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Ministry of Energy, Mines & Petroleum Resources
Mining & Minerals Division
BC Geological Survey

Assessment Report
Title Page and Summary

TYPE OF REPORT [type of survey(s)]: Geologic

TOTAL COST: $ 6,219

AUTHOR(S): Scott Allan

SIGNATURE(S): Scott Allan

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):

YEAR OF WORK: 2015

STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S): August 29th

PROPERTY NAME: BV

CLAIM NAME(S) (on which the work was done): BV (987363,857032,774243,857033)

COMMODITIES SOUGHT: Barite

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 094N002

MINING DIVISION: Liard

NTS/BCGS: 94N04E

LATITUDE: 59 ° 03 ' 53 " **LONGITUDE:** 125 ° 41 ' 43 " **(at centre of work)**

OWNER(S):
1) Fireside Minerals Ltd.
2)

MAILING ADDRESS:
Box 32069, West Bank, BC, Canada, V4T- 3G2

OPERATOR(S) [who paid for the work]:
1) Fireside Minerals Ltd.
2)

MAILING ADDRESS:
Box 32069, West Bank, BC, Canada, V4T- 3G2

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):
Barite, Hydrothermal, Stone Formation, Wokkpash Formation, Devonian, Stratabound

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: 07349, 01682

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TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for...)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying	6 Whole rock samples		450
Petrographic	2 Thin Sections		5,769
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST:	$6,219

Geologic Report

BV Claims
987363, 857032, 774243, 857033
Fireside Minerals

Liard Mining Division

N.T.S. 094N/04E

Work Centered at

Latitude 59° 03' 53" N Longitude 125° 41' 43" W

Report by:

Scott Allan

(G.I.T)

Nov 19th 2015

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Introduction;

In the Sentential range of the northern Rocky Mountains, lies one of the largest barite prospects in Canada. Located 6 kilometers north east of Muncho Lake. The BV deposit is the largest of three barite deposits in the area, known as the BV, Mun and Mo. The BV deposit is made up of a well-defined stratabound barite unit measuring a maximum of 30 meters in thickness grading 43.5 % $BaSO_4$. Non 43-101 complaint reserves have estimated the deposit at 100 million tonnes (Watson, 1967). The site was visited August 30th, 2015 by Andrew Allan and the Author. Six samples were taken and two thin sections were manufactured. The purpose of this field trip was to gain further insight on the deposits diagenetic history.

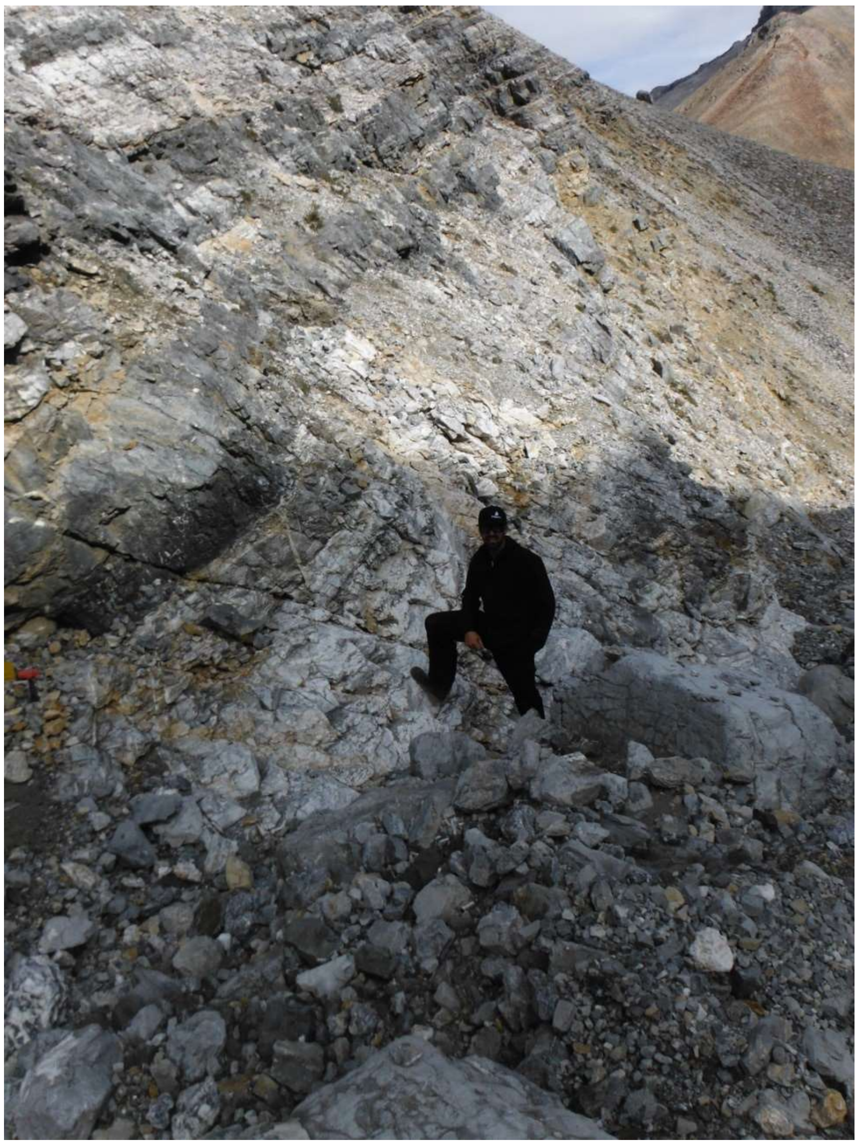

Figure 1, Meter Scale Barite bedding

Summary and Conclusions:

The BV deposits are considered a very large low grade source of barite that could supply barite market for numerous years. The deposit has been interpreted to be hydrothermal in origin, with the inspected outcrop indicating that the deposits estimate of 100 million tonnes is plausible. The largest exposure of barite is on McMechan creek, exposes a 30 meter unit with an average SG of 3.44 grading 43.5% $BaSO_4$. Excluding the inter-beds of dolomite the barite unit has a thickness of 16.4 meters with an average SG of 3.99 grading 65% $BaSO_4$. Previous inspections have shown that the barite unit pinches 13.2 meters over 915 meters of strike length. For this reason it has been interpreted by Dawson (1967) that barite unit pinches in all direction from the main exposure having a lensoidal structure.

Further work should be done on the old BV10 Claim adjacent to the McMechan Creek exposure, as topography here is gentler and favors open pit mining. Exploration drilling in this area would undoubtedly highlight mineable reserves and focus should be put on grade consistency and whether the deposits should be selectively mined to increase grade. Hurdles for this deposit do exist. The first being that it it is in a tributary of sulphur creek , the area is prized by hunters for it stone sheep populations and that currently there is no road access into the property.

Location and Access:

Located in the sentential range of the northern Rocky Mountains a tributary of Sulphur Creek, exposes outcrops of barite beds. Elevations of the claims range from 1200 – 1850 meters above sea level. This tributary dubbed barite creek is most easily accessible by helicopter. Helicopters can be chartered either from Fort Nelson or Watson Lake. The western edge of these claims straddle Muncho Lake provincial park boundaries. Access by foot or horse is discussed in assessment report 01682.A deactivated service road leads north from kilometer 658 of the Alaska Highway to a microwave tower. A route laid out by Watson 1979 to the BV Claims is 11 kilometers from this microwave tower and follows easy grades.

Figure 2, Turn off to microwave tower kilometer 658 Alaska highway

Claims:

The BV Claims are held by 4 claims blocks tenures, 774243, 857032 , 857033, 987363, these claims are held in good status by Fireside Minerals until May 19th 2016. Total area covered by these claims is 949 Hectares.

Tenure Number	Type	Claim Name	Good Until	Area (ha)
774243	Mineral	BV	20160519	16.6401
857032	Mineral	MUNCHO B	20160519	316.1903
857033	Mineral	MUNCHO C	20160519	416.0485
987363	Mineral	BV 2	20160519	199.7019

Total Area: 948.5808 ha

Originally the BV claims were held by 15 mineral tenures, a detailed map from AR 01682 shows there location.

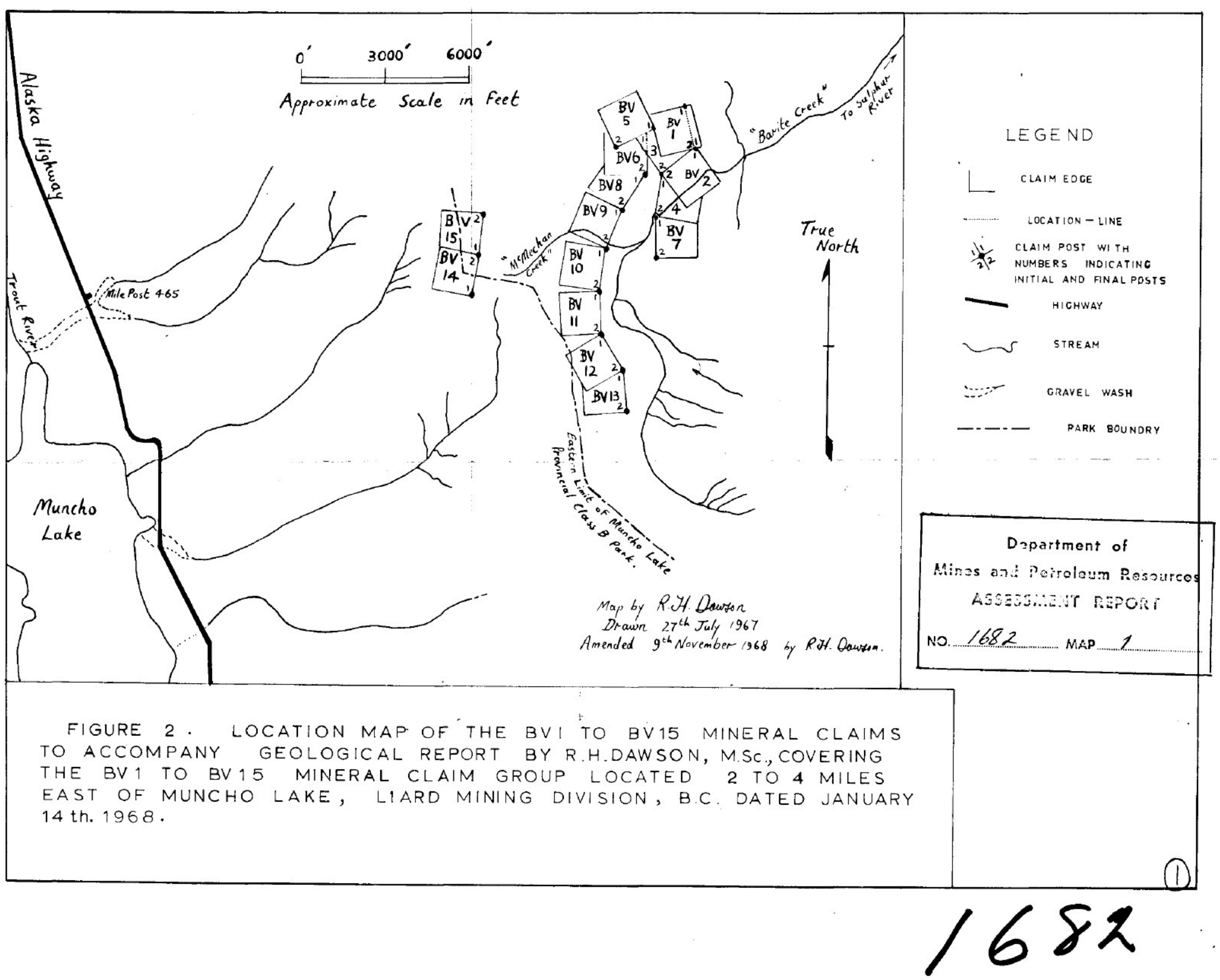

Figure 3, Taken from Assessment report 01682 m Claim Map

Local Geology and Mineralization;

Structure:

The BV Claims group is dominated by 4 geologic structures as identified by Dawson, 1967

1) Large asymmetric anticline with its western flank dipping at 37 degrees. The eastern limb dips much steeper and is possibly faulted. Gabbroic dykes are exposed in the core of the anticline.
2) Syncline with gentle dipping limbs, the western arm corresponds to the eastern arm of the large syncline 1)
3) McMechan creek thrust, distinct colour of the hanging wall and footwall make an easily identifiable thrust fault. The eastern limb of the of the syncline forms the hanging wall, the fault plane appears to be parallel to bedding.
4) Barite Creek Thrust – Wokkpash formation forms the hanging wall with the stone formation forming the footwall. Distinct colour makes it easily identifiable.

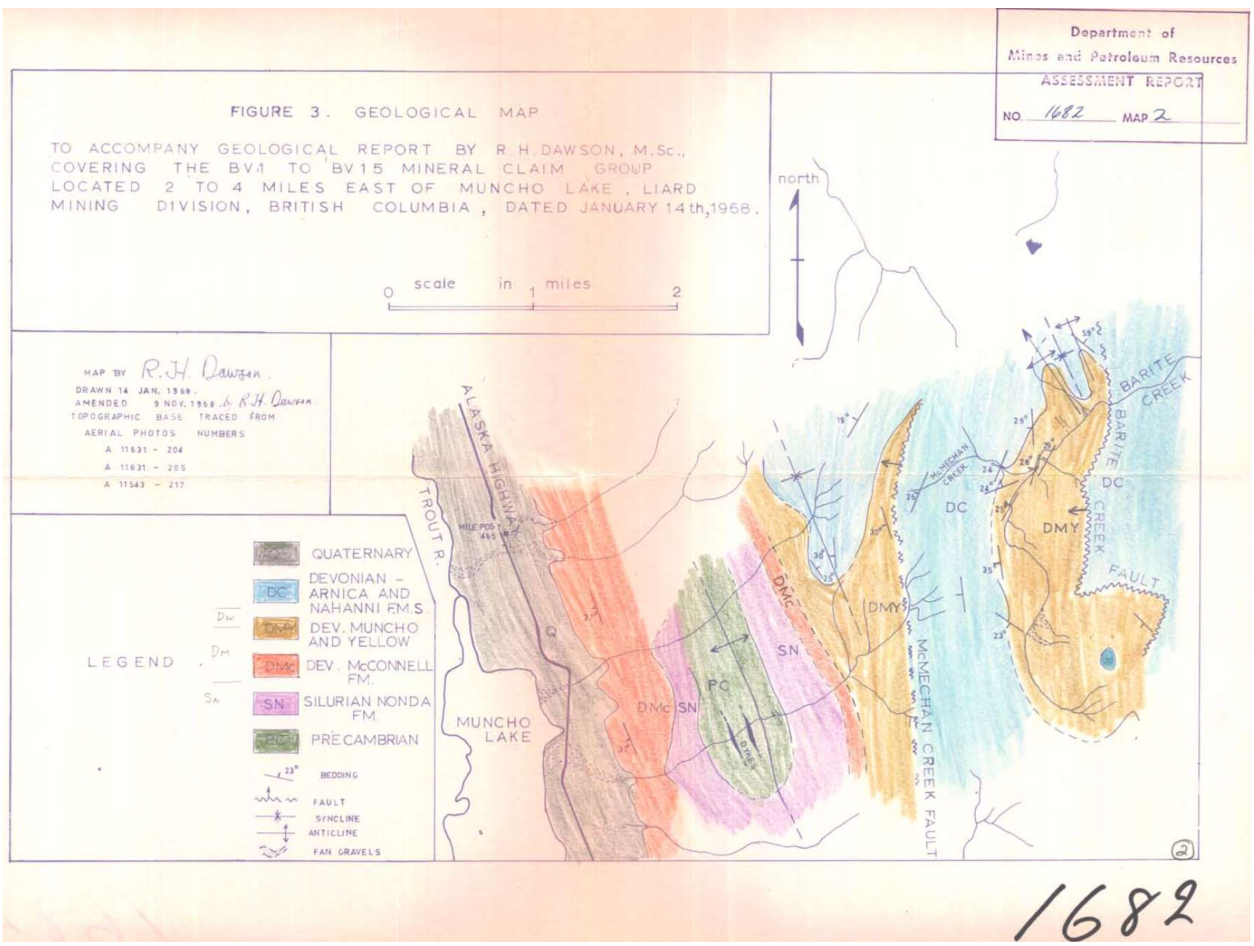

Figure 4 Taken from Assessment report 1682, note Devonian Arnica and Nahanni Formation have been reclassified as the stone formation and Dunedin respective

Stratigraphy:

Stone Formation: Lower Devonian

The stone formation is part of the bear rock sequence and is roughly 600 meters thick consisting of light colour fine to medium grained crystalline dolostone with breccia's (Stott , Aitken 1993). The top of the stone formation is transitionally conformable to the Dunedin formation. At its base it normally consists of sandstone that disconformably overlie the Wokkpash formation, these sandstone can be hard to distinguish from the Wokkpash formation (Stott , Aitken 1993) . It has been noted that basal barite lag deposits commonly form at the base of the stone formation (Stott, Aitken 1993). Locally, this unit is the most economically significant as it host the barite zone at its base. Two breccia's are common in the unit the first being, conformable tabular dolomites breccia that occur throughout the formation (morrow, 1975). The second type of breccia forms buttress structures cutting the overlying Dunedin formation which are these breccia's are composed of rubble and are associated with solution collapse (Stott, Aitken 1993).

