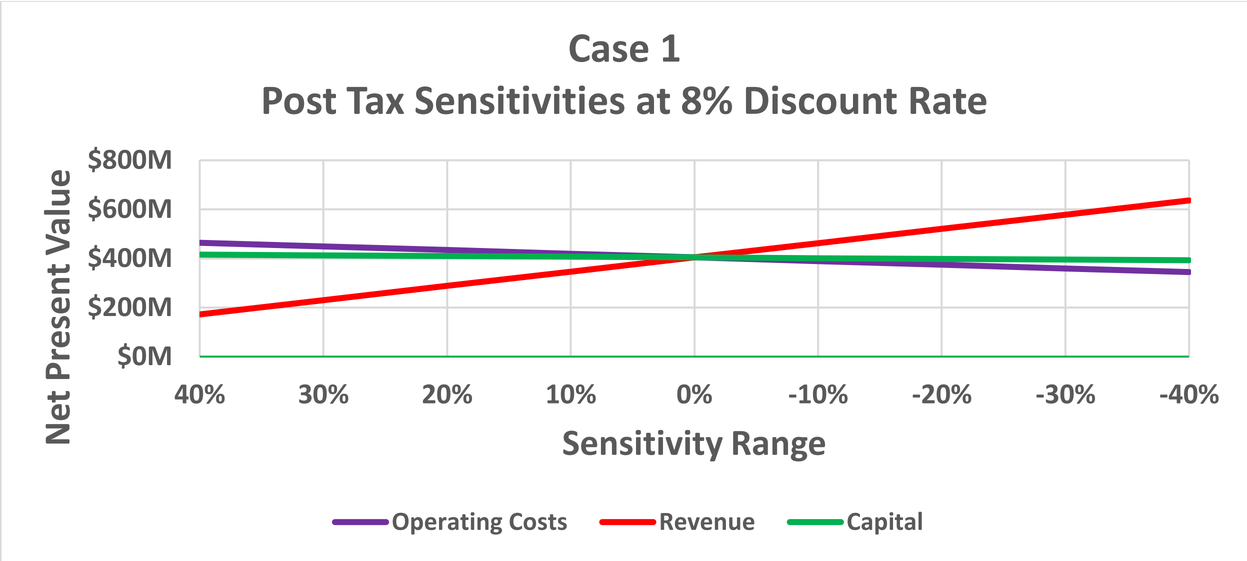


Figure 22-4: Case 1 - Post Tax Sensitivities at 8% Discount Rate

22.3.1 Case Comparison

The mine production rates were not varied for the case comparisons, only the revenue streams of $BaSO_4$ allocated to either pharmaceutical products or to bulk sales of Barite.

The project is sensitive to changes in pharmaceutical sales, as small amounts of $BaSO_4$ are required for these sales. A detailed marketing study is suggested for the next stage of study to assess the validity of the market penetration rates.

23 ADJACENT PROPERTIES

No data from adjacent properties was used in the preparation of this report.

24 OTHER RELEVANT DATA AND INFORMATION

All relevant data and information regarding the Frances Creek Project have been disclosed under the relevant sections of this report.

25 INTERPRETATION AND CONCLUSIONS

The Inferred Mineral Resources used in this PEA are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized. The words "production", "mineable" and mine plan" are used in the PEA in an operational sense and not in an accounting sense.

The Frances Creek Project is a "Project of Merit" and warrants being carried forward to the Pre-Feasibility Study (PFS) stage with further expenditure for continued exploration and project development. Conclusions based on this report include:

- The geology of the mineral deposit is amenable to open pit mining.
- Studies of the Frances Creek barite deposit suggest that the mineral resource may be processed to obtain a pharmaceutical grade Barium Sulphate product for use in contrast media solutions. Further, processed Barite concentrates may find a market in industrial applications such as the drilling mud market, the glass manufacturing market, the industrial filler market and the chemical industry.

Potentially economic mineralization within each zone is open both to the NW (upslope) and the SE (downslope). Additional resources can probably be discovered by exploring on strike to the NW of the B – Zone and to the SE of the A – Zone. Likewise, the poorly explored area which lies on strike between the two mineralized zones probably hosts potential mineralization.

The independent Qualified Persons responsible for assigned portions of this PEA are not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Updated Mineral Resources Estimate presented in this PEA.

Conceptual Project

The Project has been developed to a conceptual level and additional technical studies are required to provide information for the PFS study.

Risks and Uncertainties

Potential significant risks and uncertainties that could affect the updated mineral resources estimate and/or the projected economic viability of the Project are summarized in Table 25-1 below

Table 25-1: Potential Significant Risks and Uncertainties

Area	Potential Risks / Uncertainties
Mining	• The mine development and production plan is based on the use of conventional mining equipment. Slope designs and groundwater conditions should be verified at the next level of study to confirm the assumptions used in this study, or provide detailed data for a pre-feasibility study • This PEA assumes that mining is conducted sporadically to provide process feed as needed for off-site processing. This study assumed mining to be conducted by a contractor with a hired fleet. • It is expected that local contractors with suitable expertise would be available to provide the necessary site services.

	• The PEA assumes that mine water would be diverted through a series of ditches to on-site settling ponds prior to discharge to the environment. The PEA also assumes that there are no deleterious substances in the discharge water. There is a possibility that further study may find that on-site water treatment is required. • The PEA assumes that on-site densimetric sorting (the Allgaiers system) will work as indicated based on previous test work. There is a risk that this sorting system will not provide the concentrate grades leading to higher haulage and off-site process costs. • There is a possibility that actual wages and salaries could be higher than estimated in the PEA. Possible reasons include as examples: higher wage levels for experienced lead hands; and additional social costs due to governmental factors.
Marketing / Sales	• There is a risk that the market penetration of pharmaceutical products is not as high as assumed in this PEA, leading to reduced revenue predictions
Tailings	• No tailings are anticipated from the final process. Onsite sorting will provide dry gangue material that may be replaced in the waste dumps. Off-site processing is anticipated to provide saleable products of all materials, with no residual waste. There is a risk that there will be a requirement for off-site handling of processed waste, leading to increased disposal costs.
Projected potential economic viability	• The cashflow is based on projected revenues and costs from assumed Pharmaceutical market penetrations as well as the assumption that pure industrial grade Barium Sulphate will be sold. There is a risk that income from sales may be lower than projected due to lower market penetration and delays in approval of pharmaceutical products outside of Canada

26 RECOMMENDATIONS

26.1 Mining Methods and Infrastructures:

We recommend the following for the mining methods and Infrastructures:

1. A large flat surface for mine offices, mineralized barite processing, parking, auxiliary equipment, etc. has already been constructed by a timber company to aid in timber harvest which coincided with the project claim boundaries. An as-built survey is required to establish the area for the above-mentioned infrastructures.
2. In support to the next phase of work for the PFS study, geotechnical work is to be undertaken to refine the pit slope design and hydrological work be undertaken to characterize the surface and ground water regimes as they pertain to ground stability and pit pumping requirements.
3. In the next level of study, water resources shall be identified such as the perennial streams that drain within the property to be able to quantify and design a water collection facility for domestic and processing water use.
4. Access roads to the property are already constructed, but they will require some delayed maintenance attention prior to initiation for mining activity. The needed road upgrade shall be identified in a map format to be able to provide the capital cost for road required upgrade to government standards.

It is recommended that Voyageur take this project to the next stage of development by undertaking the 2-phase work program discussed further.

A full LIDAR survey of the project area should be completed at a level of detail sufficient for future pre-feasibility or feasibility studies.

A drill program should be conducted to determine the geotechnical and hydrogeological conditions at the deposit site for use in future studies and permitting activities. A few twin drillholes should also be done on both mineralized zones to confirm the grade and purity of the barite. Emphasis should be on the QAQC and smaller samples to help assess the small-scale variability of the deposit.

26.2 Bulk Sampling

A 10,000 tonne Bulk Sample of mineralized material should be collected and used to confirm the applicability of on-site densimetric sorting. This sample should be collected as soon as permits allow Lab testing to support this activity should be by a USP certified lab.

Metallurgical Testing – This part of the program can be designed to be supplemental to the two sampling projects mentioned above. The entire metallurgical circuit – crushing, screening, jigging, tabling and grinding, needs to be tested and thoroughly understood. The goal of this activity is to fully understand the metallurgy of the mineralization at the prospect.

The final product from the metallurgical tests above should also be processed at a contract facility, and final pharmaceutical products generated. These final products should be used to assess and develop a final marketing study to be used at pre-feasibility and feasibility study stages.