Figure 5 Stone Formation - Dark Grey Dolmoite , note barite zone at base overlying the yellow Wokkpash formation

Wokkpash Formation: Lower Devonian

The Wokkpash formation consists of red-brown and yellow weathering sandstones and dolomitic sandstone provide a highly visible marker unit, for the overlying barite unit (Watson, 1979). This unit represents the top of the Delorme sequence and is considered to be a terminal formation of a regressive shoreline (Stott, Aitken 1993).

Figure 6 Wokkpash Formation note yellow and red beds

Mineralization:

An exposure on McMechan creek provide the easiest workable outcrops of barite. The exposure has a true thickness of 30 meters with 18 alternating beds of dolomite and barite overlain by a calcite breccia. The barite beds occur at the base of the stone formation and are controlled by their stratigraphy preserving original dolomite bedding. The entire unit dips at 26 degrees and is laterally extensive running for approximately 3900 meters before being folded and terminated by the barite creek fault to the north and pinching to the south (Dawson, 1967). Two outcrops are noted by Dawson in 1967, the first being McMechan creek visited on August 30th 2015, the second outcrop exposes 3.35 meters of barite and is located 914m south of the first outcrop and was not visited. The barite unit pinches 13 meters in 915 meter of strike length as such the deposit has been interpreted by Watson to have a lensoidal structure pinching in all directions, from the McMechan creek section. The barite itself is white massive and crystalline and appears to be free of iron staining and heavy metals the main contaminates appear to be dolomite inter-beds and calcite.

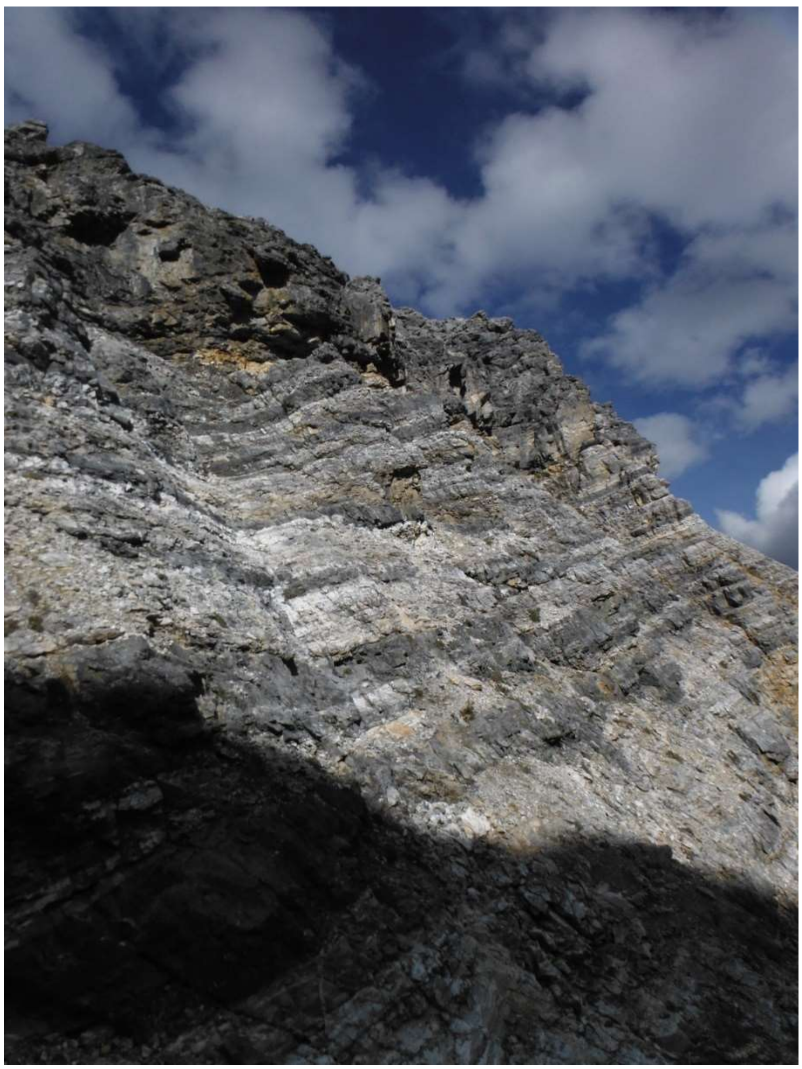

Figure 7 McMechan Creek section - note interbedding of white barite and dark grey dolostone, underlain by Wokkpash formation

Breccia unit;

Overlying the barite is a zone of strong brecciation. Dolostone is brecciated by calcite on the veins of calcite cut the unit on an mm to cm scale with clast ranging from 2 - 90 cms. This unit was thoroughly inspected by the author. It was found to be generally conformable to the barite unit, and tabular in nature. No barite was observed in this breccia unit, as suggested by previous reporting.

Figure 8 Breccia Unit

Results:

Six samples were taken from the McMechan creek cut, which exposes the entire barite unit on the old BV 9 claims. These samples were taken in-situ and submitted to Loring Labs in Calgary for whole rock analysis, specific gravity, and 30 element ICP including mercury. Two samples were split and selected for thin section analysis, BV-TS and BB-TS these samples were sent to Calgary Rock and Material Services of Calgary Alberta.

Sample Name	Sample Code	Type	Depth	Lithology	Mineralization / Description	Northing	Easting	Elevation	Zone	Datum
Top of Wokkapash	-	-	-	-	-	6550370	345136	1143	10	NAD 83
BV-1	-	Rock	Surface	Stone	Barite /Chalky White	6550362	345110	1154	10	NAD 83
BV-2	-	Rock	Surface	Stone	Dolomite / Tan	6550367	345123	1149	10	NAD 83
BV-3	-	Rock	Surface	Stone	Barite / Chalky White	6550363	345116	1153	10	NAD 83
BV-4	BB-TS	Rock/ TS	Surface	Stone	Breccia /Dark Grey Fragments seperated by calcite	6550359	345100	1161	10	NAD 83
BV-TS	-	Thin Section	Surface	Stone	Interbedded Barite Dolomite / chalky white with tan bands	6550371	345134	1144	10	NAD 83
BV-Chip Start	-	Chip	Surface	Stone	10 meter section of interbedded barite and dolomite	6550368	345131	1148	10	NAD 83
BV-Chip Finish	-	Chip	Surface	Stone	10 meter section of interbedded barite and dolomite	6550370	345136	1143	10	NAD 83
Loring Labs										
Sample Name	**S.G. g/cm3**	**BaSO4 %**	**LOI %**	**CaO %**	**SiO2 %**	**Cd ppm**	**Hg ppb**	**Sr ppm**	**Zn ppm**	**Pb ppm**
BV-1	4.41	97.58%	0.9	0.51	0.1	<1	10	1257	3	213
BV-2	2.88	8.14%	35.62	24.52	16.16	<1	-	551	18	157
BV-3	4.23	92.70%	2.84	2.2	0.45	<1	9	5167	7	18
BV-4	2.78	0.20%	44.5	43.55	0.86	<1	16	194	16	35
BV-TS	3.83	75.60%	10.31	9.25	1.58	<1	11	4755	1	18
BV-CHIP	3.97	77.80%	10.15	7.51	0.51	<1	12	1486	4	9

Table 1. Rock Samples

Samples See Cross Section Apppendix 1.

BV-1 – Grab sample taken from a barite bed, this sample was selected to gauge purity of barite

BV-2 – Was a grab sample from the dolomite interbeds to determine barite content of dolomite bedding

BV-3 – Grab sample taken from a barite bed, this sample was selected to gauge purity of barite

BV-4 – Also known as BB-TS was taken from the calcite breccia zone above the barite unit.

BV-TS – Was selected from the bottom of the barite bedding as it showed mm – cm scale barite bedding with dolomite interbeds making it suitable for study.

BV-CHIP –10 meter chip sample crossing 2 barite zones and 2 dolomite beds.

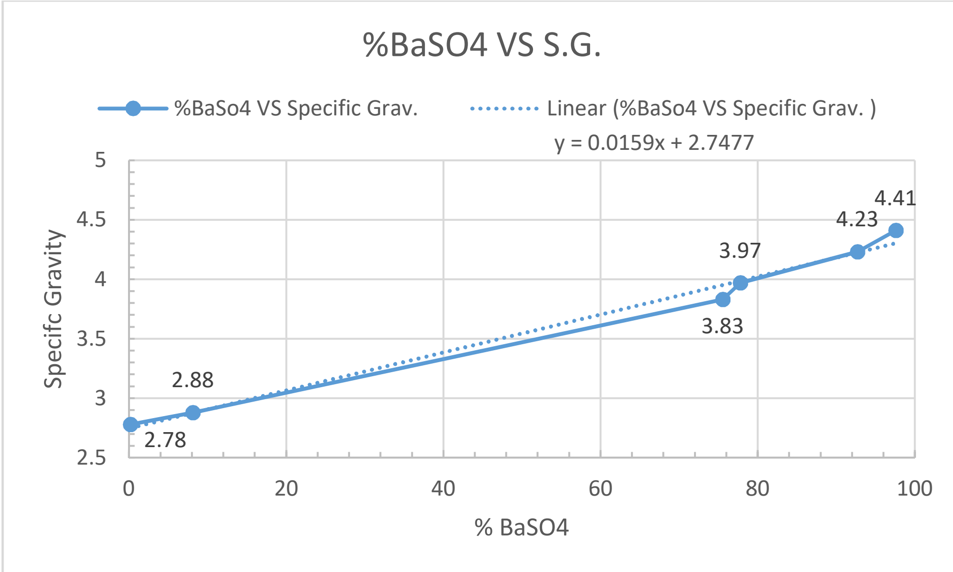

Figure 9. Interpreted results from Loring Labs

No attempt was made to systematically test the deposit during the field visit, due to time constraints. Dawson, 1967 systematically tested the deposits and listed his results in assessment report 1682. His results were interpreted using weighted averages, and data trends acquired from the Loring labs results. The entire barite zone exposed by McMechan creek has an average SG of 3.44 grading 43.5% $BaSO_4$ over 30 meters, the barite beds alone have an average SG 3.99, grading 78% $BaSO_4$ over 16.40 meters. The barites beds range in specific gravity from 3.45 – 4.24 g/cm^3, the main contaminant is determined to be dolomite and calcite fracture fills. Grab sampling results showed Pb values from 9-213 ppm, Zn 3- 18 ppm , Sr 551 – 5167 ppm with negligible Cd and Hg, making this barite suitable for drilling mud use. It appears that some barite exists in the matrix of the dolomite interbeds. Only one sample was taken from the calcite breccia zone this zone showed to only have 0.20% of the whole rock in barite. Further sampling would dictate but this horizon does not appear to have barite mineralization hosted with it as suggested in previous reporting.

Thin Section Analysis:

Dawson R.H. 1968 had speculated that the origin of the barite was secondary in nature as a replacement deposit, Similar to the famous magnet cove barium deposit of Arkansas. As bedded barite occurrences are uncommon in British Columbia but common in the state of Nevada as primary deposits. It was of interest to further determine the nature of origin. As such the production of two thin sections was commissioned to be interpreted by Calgary Rock and material services and the Author. A sample was selected near of the bottom of the unit that had multiple centimeter scale beds of dolomite and barite. This sample was selected as it provide ample opportunity to compare the nature of the barite beds to the dolomite. A second sample was selected from the "Barite – Calcite breccia" overlying the barite unit. As this unit represent an unconformable surface possible representative of a solution collapse breccia.

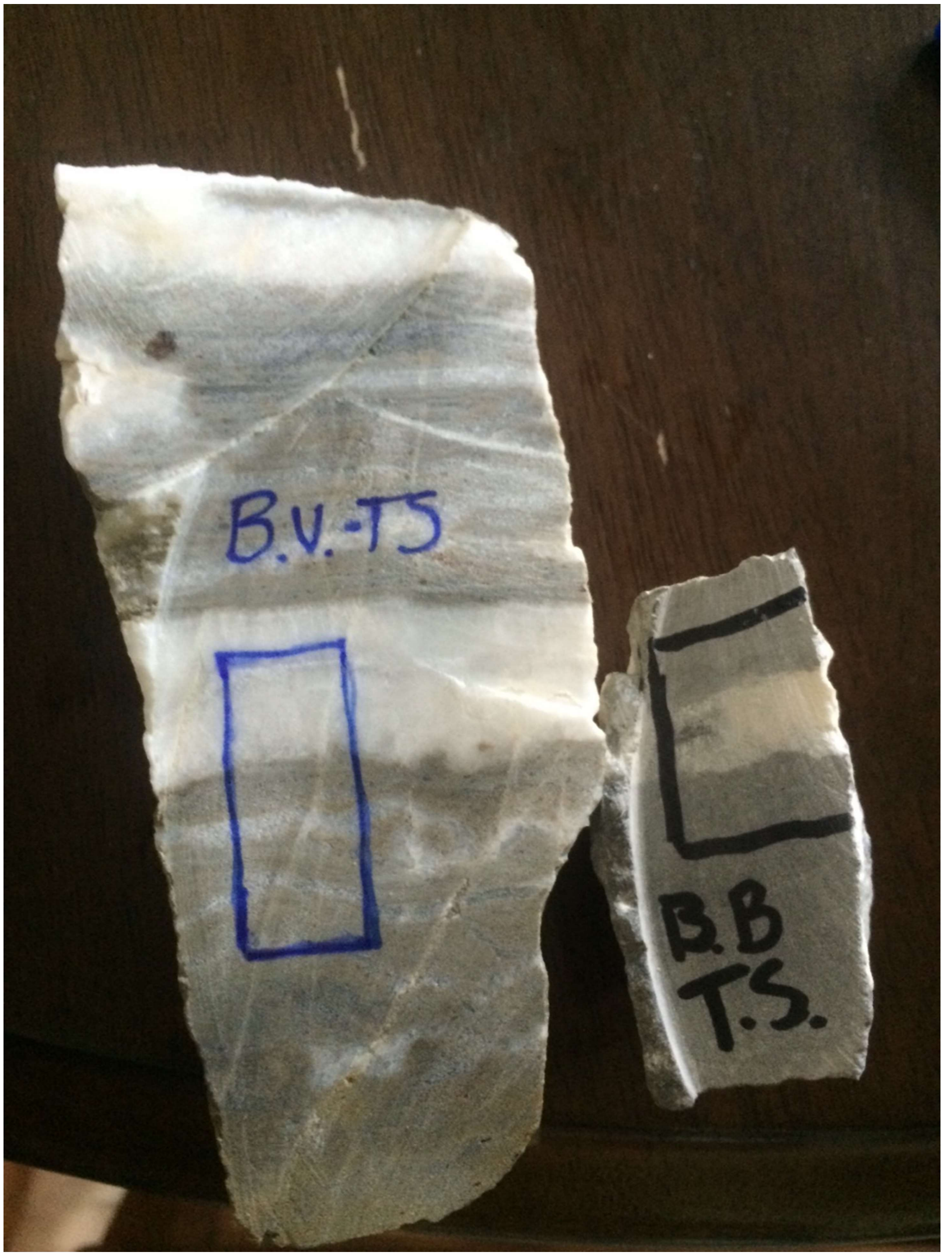

Figure 10 Samples submitted for thin section

Interpretation of thin sections;
A complete interpretation of the thin sections can be found in appendix 3. A summarized version of Cheung S. work will be offered here.

B.V.-TS

Primary Composition – Dolomite, Barite, Calcite, Quartz, and possible clay / fines.
Primary Texture – Planar bedding, composed of microcrystalline dolomite

In thin section four distinct morphologies of barite were identified by Cheung S. The first and theoretically significant is the existence of barite in the dolomitic matrix, as seen in figure 7. The barite is characterized as fine crystal laths organized pseudo-parallel to bedding. The euhedral nature of the barite crystals indicates primary deposition. The second is the most economically significant occupying approximately 1/3rd of the section and is characterized by as a coarse crystalline barite forming planar beds. These planar beds are made up of on lapping radiating fans of coarsely crystalline barite. These fans nucleate on the beds of dolomite and precipitate outwards, as seen in figure 8. Occasionally when these fans are observed they occur with a pin point crystalline matrix of barite. The third type of barite is present as fracture fills horizontal to bedding, it is important to note that vertical fracture are filled by calcite. Lastly a dolomite rhomb was found to be replaced by barite, this was the only example found on section and suggest that replacement is not the main method of mineralization, this can be seen in figure 9.

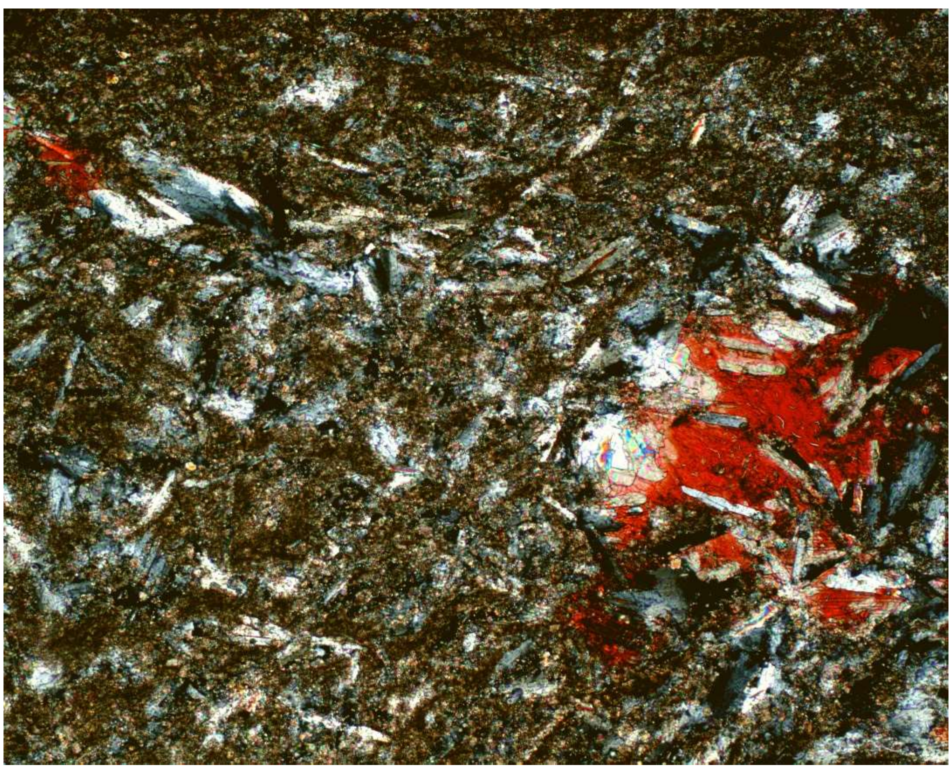

Figure 11. barite in matrix of dolomite bedding Vugs filled with calcite

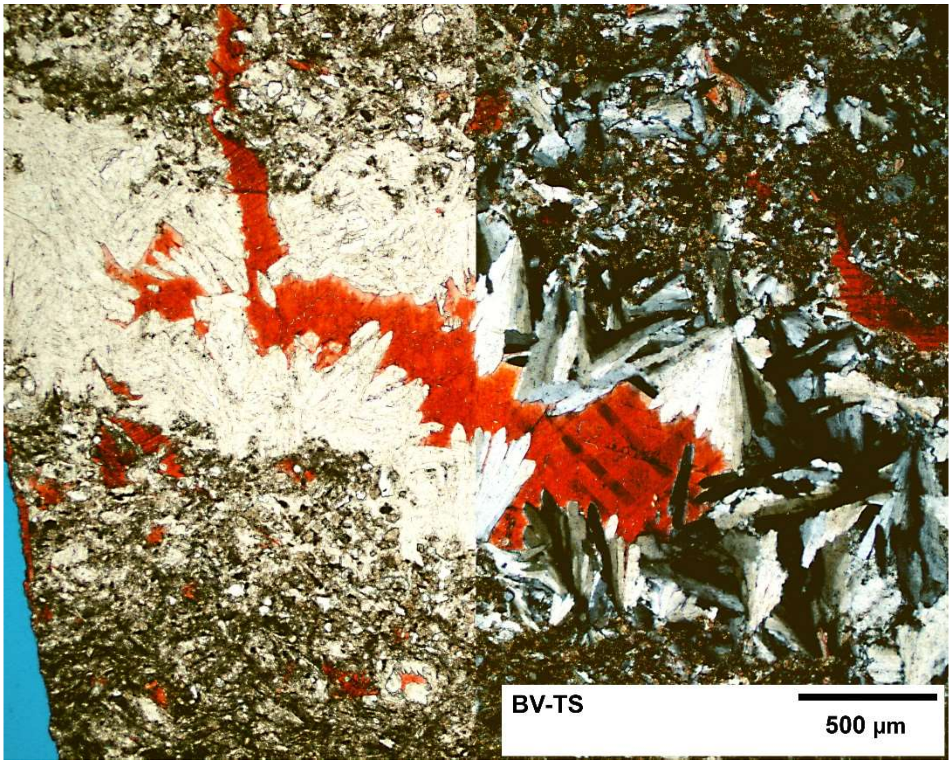

Figure 12. Hydrothermal barite fans - Red calcite fills remaining fracture porosity

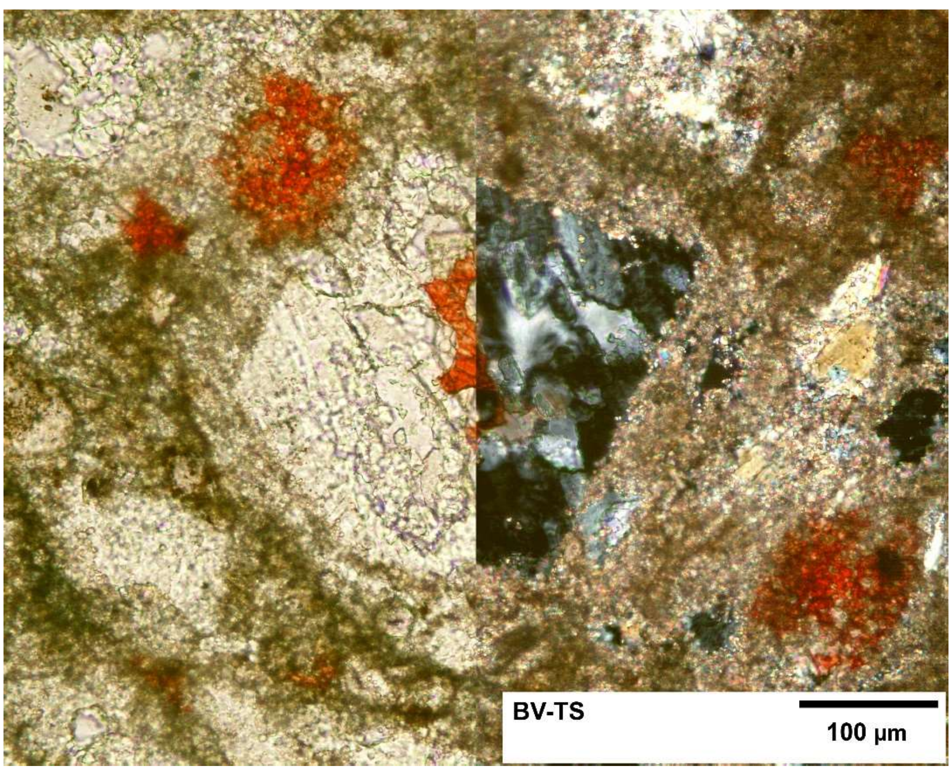

Figure 13 - Barite Replacement of dolomite rhomb

BB-TS

Primary Composition – Dolomite, Barite, Calcite, Quartz, and possible clay / fines.
Primary Texture – dolomitic breccia with fractures healed by calcite

Two prominent textures in the slide are dolomite rich matrix and non-planar very fine crystals. The non-planar very fine crystals are anhedral to euhedral and would have been associated with micro porosity and fracture porosity that has now been infilled by calcite as seen in figure 10. The second texture is the microcrystalline dolomite fabric containing dark fossil fragments, quartz grains, and calcite and barite fragments. Some of the barite fragments have been leached and the ghost forms are replaced by calcite cement, this can be observed in figure 11. The large calcite infilled fracture is infilled with of coarsely crystalline calcite.

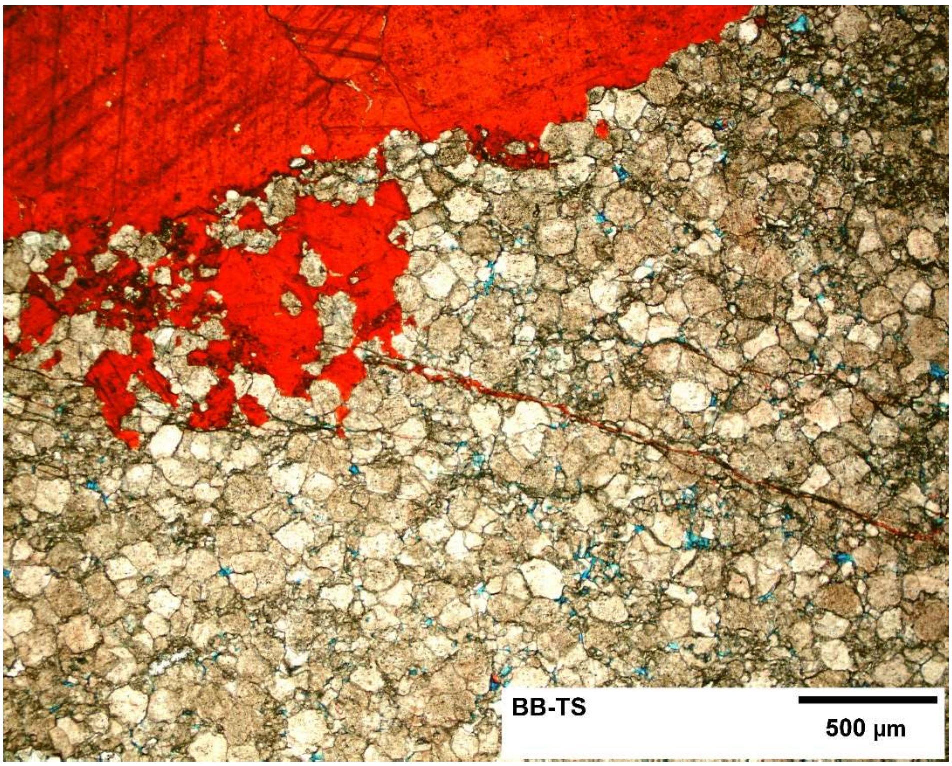

Figure 14. Overview of TS - Note red calcite filled fracture, blue micro porosity and non-planar texture of anhedral subhedral crystals

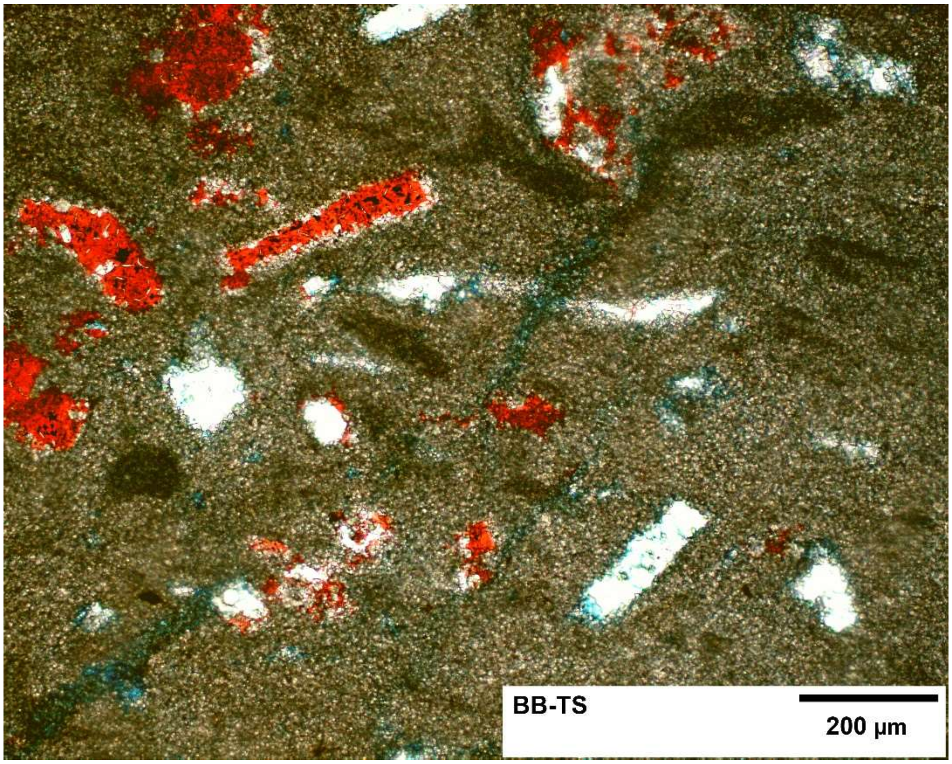

Figure 15 Matrix of sample, note white rectangular laths of barite some of which have been leached and infilled with calcite

Barite Origin:

There are three strata-bound deposits found in the area, known as the BV, Mo and Mun. Although time was only spent at the BV deposits it is of no doubt to the author that these deposits represent one ore body that has been structurally repeated. Petrographic examination of the BV has identified Euhedral laths of barite in the dolomite matrix in the dolomite beds, suggesting primary deposition with the dolomite. This highlights that during the Devonian the seas were enriched in barium. This enrichment in barium allowed for seawater sulphate to bond with the barium, to deposits barite in the stone formation. To the west of the stone formation the road river group is stratigraphically equivalent. This group is well-known geologic unit of the Selwyn basin and Kechika trough. These basins are known for their massive reserves of lead zinc in SEDEX deposits. SEDEX deposits form in extensional environments from hydrothermal vents near oceanic trenches. These vents driven by mantel plumes spew out lead, zinc and barium onto the seafloor. Chemically once the barium has travelled out of the reduced environment of the SEDEX, deposit barite can precipitate out. Majority of the precipitating barite forms caps, on top of large lead zinc reserves, a great example of this can be seen on Mount Alcock. But the remaining becomes available for deposition with oceanic sediments, possibly being transported to distal shore line's to form the lag deposits noted by Stott and Aitken.

The second mode of barite is of economic interest and is primarily hydrothermal in origin. The hydrothermal origin can be deduced from figure 8. Where coarsely crystalline barite fans precipitate outwards to fill fractures between bedding, these crystal fans would need sufficient space, time and heat to allow for their formation consistent with a hydrothermal origin. Barite would have been forced in to solution along with calcite during diagenesis and orogeny eventually an over pressurisation in formation would have caused a fracking in the formation to propagate the dolomite beds apart and allow for a slow cooling to form the euhedral crystals.

This hydrothermal fracking is also thought to be responsible for the overlying calcite breccia unit, which slightly postdates the barite formation. The breccia unit is not thought to be of solution collapse as suggested by previous authors (blank MUN report) as the unit does not appear to cross cut stratigraphy and is tabular in nature generally conforming to the strike and dips over overlying and underlying units. In the vicinity of the BV deposit barite was not noted in the calcite breccia zone, as suggested by previous reports. Perhaps in the other deposits such as Mo and Mun the fracking force was not as great and did not create sufficient room for the barite to crystalize out in the pseudo beds and instead it crystallized out in the breccia unit above.

The BV deposit is in essence not a true bedded barite deposits as seen in Nevada. Barite beds show bioturbation in Nevada providing excellent evidence of primary deposition (USGS) . The replacement origin of barite is in essence incorrect as petrographic examination, showed very little remnants of overprinting so a replacement origin cannot be concluded as correct. It is instead determined that the barite deposits in the area are of hydrothermal origin with hydrothermal fluids exploiting bedding planes, to create pseudo-beds. The barite enriched fluids are intraformational coming from distal Sedex emplacement.

Discussion:

Original estimations place the BV deposit at 90 million tonnes of barite (Hlavay 1970). Examination by the author can contest to this estimate. The deposit is by all means is lensoidal, and in sense should pinch in all directions, if the assumption that the BV, MO and MUN are a one structurally repeated geologic body than it can be assumed that the BV deposit has a great extent down dip. As noted by Dawson (1967) the BV 10 claims have the gentler topography and would favor open pit mining. This has been confirmed by the author exploration drilling should focus in these area. This area of the deposit would be relatively easy to explore because the talus slope would allow for drill placement exposed on the old BV 10 claims. Scissor pads should be drilled utilizing a 26 degrees hole to intersect parallel to bedding and vertical holes should be used to quickly identify. Hlavay (1970) has estimated the depth of talus is assumed to be 10 meters. This program would have to be helicopter supported, an airstrip across from the muncho lake lodge could possibly be utilized as a staging area for exploration programs.

Although no systemic sampling was carried out by the author, grab samples were taken and shown to be of a much higher grade than noted by Dawson (1967). Using weighted average of chip sampling results the overall barite zone is 16.40 meters with an SG of 3.99 equivalent to 65% $BaSO_4$. Exploration drilling should attempt to determine how grade varies along dip and whether the deposit should be selectively mined to increase quality of ore. In recent years barite has been imported from overseas and in general world barite supplies are depleting resulting in API spec barite being lowered from an SG or 4.2 to 4.1. Another lowering of API specification is expected to 4.0, as this grade is already being imported from overseas.

Preliminary engineering showed that the BV 10 claims have 1.25 million tonnes can be recovered at a stripping ratio of 1.4:1 (Hlavay , 1970). However there a major hurdles for this deposit to overcome, primarily market access. Located 11 kilometres from a deactivated fair weather road significant road building would be needed. In a preliminary engineering report from 1970 it was estimated that the cost of building an all-weather road from the microwave tower would be $265,000 CAD, today that equates to a 1.6 million dollar road (Hlavay, 1970). The area is also popular with hunting outfitters, two notable outfits are Stone Mountain Safaris and Folding Mountain Outfitters. These outfitters are likely to create a push back on notice of work submitted to the ministry. Potentially an answer to their timing concerns would be to minimize exploration effort to a limited window of mid-July to mid-August. Finally the deposits is in a tributary of sulphur creek, it would be expected that significant regulations would be required to minimize impact to the water shed and surrounding environment.

Recommendations:

1) Further exploration should be done in the area by mapping the Wokkpash formation, as this formation marks the barite unit, it may be possible to find new showings by using the Wokkpash as a marker.
2) Dependent on further mapping and sampling, an exploration drilling program should be carried out to test ore quality down dip on the old BV 10 claims. 12 drill holes from 6 pads would be sufficient to highlight the proposed mining area. These drill holes would include one hole at 26 degrees of dip and another at 90 degrees.
3) The MO claims should be thoroughly inspected and evaluated, to gather further insight on the origin and diagenesis of the barite unit.