26.3 Proposed Budget

The budget estimate for a 2 Phase work plan was prepared as part of this report, in order to move the Frances Creek Prospect towards production. A synopsis of the work plan / budget proposed for the next phase of the project follows:

Table 26-1: Phase 1 – Work Plan and Budget

PROPOSED WORK – PHASE 1	ESTIMATED COST
Continued Exploration	
LIDAR Survey	$ 50,000
Hydrogeology / Geotechnical / Twin Drilling	$ 400,000
Subtotal	$ 400,000
Bulk Sampling and Pre-Feasibility Study	
10,000 Tonne Bulk Sample	$ 400,000
Metallurgical Testing	$ 100,000
Pre-Feasibility Study and Lab Work	$ 500,000
Subtotal	$ 1,000,000
Total - PHASE 1 – Exploration and Pre-Feasibility	$ 1,450,000

Table 26-2: Phase 2 – Work Plan and Budget

PROPOSED WORK – PHASE 2	ESTIMATED COST
Product Development - Pharmaceutical	
Barium Contrast Formulation	$ 50,000
FDA / Health Canada Application	$1,500,000
Product Marketing	$ 75,000
Total – PHASE 2 – Product Development	$ 1,625,000

Both Phase 1 and Phase 2 are proposed by the authors for the next stage of the project. The authors of this report acknowledge that the project is still at a relatively early stage. However, the authors believe that it is appropriate to move the project into the pre – feasibility and product development stage once funding is accomplished. The total funds required for Phases 1 and 2 is CAD $ 3,075,000.

27 REFERENCES

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28 DATE AND SIGNATURE PAGE

This report titled "NI 43-101 TECHNICAL REPORT ON THE PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT, BRITISH-COLUMBIA, CANADA" dated February 22, 2022 (the "Technical Report") for Voyageur Pharmaceuticals Ltd. was prepared and signed by the following authors:

The effective date of the report is January 11, 2022.
The date of the report is February 22, 2022.

Signed by:

Qualified Person Yann Camus, P.Eng. February 22, 2022	Company SGS Canada Inc. ("SGS")
Qualified Person Johnny Canosa, P.Eng. February 22, 2022	Company SGS Canada Inc. ("SGS")
Qualified Person William Van Breugel, P.Eng. February 22, 2022	Company SGS Canada Inc. ("SGS")
Qualified Person Joseph Keane, P.Eng. February 22, 2022	Company SGS North America Inc. ("SGS")

29 CERTIFICATES OF QUALIFIED PERSONS

QP CERTIFICATE – YANN CAMUS

To accompany the report entitled: NI 43-101 TECHNICAL REPORT ON THE PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT, BRITISH-COLUMBIA, CANADA, dated February 22, 2022 and with an effective date of January 11, 2022.

I, Yann Camus, P. Eng. of Val-Morin, hereby certify that:

a) I am a Mineral Resource Estimation Engineer for SGS Canada Inc, - SGS Geological Services with an office at 10 Boul. de la Seigneurie Est, Suite 203, Blainville Quebec Canada, J7C 3V5. (www.geostat.com).

b) I am a graduate of the École Polytechnique de Montréal (B.Sc. Geological Engineer, in 2000). I am a member of good standing, No. 125443, of the l'Ordre des Ingénieurs du Québec (Order of Engineers of Quebec). My relevant experience includes continuous mineral resource estimation since my graduation from University including many gold projects. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

c) I have personally inspected the Property on October 27, 2020.

d) I am an author of this report and responsible for sections 1.1 to 1.9, 1.11, 1.16, 2 to 12, 14, 15, 20, 23, 24 and 27. I have reviewed these sections and accept professional responsibility for these sections of this technical report.

e) I am independent of Voyageur Pharmaceuticals Ltd. as defined in Section 1.5 of National Instrument 43-101.

f) I have had no prior involvement with the subject property.

g) I have read the definition of qualified person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of National Instrument 43-101.

h) As at the effective date of the technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

i) I have read National Instrument 43-101, Form 43-101F1 and confirm that this technical report has been prepared in accordance therewith.

Signed and dated this 22nd day of February 2022 at Val-Morin, Quebec.

"Original Signed and Sealed"

Yann Camus, P.Eng., SGS Canada Inc.

QP CERTIFICATE – JOHNNY CANOSA

To accompany the report entitled: NI 43-101 TECHNICAL REPORT ON THE PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT, BRITISH-COLUMBIA, CANADA, dated February 22, 2022 and with an effective date of January 11, 2022.