Cost Statement

Scott Allan – Geologist in training	
Field Days - .5 * $450 / day	$ 225
Helicopter – 2.5 hrs * 1000 / hr	$ 2500
Report Preparation	$ 2000
Mapping	$ 500
Andrew Allan – President Fireside Minerals	
Field Days - .5 * 700/day	$ 350
Samples	
Rock Samples for Assay – 6 x $75	$ 450
Thin Section Preparation -	$ 94
Thin Section Description -	$ 600
Total Expenditure -	$ 6219

Statement of qualifications:

I, Scott Allan, geologist, with business address of box 32069 Kelowna BC, V4T 3G2 and residential address of 250 Jarvis bay drive Alberta, T4S 1R8 certify that,

I have obtained a Bachelor of Science degree from the University of Calgary in 2013
That I am a registered geologist in training with Alberta Professional Engineers and geoscientist association (APEGA, member # 116181)
From 2010 to present I have been involved in Production and Exploration for Fireside Minerals Ltd.
I have personally participated in field acquisition of data and data interpretation.

Scott Allan

References:

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Geologic Report on the Mun 1 & 2 Claims, Muncho Lake Area, Liard Mining Division, Assessment report 7349, 16 pages, 1 map , 2 cross sections

Hlavay J F, 1970

Preliminary engineering report, Muncho Lake Barite Deposit, Liard Mining Division, Assessment report 3078, 30 pages , 3 maps,

Dawson R.H, 1968

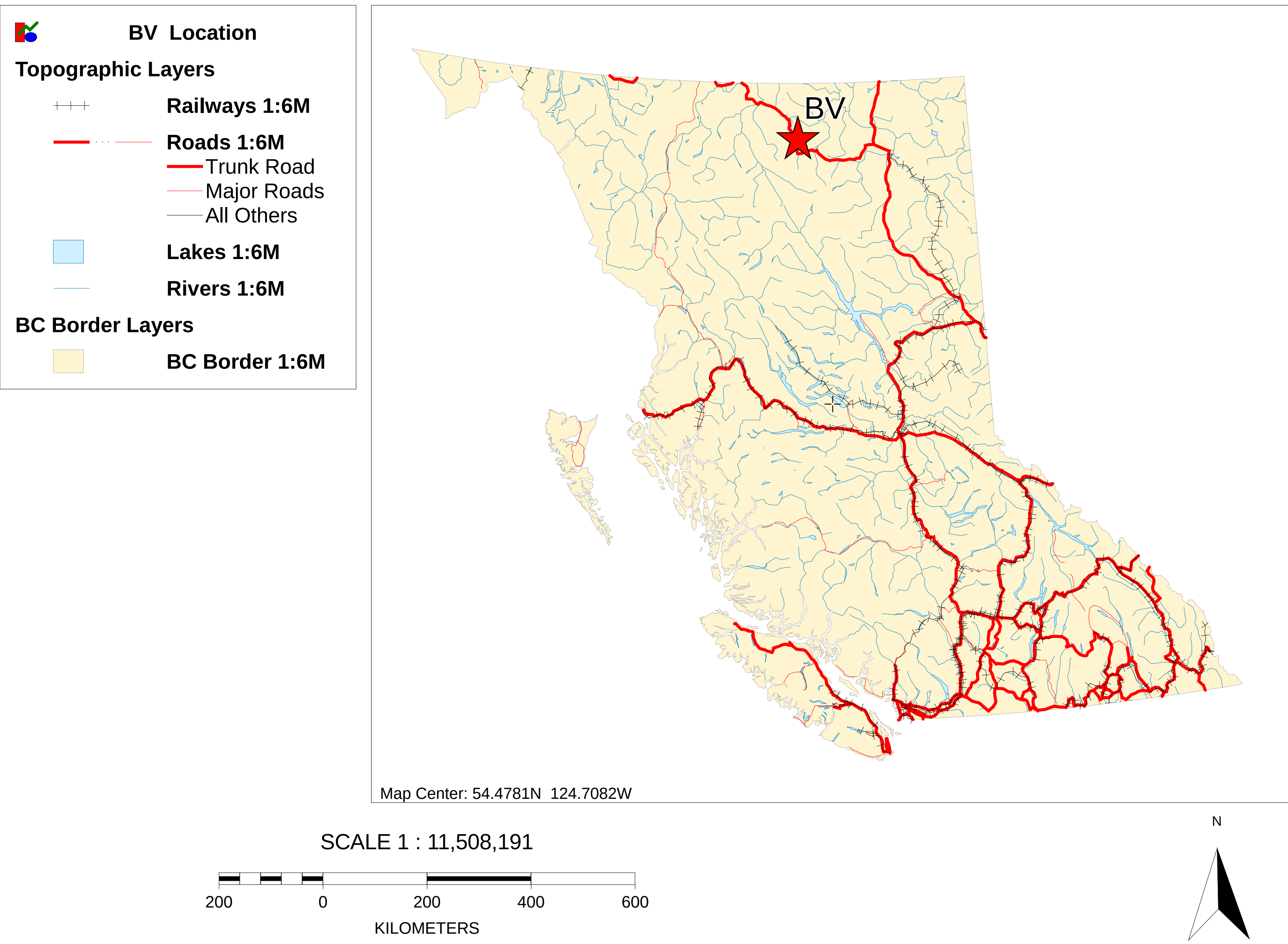
Geologic Report Covering BV 1 to BV 15 Mineral Claims, Liard Mining Division, Assessment report 01682, 28 pages, 8 photos, 2 maps.

Stott, D F; Aitken J D, 1993

Sedimentary Cover of the Craton in Canada, Natural Resources Canada, Page 165, 169

APPENDIX 1

BV Location Map



BV Claim Map

Mineral Titles Layers

BV Tenure

All Mineral Tenures

Topographic Layers

Railways 1:20K

Roads 1:20K

Gravel Road

Paved Road

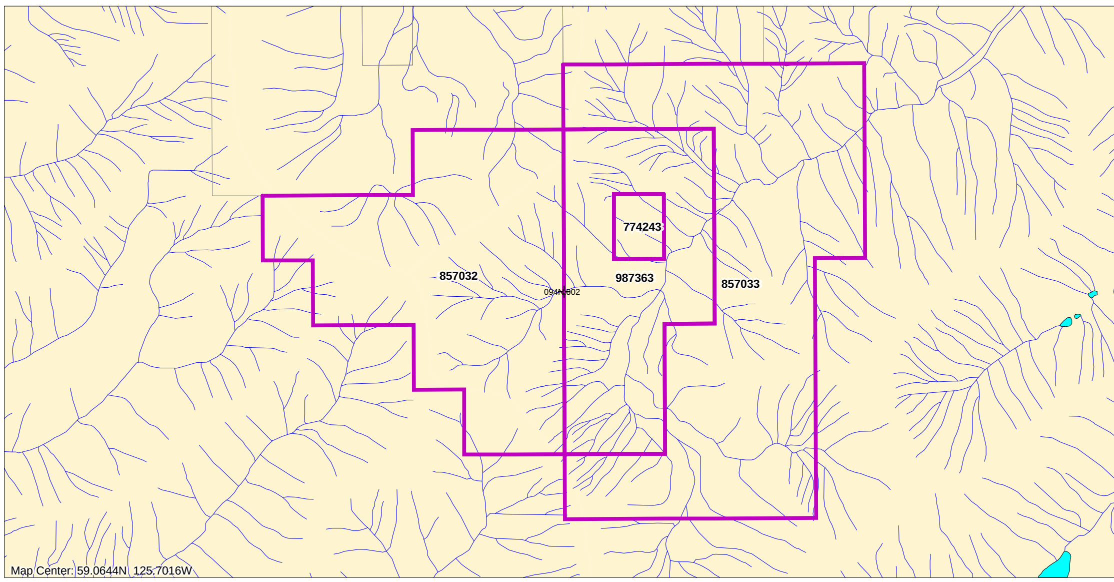
Rough Road

Lakes 1:20K

Rivers 1:20K

Grid Layers

Grid 1:20K - labels

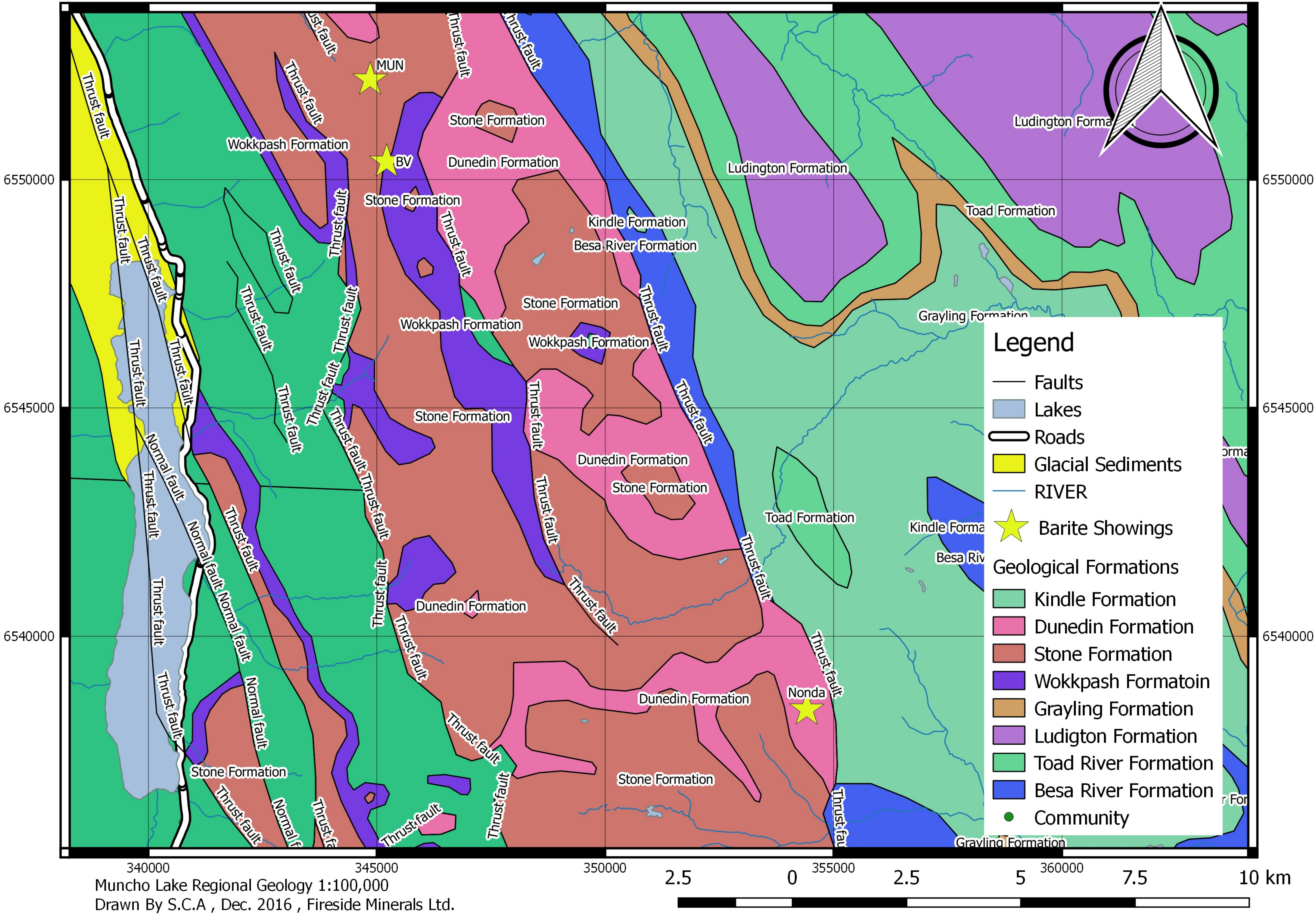


SCALE 1 : 54,043

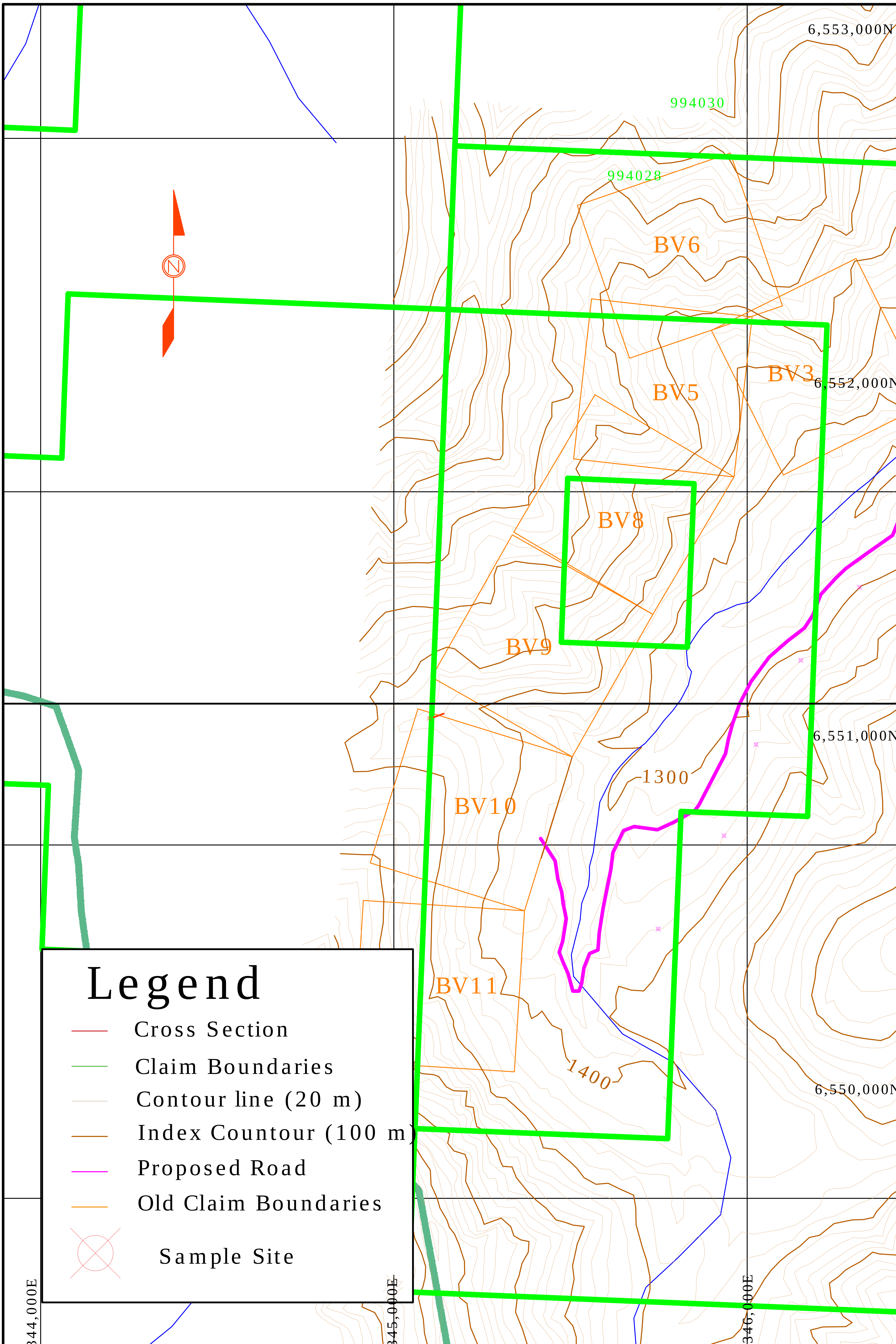
1 0 1 2 3

KILOMETERS

N



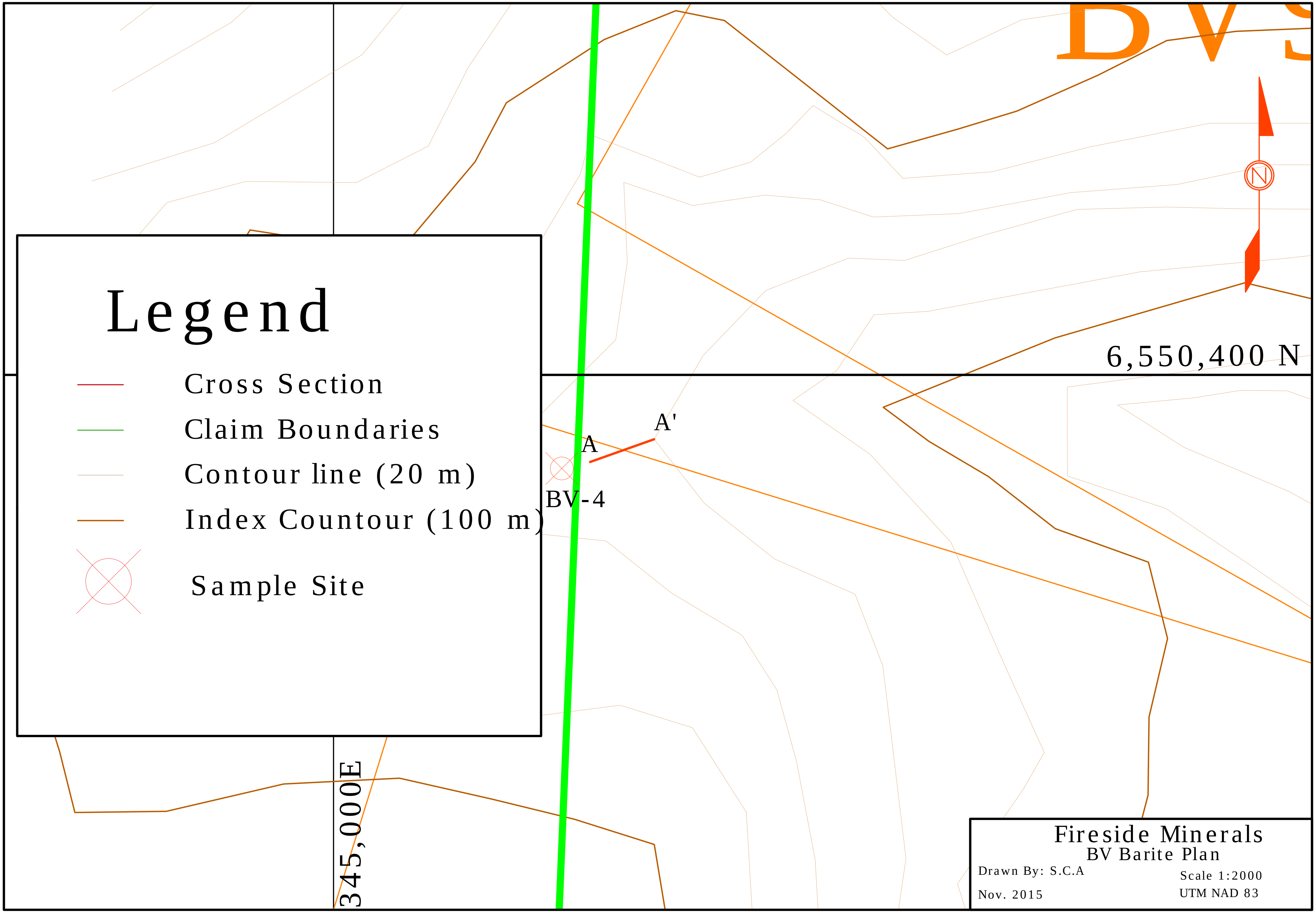
Muncho Lake Regional Geology 1:100,000
Drawn By S.C.A , Dec. 2016 , Fireside Minerals Ltd.



Drawn by EWC
Date December 2012
Revised by SCA , December 2015

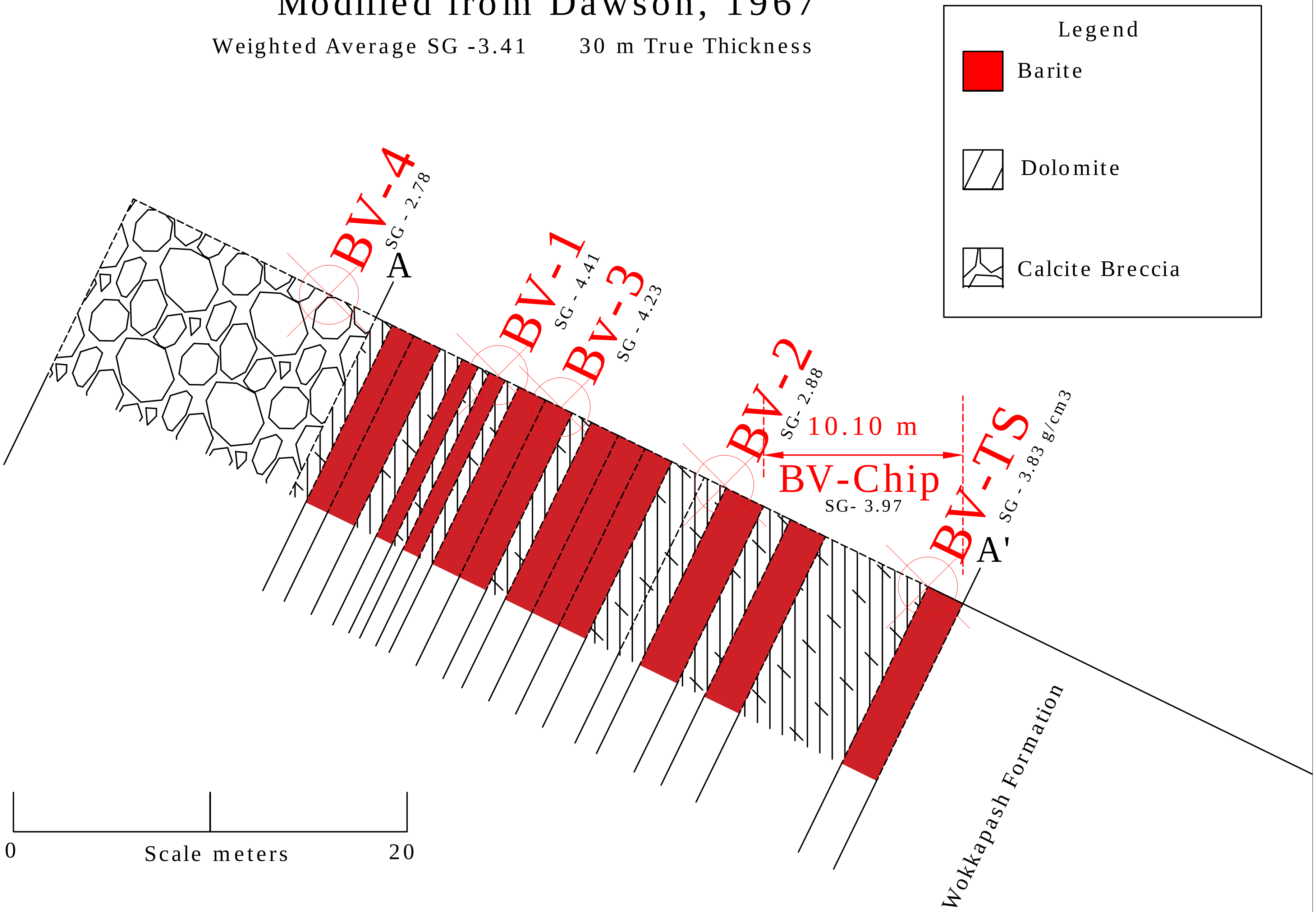
FIRESIDE MINERALS
Muncho Lake Barite
Plan

Scale 1 : 10,000
Ref: NAD 83 UTM
Scale 0m 500m


BVS
Legend
Cross Section
Claim Boundaries
Contour line (20 m)
Index Countour (100 m)
Sample Site
6,550,400 N
345,000E
A
A'
BV-4
N
Fireside Minerals
BV Barite Plan
Drawn By: S.C.A
Nov. 2015
Scale 1:2000
UTM NAD 83

Exposed Barite Zone Creek Cut
Modified from Dawson, 1967

Weighted Average SG -3.41   30 m True Thickness

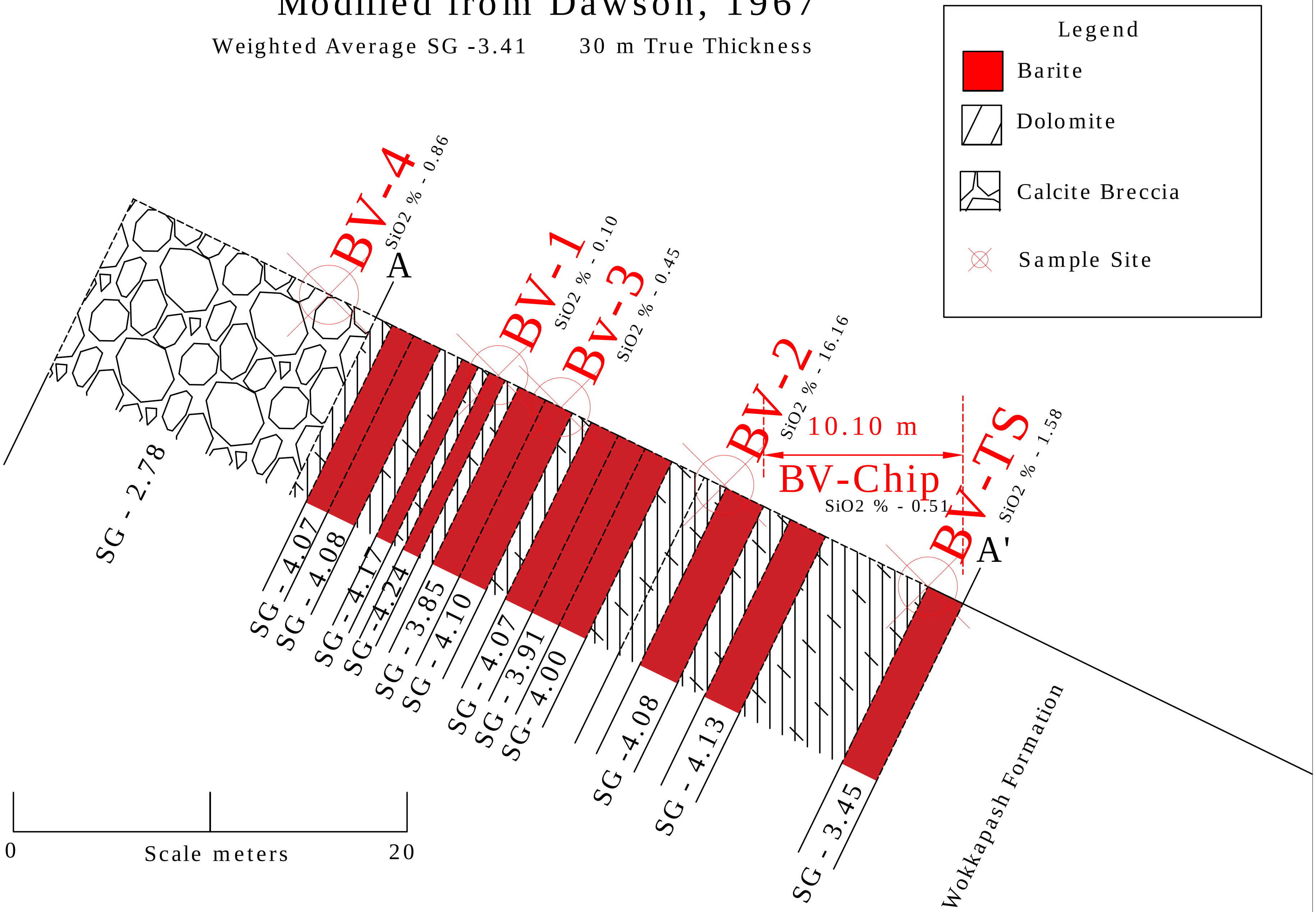


Drawn By S.C.A , SG (specific gravity) - g/cm3

Exposed Barite Zone Creek Cut

Modified from Dawson, 1967

Weighted Average SG -3.41 30 m True Thickness

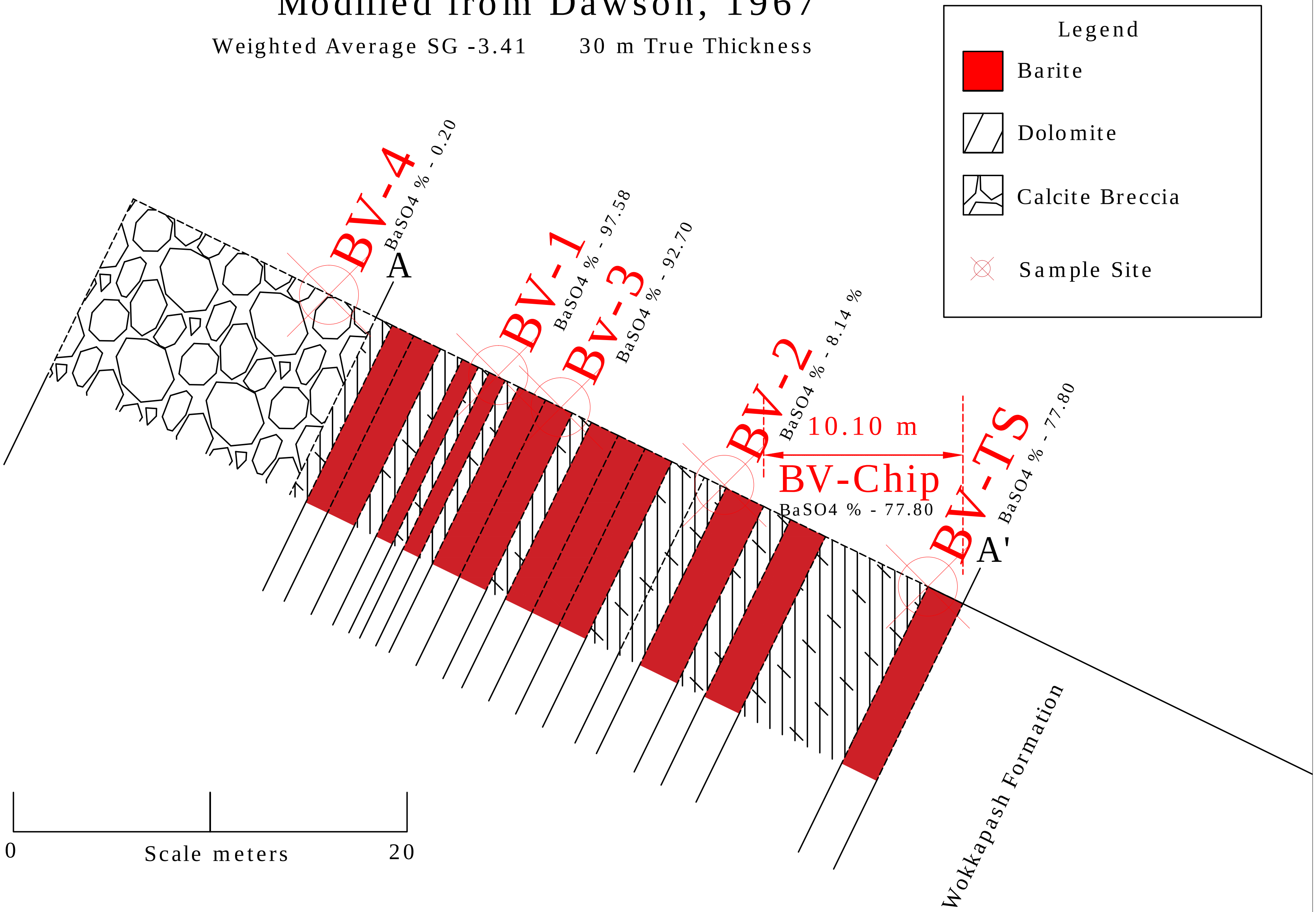


Drawn By S.C.A , SiO2 %

Exposed Barite Zone Creek Cut

Modified from Dawson, 1967

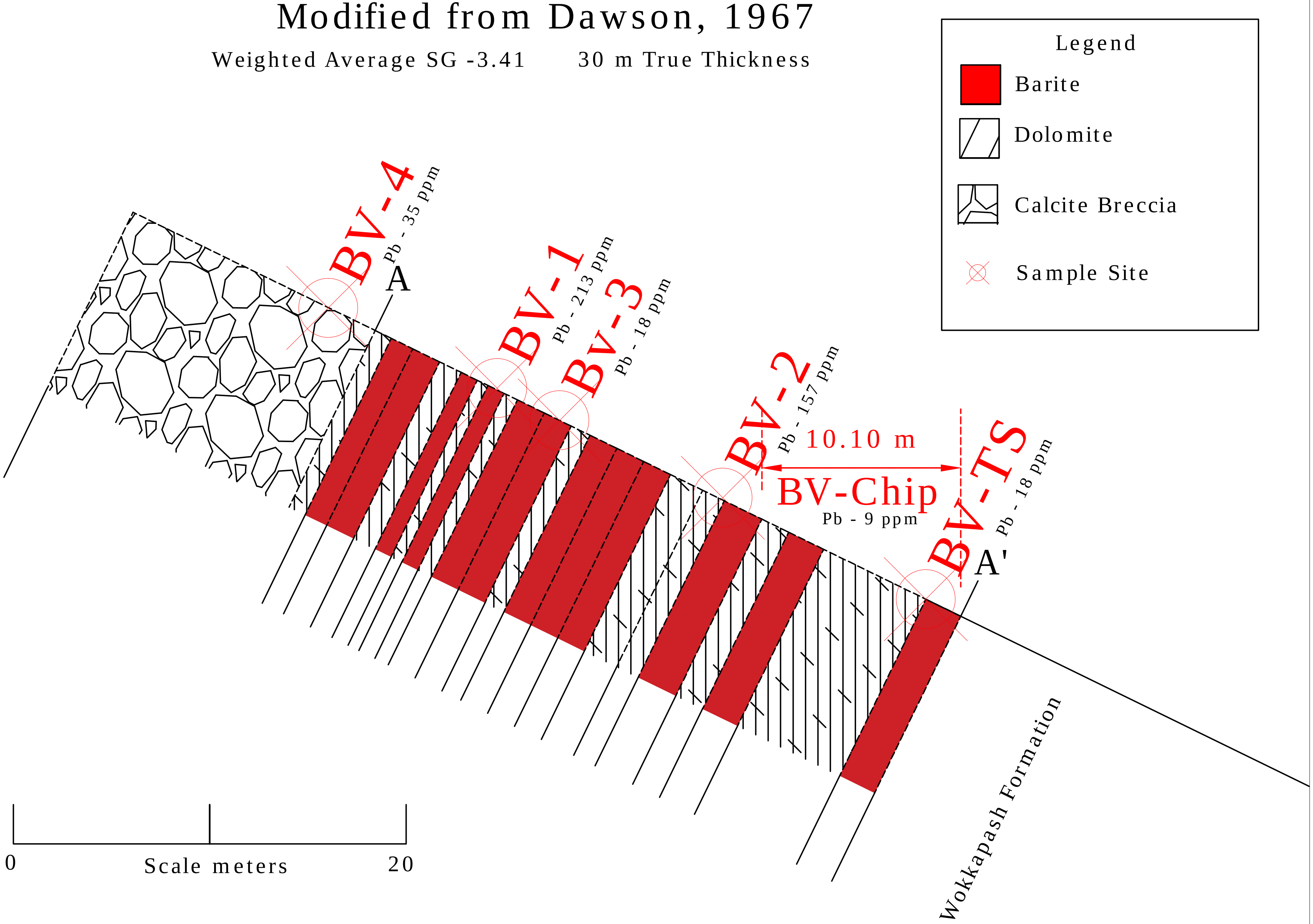
Weighted Average SG -3.41 30 m True Thickness