I, Johnny Canosa, P. Eng. of Surrey, British Columbia hereby certify that:

a) I am a Senior Mine Engineer for SGS Canada Inc, - SGS Geological Services with an office at 10 Boul. de la Seigneurie Est, Suite 203, Blainville Quebec Canada, J7C 3V5. (www.geostat.com).

b) I am a graduate of Bachelor of Science in Mining Engineering from Saint Louis University, Baguio City Benguet, Philippines with diploma issue date on March 23, 1980. I am a member of good standing of the Association of Professional Engineers of Ontario (licence # 100509964) and the Association of Professional and Geoscientist of Alberta (licence #93946). My relevant experience includes more than 20 years of experience in mine engineering, mine planning and mining operation, including mine optimization, projects, open pit planning and scheduling, and mining consultancy. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

c) I have not personally inspected the Property.

d) I am an author of this report and responsible for sections 1.12, 1.14, 16.1 to 16.5, 16.8, 16.9 and 18. I have reviewed these sections and accept professional responsibility for these sections of this technical report.

e) I am independent of Voyageur Pharmaceuticals Ltd. as defined in Section 1.5 of National Instrument 43-101.

f) I have had no prior involvement with the subject property.

g) I have read the definition of qualified person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of National Instrument 43-101.

h) As at the effective date of the technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

i) I have read National Instrument 43-101, Form 43-101F1 and confirm that this technical report has been prepared in accordance therewith.

Signed and dated this 22nd day of February 2022 at Surrey, British Columbia.

"Original Signed and Sealed"

Johnny Canosa, P.Eng., SGS Canada Inc.

QP CERTIFICATE – WILLIAM VAN BREUGEL

To accompany the report entitled: NI 43-101 TECHNICAL REPORT ON THE PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT, BRITISH-COLUMBIA, CANADA, dated February 22, 2022 and with an effective date of January 11, 2022.

I, William van Breugel, P. Eng. of Saskatoon, hereby certify that:

a) I am an Associate Mining Engineer for SGS Canada Inc, with an office located at 931 Greaves Crescent, Saskatoon, Saskatchewan, Canada.

b) I graduated from the University of Waterloo in 1990 (BaSc (Hons). Geological Engineering). I am a member of good standing of the Association of Professional Engineers and Geoscientists of British Columbia (License #53342). I have worked as a mining engineer for over 31 years since my graduation from University. I have worked on precious metals, base metals, industrial commodities and diamond projects including mine operations and property evaluations. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

c) I have not conducted a site visit of the property.

d) I am an author of this report and responsible for sections 1.15, 1.17 to 1.19, 16.6, 16.7, 19, 21, 22, 25 and 26. I have reviewed these sections and accept professional responsibility for these sections of this technical report.

e) I am independent of Voyageur Pharmaceuticals Ltd. as defined in Section 1.5 of National Instrument 43-101.

f) I have had no prior involvement with the subject property.

g) I have read the definition of qualified person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of National Instrument 43-101.

h) As at the effective date of the technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

i) I have read National Instrument 43-101, Form 43-101F1 and confirm that this technical report has been prepared in accordance therewith.

Signed and dated this 22nd day of February 2022 at Saskatoon, Saskatchewan.

"Original Signed and Sealed"

William van Breugel, P.Eng.

QP CERTIFICATE – JOSEPH KEANE

To accompany the report entitled: NI 43-101 TECHNICAL REPORT ON THE PRELIMINARY ECONOMIC ASSESSMENT (PEA) FRANCES CREEK PROJECT, BRITISH-COLUMBIA, CANADA, dated February 2, 2022 and with an effective date of January 11, 2022.

I, Joseph M. Keane, P.E. of Tucson, Arizona do hereby certify that:

a) I am an independent mineral processing engineer consultant currently residing at 1061 W. Calle Santiago, Sahuarita, Arizona 85629 and I am an associate of SGS North America Inc., 3845 North Business Center Drive, Suite 115, Tucson, Arizona 85705.

b) I graduated with a degree of Bachelor of Science in Metallurgical Engineering from the Montana School of Mines in 1962. I obtained a Master of Science degree in Mineral Processing Engineering in 1966 from the Montana College of Mineral Science and Technology. In 1989, I received a Distinguished Alumni Award from that institution. I have worked as a mineral processing engineer for a total of 55 years since my graduation from university. I am a member of the Society for Mining, Metallurgy, and Exploration, Inc. (SME #1682600) and am a registered professional metallurgical engineer in Arizona (#12979) and Nevada #5462). I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

c) I have not visited the property.

d) I am an author of this report and responsible for sections 1.10, 1.13, 13, and 17. I have reviewed these sections and accept professional responsibility for these sections of this technical report.

e) I am independent of Voyageur Pharmaceuticals Ltd. as defined in Section 1.5 of National Instrument 43-101.

f) I have had no prior involvement with the property.

g) I have read the definition of qualified person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of National Instrument 43-101.

h) As of the effective date of this certificate, to the best of my knowledge, information, and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

i) I have read National Instrument 43-101, Form 43-101F1 and confirm that this technical report has been prepared in accordance therewith.

Signed and dated this 22nd day of February 2022 at Tucson, Arizona, USA.

"Original Signed and Sealed"

Joseph M. Keane, P.E., Consultant to SGS Bateman