Drawn By S.C.A , BaSO4 %

Exposed Barite Zone Creek Cut
Modified from Dawson, 1967

Weighted Average SG -3.41   30 m True Thickness

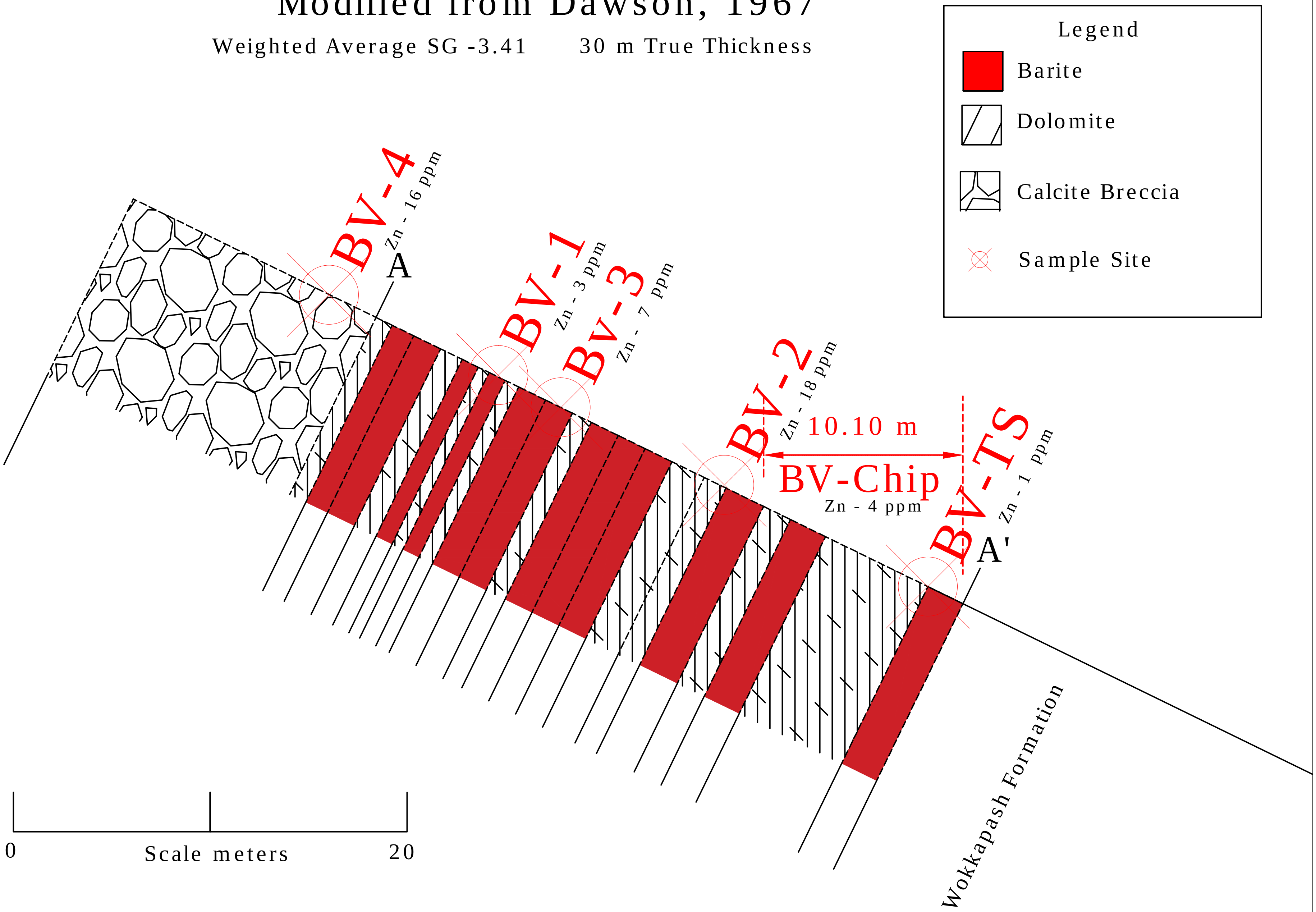


Drawn By S.C.A , Pb ppm

Exposed Barite Zone Creek Cut

Modified from Dawson, 1967

Weighted Average SG -3.41   30 m True Thickness

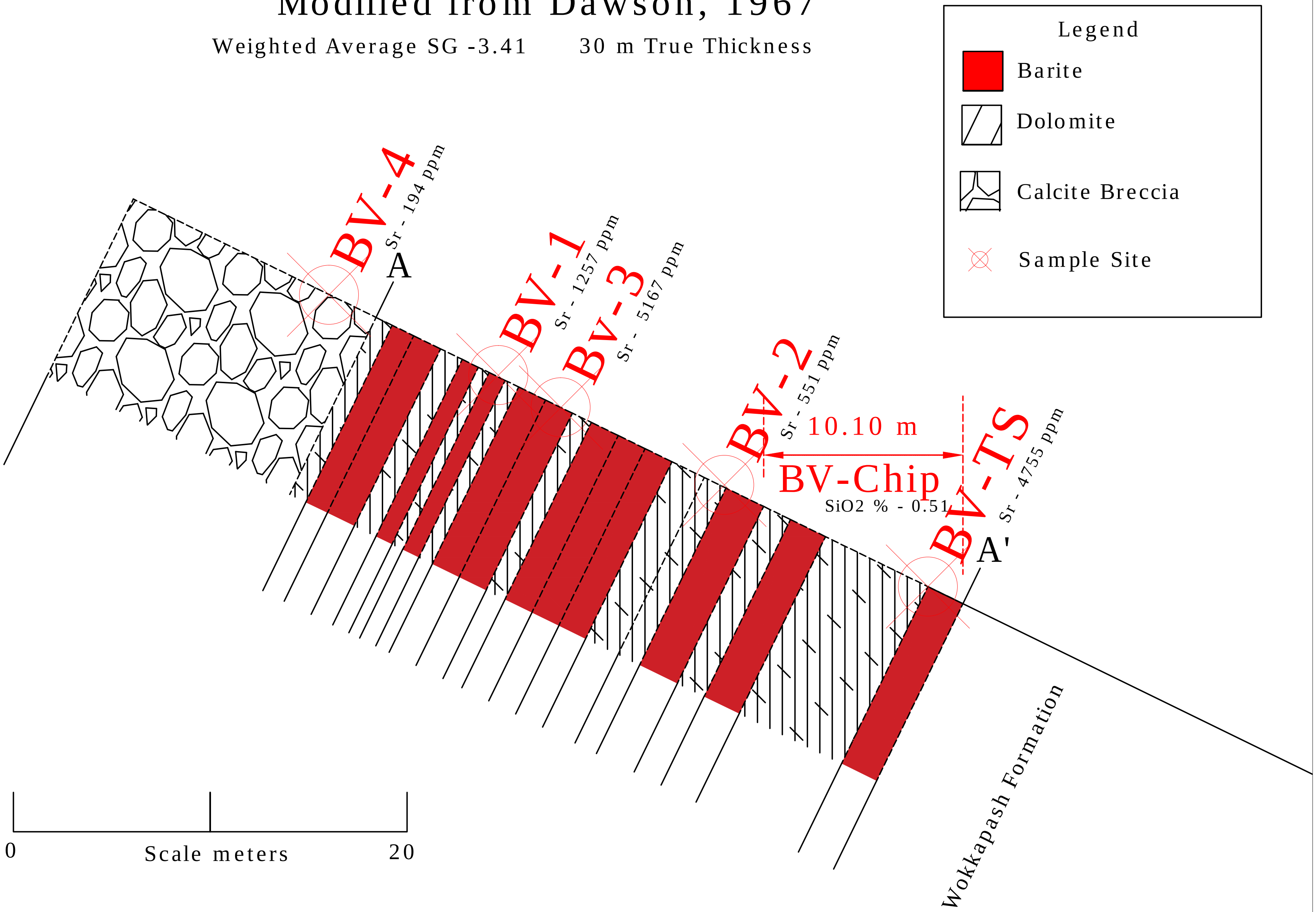


Drawn By S.C.A , Zn ppm

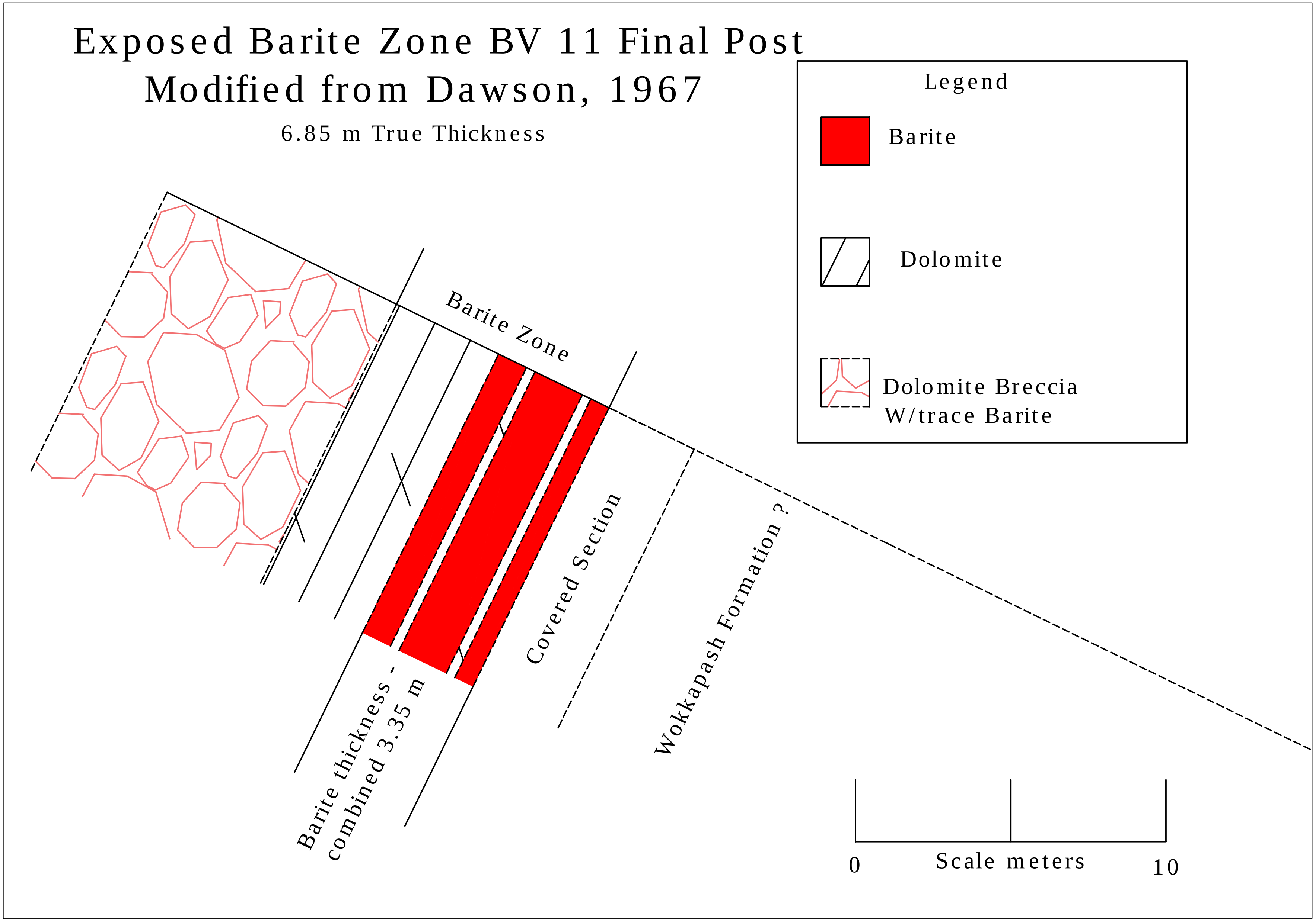
Exposed Barite Zone Creek Cut

Modified from Dawson, 1967

Weighted Average SG -3.41 30 m True Thickness



Drawn By S.C.A , Sr ppm


Exposed Barite Zone BV 11 Final Post
Modified from Dawson, 1967
6.85 m True Thickness
Legend
Barite
Dolomite
Dolomite Breccia
W/trace Barite
Barite Zone
Covered Section
Wokkapash Formation ?
Barite thickness -
combined 3.35 m
0
Scale meters
10

APPENDIX 2

LORING LABORATORIES (ALBERTA) LTD.
629 Beaverdam Road N.E. Calgary, Alberta T2K 4W7
Tel : (403) 274-2777 Fax : (403) 275-0541
Email: loringlabs@telus.net www.loringlabs.net
ISO 9001:2008 Certified

FILE: 5 8 9 2 4

TO: Fireside Minerals
Box 32069 West Bank BC
V4T 3G2

DATE: September 22, 2015

Sample: Pulp

Attn: Scott Allan

Certificate of Assay

Sample No.	% BaSO4	S.G.	ppb Hg
"Assay Analysis"			
BV-1	97.58	4.41	10
BV-2	8.14	2.88	--
BV-3	92.70	4.23	9
BV-4	0.20	2.78	16
BV-TS	75.56	3.83	11
BV-Chip	77.80	3.97	12

Methodology: Specific Gravity by le Chatelier SG bottle.
BaSO4 by wet chemistry gravimetric method.

Sample received on Sept. 11, 2015

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples:

Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

FORM ASYC-015

ISO9001:2008 Certified

Loring Laboratories (Alberta) Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 403- 274-2777 Fax: 403-275-0541
loringlabs@telus.net

FILE: 5 8 9 2 4

TO: Fireside Minerals
Box 32069 West Bank BC
V4T 3G2

DATE: September 22, 2015

Sample: Pulp

Attn: Scott Allan

30 ELEMENT ICP ANALYSIS

Sample No.	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P %	Pb ppm	Sb ppm	Sr ppm	Th ppm	Ti %	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
BV-1	<0.5	0.02	1	133	>10000	<1	0.36	<1	<1	2	<1	0.02	0.00	2	0.17	4	<1	0.02	<1	0.00	213	<1	1257	<1	0.00	10	<1	<1	3	2
BV-2	<0.5	0.05	1	1103	>10000	1	17.52	<1	<1	36	<1	0.06	0.01	3	8.38	38	<1	0.23	<1	0.00	157	<1	551	1	0.00	8	1	2	18	10
BV-3	<0.5	0.13	<1	118	>10000	1	1.57	<1	<1	2	<1	0.04	0.03	6	0.25	15	<1	0.01	<1	0.00	18	<1	5167	<1	0.00	<1	1	<1	7	1
BV-4	<0.5	0.19	1	2110	>10000	3	31.12	<1	<1	11	<1	0.06	0.05	3	5.25	206	<1	0.13	2	0.00	35	<1	194	1	0.00	4	2	1	16	22
BV-TS	<0.5	0.26	<1	111	>10000	1	6.61	<1	<1	9	<1	0.09	0.09	5	1.07	69	<1	0.02	<1	0.00	18	<1	4755	1	0.01	6	3	1	10	2
BV-Chip	<0.5	0.12	1	109	>10000	<1	5.37	<1	<1	7	<1	0.06	0.04	2	1.84	27	<1	0.01	<1	0.00	9	<1	1486	1	0.00	4	2	1	4	2
Blank	<0.5	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<0.01	<0.01	<1	<0.01	<1	<1	<0.01	<1	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<1

* 0.500 Gram sample is total digested with multi acid and ICP finish.

* Sample received on Sept. 11, 2015

Certified by: ______________________________

Loring Laboratories(Alberta) Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel:403- 274-2777 Fax:403- 275-0541

ISO9001:2008 Certified

FILE: 5 8 9 2 4

TO: Fireside Minerals
Box 32069 West Bank BC
V4T 3G2

DATE: September 22, 2015

Sample: Pulp

Attn: Scott Allan

WHOLEROCK ICP ANALYSIS

Sample I.D.	Al_2O_3 %	BaSO4 %	CaO %	Cr ppm	Fe_2O_3 %	K_2O %	MgO %	MnO %	Na_2O %	Ni ppm	P_2O_5 %	SO_3 %	SiO_2 %	Sr ppm	TiO_2 %	V ppm	LOI@1000 %	SUM %
BV-1	0.04	97.58	0.51	2	0.03	0.01	0.29	<0.01	0.03	<1	<0.01	0.85	0.10	1257	<0.01	<1	0.90	100.35
BV-2	0.09	8.14	24.52	36	0.09	0.02	13.89	<0.01	0.31	<1	<0.01	1.28	16.16	551	<0.01	1	35.62	100.14
BV-3	0.25	92.70	2.20	2	0.06	0.04	0.42	<0.01	0.01	<1	<0.01	1.32	0.45	5167	0.01	1	2.84	100.30
BV-4	0.36	0.20	43.55	11	0.09	0.06	8.70	0.03	0.18	<1	0.01	0.98	0.86	194	0.01	2	44.50	99.53
BV-TS	0.49	75.56	9.25	9	0.13	0.10	1.78	0.01	0.03	<1	0.01	1.20	1.58	4755	0.01	3	10.31	100.46
BV-Chip	0.23	77.80	7.51	7	0.09	0.04	3.05	<0.01	0.01	<1	<0.01	1.02	0.51	1486	0.01	2	10.15	100.44

Sample received on Sept. 11, 2015

0.5 gm sample digested with multi acids and finished by ICP

Certified by: ______________________

BaSO4 value by wet chemistry gravimetric assay method.

Loring Laboratories(Alberta) Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel:403- 274-2777 Fax:403- 275-0541

ISO9001:2008 Certified

FILE: 5 8 9 2 4

TO: Fireside Minerals
Box 32069 West Bank BC
V4T 3G2

DATE: September 22, 2015

Sample: Pulp

Attn: Scott Allan

WHOLEROCK ICP ANALYSIS

Sample I.D.	Al_2O_3 %	BaSO4 %	CaO %	Cr ppm	Fe_2O_3 %	K_2O %	MgO %	MnO %	Na_2O %	Ni ppm	P_2O_5 %	SO_3 %	SiO_2 %	Sr ppm	TiO_2 %	V ppm	LOI@1000 %	SUM %
BV-1	0.04	97.58	0.51	2	0.03	0.01	0.29	<0.01	0.03	<1	<0.01	0.85	0.10	1257	<0.01	<1	0.90	100.35
BV-2	0.09	8.14	24.52	36	0.09	0.02	13.89	<0.01	0.31	<1	<0.01	1.28	16.16	551	<0.01	1	35.62	100.14
BV-3	0.25	92.70	2.20	2	0.06	0.04	0.42	<0.01	0.01	<1	<0.01	1.32	0.45	5167	0.01	1	2.84	100.30
BV-4	0.36	0.20	43.55	11	0.09	0.06	8.70	0.03	0.18	<1	0.01	0.98	0.86	194	0.01	2	44.50	99.53
BV-TS	0.49	75.56	9.25	9	0.13	0.10	1.78	0.01	0.03	<1	0.01	1.20	1.58	4755	0.01	3	10.31	100.46
BV-Chip	0.23	77.80	7.51	7	0.09	0.04	3.05	<0.01	0.01	<1	<0.01	1.02	0.51	1486	0.01	2	10.15	100.44

Sample received on Sept. 11, 2015

0.5 gm sample digested with multi acids and finished by ICP

Certified by: ____________________

BaSO4 value by wet chemistry gravimetric assay method.

APPENDIX 3

Petrographic Descriptions

Fireside

BV-TS & BB-TS

October 23, 2015

Calgary Rock and Materials Services Inc.

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The purpose of this study is to evaluate the mineralogy, texture, fluid sensitivity issues and porosity/permeability for two samples. The study was commissioned by Fireside Minerals.

The thin-sections were produced by impregnating selected samples with blue-dyed epoxy to identify porosity and to reduce the likelihood of delicate structures (e.g. clays) from being destroyed during preparation. The samples were stained with alizarin red S to distinguish calcite and potassium ferricyanide to distinguish ferroan carbonates.

Petrographic results are summarized in Appendix A: Table 1. Overview and described thin-section photomicrographs are presented after the text and petrographic tables.

Listed on the following in Table A is a summary of the well location, depth, rock name, estimated porosity and estimated permeability for each of the described thin sections.

CR Sample ID	Location	Rock Name	Est. Porosity %	Est. Permeability (md)
TS1	BV-TS	Dolomitic Wackestone	<1	<0.01
TS2	BB-TS	Dolomitic Wackestone	<1	<0.01

2. PETROGRAPHIC OBSERVATIONS

2.1 Petrology and Mineralogy Overview

To evaluate the factors controlling porosity and permeability and fluid-sensitivity issues within the study well, petrological and mineralogical information was collected using thin-section analysis. Porosity and permeability values were estimated. Cathodoluminescence analysis was performed on the samples *ex gratia* to further clarify the diagenetic history of the rock sample.

Classification of samples was determined using both Folk (1974) and Dunham (1962), modified by Embry & Klovan (1971) as well as Gregg & Sibley (1984) for dolomite texture characterization.

For grain/particle/crystal size the Wentworth Scale was used and is as follows:

Microcrystalline or clay size	<0.004mm	<4µm
Silt size crystalline or silt-size-grained	0.0040-0.0310mm	4-31µm
Coarse silt size crystalline or coarse silt-grained	0.0310-0.0625mm	31-63µm
Very fine crystalline or very fine-grained	0.0625-0.125mm	63-125µm
Fine crystalline or fine-grained	0.125-0.250mm	125-250µm
Medium crystalline or medium-grained	0.250-0.500mm	250-500µm
Coarse crystalline or coarse-grained	0.500-1.000mm	500-1000µm
Very coarse-grained	1.000-2.000mm	1000-2000µm

Within the study area 2 lithofacies were identified. Thin-section photomicrographs are illustrated in Plates TS1 to TS2, and the petrographic summary is listed in Table 1.

3. PETROGRAPHIC OBSERVATIONS

3.1.0 Lithofacies 1: BV-TS (Sample TS1)

Sample TS1 is identified under Lithofacies 1 and is identified as BV-TS. Both conventional and cathodoluminescent petrography was performed on this sample. In addition to the primary objective, which is rock characterization, a secondary objective of diagenetic/replacement origin of the barite was requested.

Sample TS1 is a matrix-supported wackestone (characterized as a baritic dolomitic wackestone).

The total rock composition consists of dolomite, barite, calcite, quartz and possible clays/fines. The primary texture of the rock sample is characterized as a planar-bedded rock composed of microcrystalline dolomite. This rock has been strongly altered by secondary diagenesis characterized by hydraulic fracturing on multiple horizontal planes by barite-rich fluids and deposition of barite-rich structures (i.e. beds, fracture-fills, etc.). Barite is the main mineral observed within this sample and is present in three distinct morphologies representing three distinct diagenetic events. The first barite type is found embedded within the microcrystalline dolomite matrix. This type of barite is characterized as fine-crystalline euhedral laths and is organized pseudo-parallel to bedding (see TS Plate 1, Image C). In terms of diagenetic/replacement origin of this barite, the euhedral nature of the crystals suggest a primary precipitation rather than a secondary replacement. The close association of the barite with the microcrystalline dolomite infers a contemporaneous precipitation/formation of these two minerals. The pseudo-planar orientation of the individual barite crystals suggests formation under unidirectional flow (aqueous). Under electron bombardment, the matrix of the rock exhibits a variety of textures (see CL Plate 1, Image B, left side of image). Dolomite exhibits a dull red luminescence. This dolomite is observed with a euhedral rhombic morphology with the occasional concentric rim exhibiting a brighter luminescence (see CL Plate 1, Image B, C-6). This difference in luminescent coloration relates to the changing fluid composition during precipitation, where the fluid was originally enriched in Fe^{2+} (a luminescent quenching ion) and became more enriched in Mn^{2+} (a luminescent activator ion) in the later stages of precipitation. This indicates a two stage precipitation event forming the dolomite in the matrix. The second morphology of barite is characterized as a coarse-crystalline mineral forming planar beds. This barite type occupies approximately one-third of the thin section and is observed as multiple irregular on-lapping radiating fans of barite. When these fans are observed occasionally adjoining they are bordered by a fine-microcrystalline variety of barite present as pin-point crystals. This barite type is observed seeded/nucleating on the dolomitic/baritic matrix and precipitating outwards from it. The third morphology of barite is related to the fracture-fills. This variety of barite is observed originating on the fracture walls and precipitating as well-formed radiating euhedral bundles (see TS Plate 1, Image A). This specific morphology of radiating bundles of barite crystals has been correlated to hydrothermal origins (Griffith, 2012) and requires available room to form. Replacing the remaining porosity in the fractures, if available, is sparry calcite cement. Under electron bombardment, the barite remains non-luminescent contrasting the calcite which exhibits a suite of luminescent colors ranging from dull orange to bright orange (see CL Plates 1 and 2, Image B). The same quenching and activating ions for dolomite also apply for calcite (Mn^{2+} is the main activator ion and Fe^{2+} is the main quenching ion). Based on the color suite, it appears that the calcite-rich fluid was initially Mn^{2+} enriched and later became Fe^{2+} enriched. It is important to note that all barite deposits mainly appear to be precipitated/deposited horizontal to bedding. Vertical fractures are all healed by calcite cement. Vertical fractures are also observed vertically displacing the horizontal barite-infilled fractures which are characterized as a micro-faults (see TS Plate 1, Image B). An interesting feature of the barite immediate to the micro-faults is a subtle morphology change when compared to the barite in the fracture-fill. Optically this barite crystal's birefringence differs as well and altogether indicates an alternate environmental/diagenetic condition for growth compared to the original fracture-fills. What this also indicates is that the vertical fracturing may have occurred penecontemporaneously, such that barite-rich fluids had not fully precipitated out when the rock was micro-faulted. The micro-faulting created additional space allowing for new barite growth to form.

In terms of paragenetic sequence it appears the initial deposit was the microcrystalline dolomite and barite matrix. The dolomite and barite minerals were precipitated contemporaneously forming the matrix, in which the dolomite was formed by a two-stage process involving fluids initially Fe^{2+} enriched and became Mn^{2+} enriched. The timing of the barite bedform compared to the fracture-fill is unclear due to no observable cross-cutting relationship. However, as an indirect form of timing, the micro-faulting can be used to determine relative timing. The baritic bedforms have not been displaced by the micro-faulting but the barite fracture-fill and the matrix has, which indicates the hydraulic fracturing (and subsequent micro-faulting) occured prior to the barite bedform precipitating. Therefore the second event in the sequence is the fracture that has been infilled by barite cement. Authigenic barite was initially precipitated onto the fracture walls. Afterwards calcite-rich fluids intruded, in which the initial composition was Mn^{2+} enriched and then became Fe^{2+} enriched, and replaced the remaining porosity. The baritic planar bedforms precipitated next and are found as three discrete planar beds, ranging from 2 to 8 mm in height. Replacement barite is observed in minor amounts and is characterized as the replacement mineral for leached dolomite rhombs (see TS Plate 1, Image D, center). The timing of the replacement is unclear. This barite was identified as replacement based on its non-characteristic exterior crystal morphology and interior polycrystalline morphology.

In terms of diagenetic/replacement origin of the barite crystals, it is clear that some of the barite is attributed to hydrothermal origin. The majority of the barite appears in euhedral crystal form which is associated with primary precipitation rather than secondary processes (i.e. replacement). Minor amounts of replacement barite are observed and are associated with leached dolomite rhombs.

3.2.0. Porosity and Permeability Controls and Distribution

The porosity in the rock sample has been largely reduced by barite and calcite cement. Barite cement is observed occupying matrix porosity as well as replacing fracture porosity. There are rare amounts of porosity present in this sample.

The main controls contributing to lack of porosity/permeability in the rock sample are cements.

Sample ID	Location	Rock Name	Est. Porosity %	Est. Permeability (md)	Reservoir Quality
TS1	BV-TS	Baritic Dolomitic Wackestone	<1	<0.01	Poor

3.3.0 Lithofacies 2: BB-TS (Sample 2)

Sample TS2 is identified under Lithofacies 2 and is identified as BB-TS. Both conventional and cathodoluminescent petrography was performed on this sample.

Sample TS2 is a matrix-supported wackestone (characterized as a dolomitic wackestone).

The total rock composition consists of dolomite, barite, calcite, quartz and possible clays/fines. The primary texture of the rock sample is characterized as a planar-bedded rock mainly composed of dolomite. There is a large calcite-healed fracture that bisects the thin section along what appears to be a non-conformity in the sample. The two prominent textures in the sample are dolomite-rich and are described as a non-planar very-fine crystalline (see TS Plate 2, Image A, center) and a microcrystalline texture (see TS Plate 2, Image C). The non-planar very-fine crystalline texture consists of anhedral to subhedral crystals. This fabric is massive and is occasionally associated with microporosity and fracture porosity. The microcrystalline dolomite fabric is also massive but has dark microcrystalline fossil fragments, quartz grains, calcite fragments and barite fragments embedded within. Some of the embedded barite has been leached and their ghost forms (euhedral laths) are replaced by calcite cement (see TS Plate 2, Image D, F-4). The large calcite-healed fracture is composed of coarsely crystalline calcite crystals. Under electron bombardment the calcite exhibits two main luminescent colors: bright and dull red-orange. Each crystal of calcite has this two color suite luminescence where the core of the crystal is dull (Fe^{2+} enriched) and the outer rind is bright (Mn^{2+} enriched) (see CL Plate 5, Image B). This distinct color suite could represent localized fractionation of the fluid constituents when the crystal was forming. The only contaminant within the calcite-healed fracture is a brecciated clast observed in-suspension (see TS Plate 2, Image B). The texture of the brecciated clast shows planar bedforms that have interbeds of fine clays/silt (see TS Plate 2, Image B, K-6). The clast is also dolomite-rich, however it has different textural attributes compared to the dolomite fabrics described prior and therefore is not sourced from these rock materials. Under electron bombardment this brecciated clast exhibits a variety of textures. The most prominent texture is coarse-crystalline (~500 microns) euhedral rhombs found throughout the matrix (see CL Plate 4, Image B, E-6). These rhombs indicate recrystallization occurring within the clast but the retention of a majority of the primary textures of the clast indicates only a partial recrystallization. The luminescence of the recrystallized components does not entirely match the luminescence exhibited by the calcite healing the fracture (compare CL Plate 5, Image B with CL Plate 4, Image B). This infers that only some of the recrystallization textures in the brecciated clast were catalyzed by the calcite-rich fluid; however others, such as the darkly-luminescent structures, maybe unrelated. In terms of paragenetic sequence it appears that very little has occurred to the dolomite matrixes other than intrusion by the calcite-rich fluid and precipitation of the calcite cement. The majority of diagenesis has occurred to the brecciated clast entrained within the calcite. However it is unclear where this clast was sourced from and therefore difficult to discriminate features inherited from the source rock and imprinted by in-situ processes (e.g. the calcite-rich fluids).

3.4.0 Porosity and Permeability Controls and Distribution

The porosity in the rock sample is not readily accommodated by the fabrics exhibited by the dolomite matrixes. The non-planar dolomite fabric displays the most amount of porosity which is characterized as non-effective microporosity.

The main controls contributing to lack of porosity/permeability in the rock sample are cements.

Sample ID	Location	Rock Name	Est. Porosity %	Est. Permeability (md)	Reservoir Quality
TS2	BB-TS	Dolomitic Wackestone	<1	<0.01	Poor

4. FORMATION SENSITIVITY ISSUES

4.1 Migration/Mobilization of Fines

Fine material (silt and clay fines) within the pore system could potentially be mobilized due to high flow rates, which could choke pore-throats, reducing permeability.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Two lithofacies were identified in this study.

The following provides a summary of the rock type and mineralogical data for each lithofacies:

Lithofacies 1: The rock in this lithofacies includes sample BV-TS and is identified as a baritic dolomitic wackestone. This sample consists of quartz, barite, dolomite, calcite, organic materials and clay. The sample has been subjected to a significant amount of deformation and has multiple horizontal factures infilled with barite cement. The estimated porosity and permeability of the sample is <1% and <0.01 md respectively.

Lithofacies 2: The rock in this lithofacies includes sample BB-TS and is identified as a dolomitic wackestone. This sample consists of quartz, barite, dolomite, calcite, organic materials and clay. The sample has a single large calcite healed fracture with a brecciated clast entrained. The estimated porosity and permeability of the sample is <1% and <0.01 md respectively.

5.2 Recommendations

X-ray analysis is recommended to refine petrographic estimates for mineral content and clay species analysis. Due to the fine-grained nature of the samples, visual petrographic porosity/permeability estimations may not account for many factors associated with the micro-textures. CMS-300 is recommended for the samples to accurately measure porosity/permeability of samples and if overburden pressures seal the fractures in the rock samples.

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6.0 Bibliography

Griffith, E., Paytan, A, 2012. *Barite in the ocean – occurrence, geochemistry and palaeoceanographic applications.* The Journal of the International Association of Sedimentologists. Journal compliation 2012. Doi:10.1111/j.1365-3091.2012.01327.x

Plate TS1

THIN SECTION PHOTOMICROGRAPHS

BV-TS

A.	**BV-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL/XPL**	**500 microns**

Image A is an overview of sample TS1 characterized as a baritic dolomitic wackestone. The fracture in the center of the image has been replaced by barite and calcite cement. Barite is identified as the white mineral in the fracture exhibiting low interference colors under cross-polarized light. Barite is observed as bundles of radiating crystals which is a morphology associated with hydrothermal solution precipitation. Calcite cement is stained red and is observed replacing the remaining fracture porosity.

B.	**BV-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**500 microns**

Image B is a low magnification view of the sample highlighting another horizontal fracture in the sample. Note the vertical fracture cross-cutting the horizontal fracture at I-8 which has caused blocks of fracture material to be vertically displaced (micro-faulting). Note the change in barite morphology in association with the proximity to the microfaulting.

C.	**BV-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**200 microns**

Image C is a medium magnification view of the sample centered on the matrix. Note the laths of barite interspersed with the microcrystalline dolomite. Vugs in the sample were infilled with calcite cement (O-6).

D.	**BV-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL/XPL**	**100 microns**

Image D is a high magnification view of a barite fragment in the sample. This is an example of replacive barite which has replaced a former dolomite crystal.

TS Plate 1

Calgary Rock and Materials Services Inc.

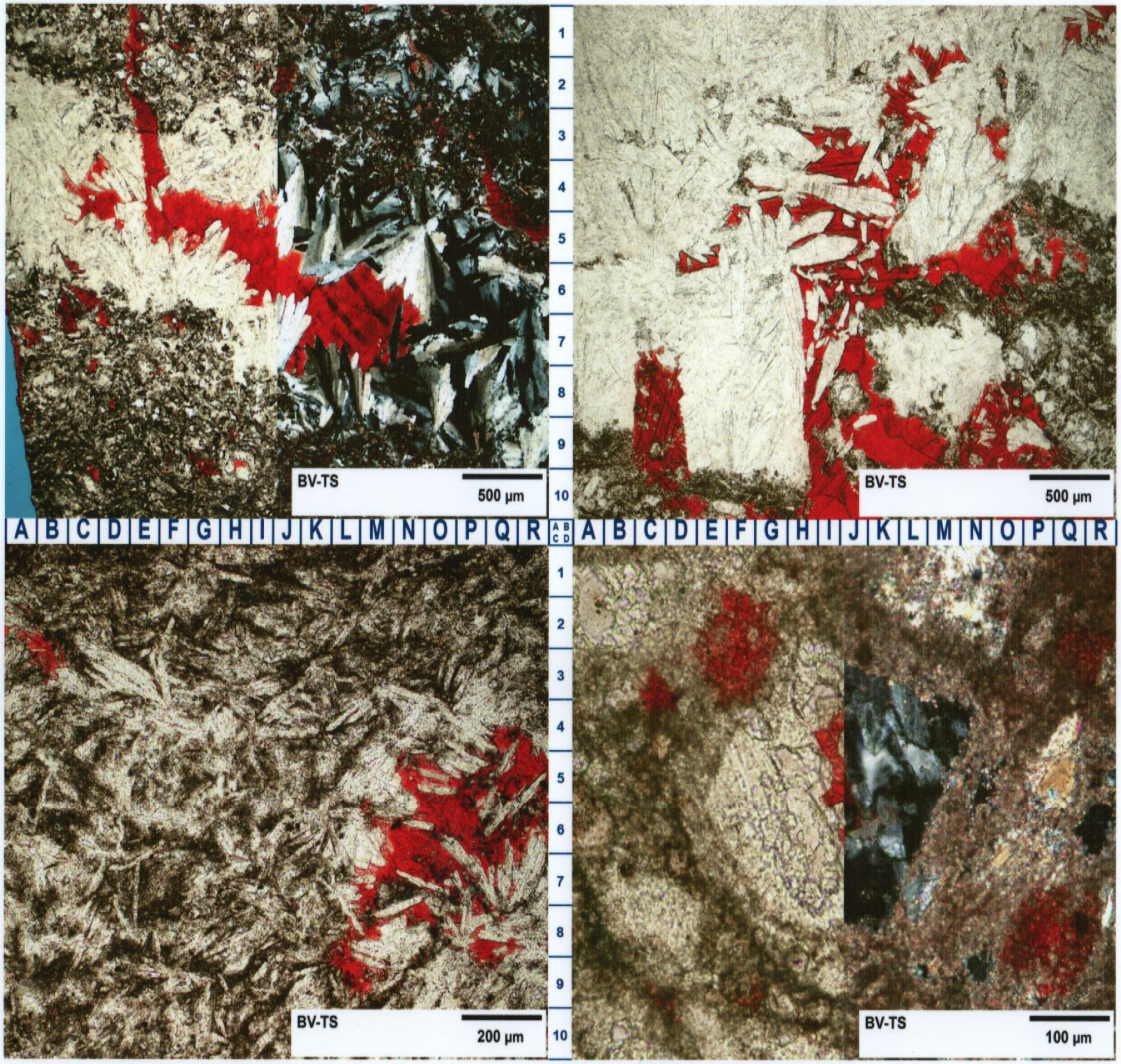

Plate TS2

THIN SECTION PHOTOMICROGRAPHS

BB-TS

A.	**BB-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**500 microns**

Image A is an overview of sample TS2 characterized as a dolomitic wackestone. The texture observed associated with the dolomite is a non-planar textu re composed of anhedral to subhedral crystals. A small portion of the large calcite healed fracture is observed in the top of the image which is stained red.

B.	**BB-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**500 microns**

Image B is a low magnification view of the sample that focuses on a brecciated clast. Note the texture of this clast which is observed with interbeds of fine clay. This texture is unique to the clast which infers sourcing from a rock type not represented in this sample.

C.	**BB-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**500 microns**

Image C is a medium magnification view of the matrix in the sample. The texture observed in the image is associated with a microcrystalline dolomite with fragments of barite/calcite and grains of quartz embedded within the matrix.

D.	**BB-TS**	**Est. ∅ <1%**	**Est. Kmax <0.01 md**	**PPL**	**200 microns**

Image D is a high magnification view of the microcrystalline dolomite texture. The barite in the sample is identified as white rectangular laths (L-9). Some of the barite laths have been leached and the secondary porosity replaced by calcite cement (stained red).

TS Plate 2

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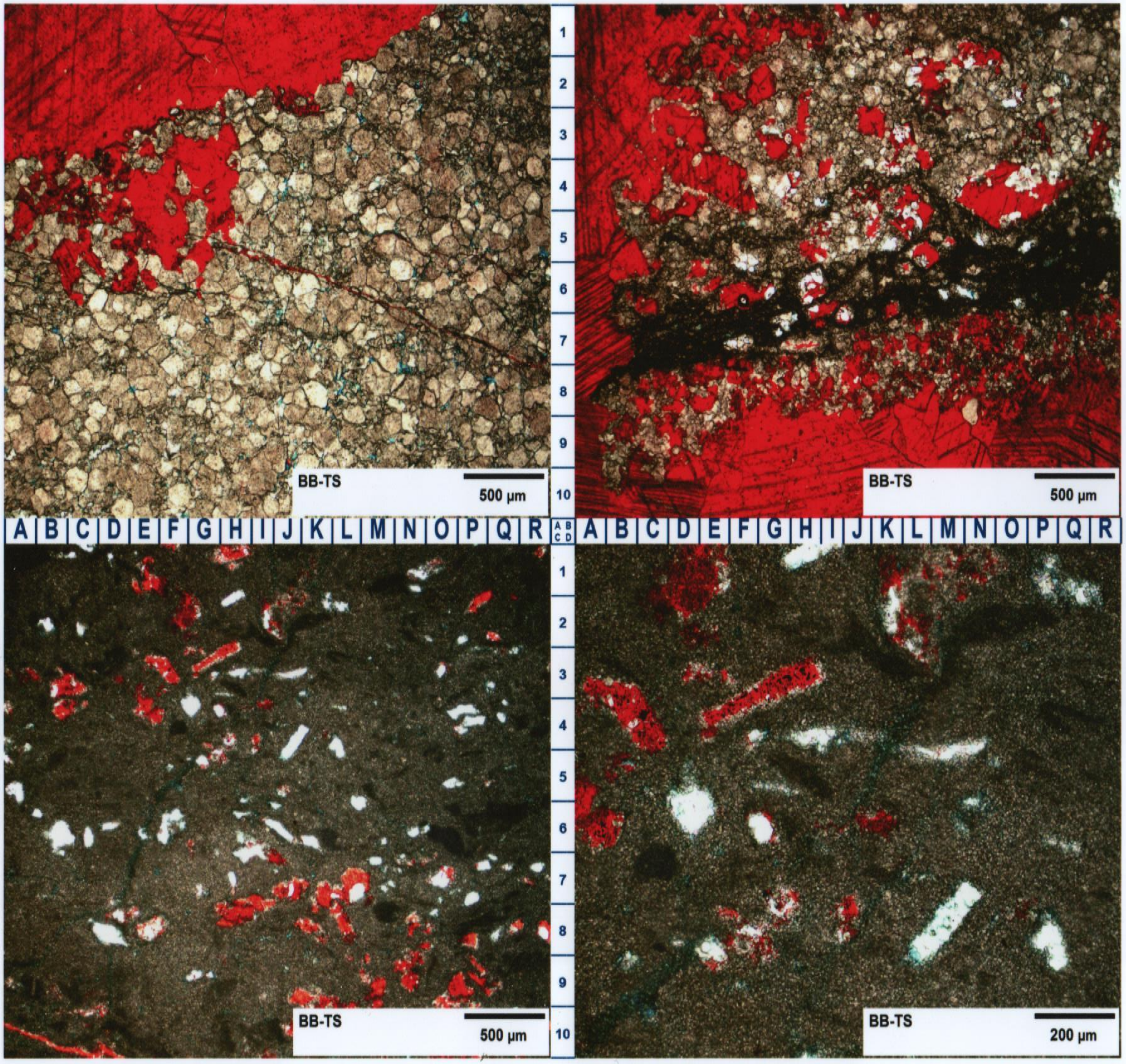


Table 1: Petrography Summary
Fireside Minerals

Sample Number:	**TS1**	**TS2**
Well Location:	BV-TS	BB-TS
Lithofacies	1	2
Rock Name (Folk, 1968):	Baritic Dolomitic Wackestone	Dolomitic Wackestone

Total Rock Composition

Quartz	3 to 5	1 to 2
Barite	50 to 60	1 to 5
Dolomite	25 to 30	60 to 70
Calcite	8 to 12	20 to 30
Organic Materials	<1	<1
Clay	<1	1 to 2

Pore Types (Fabric Selective)

Microporosity	rare to minor	minor
Intercrystalline/Interparticle	rare to minor	rare to minor
Moldic	none	none

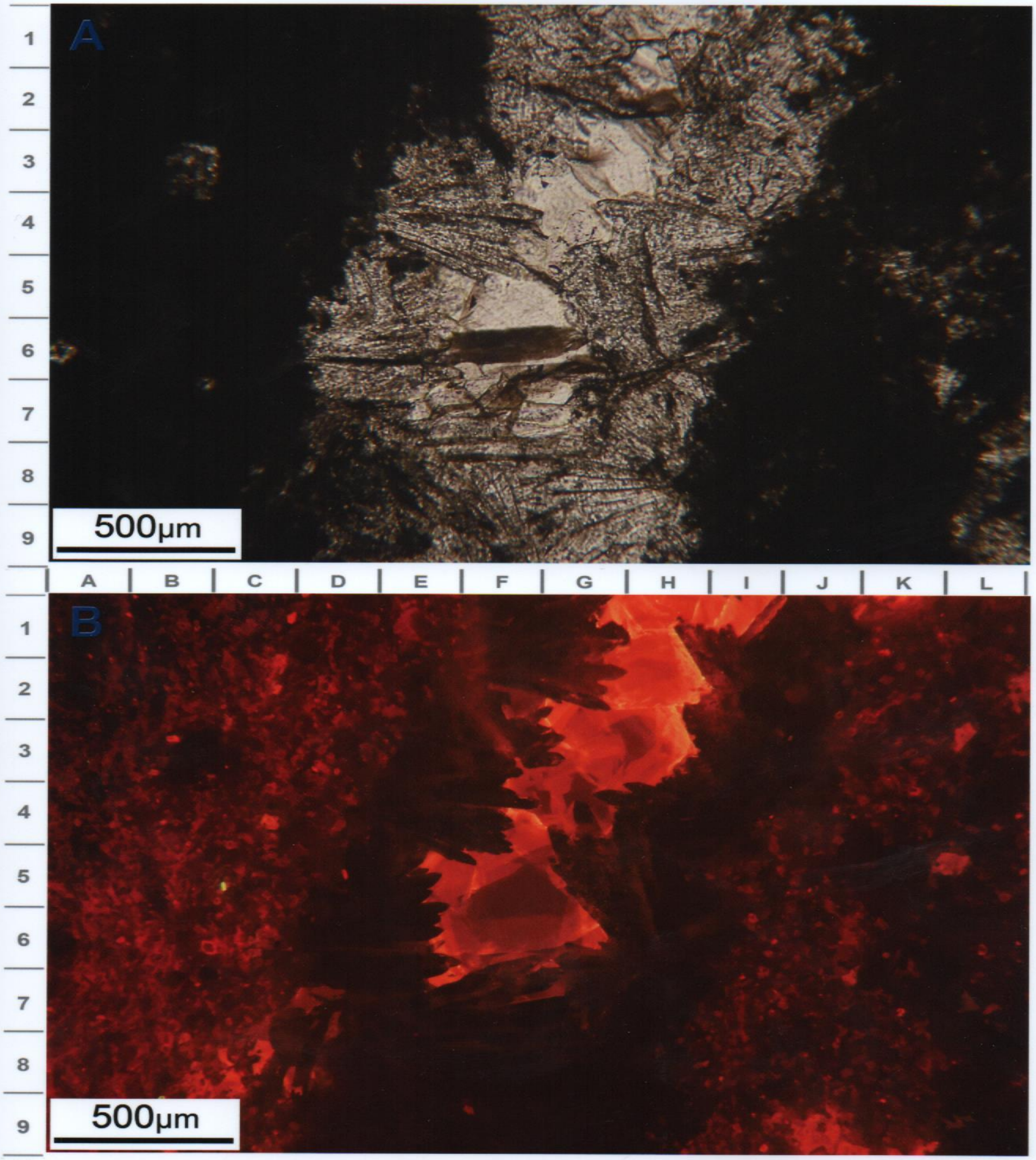
Pore Types (Non-Fabric Selective)

Vuggy	none	none
Fracture	none	none

Reservoir Quality

Est. Total Porosity %	<1	<1
Est. Permeability Kmax (md)	<0.01	<0.01

CL Plate 1

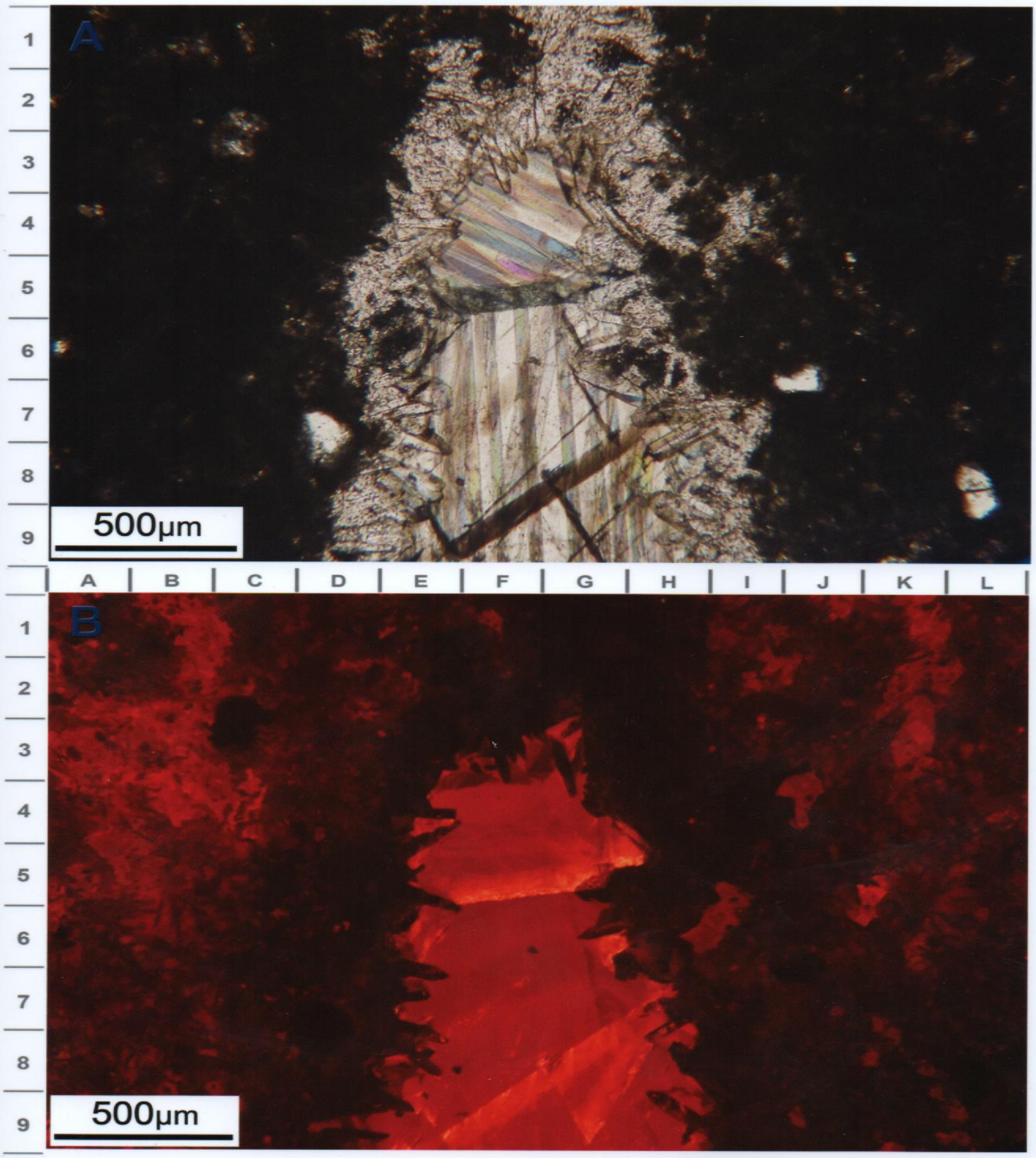


Calgary Rock and Materials Services Inc.

BV-TS

Gun Current: 800 uA
Exposure Time: 5 Sec.

CL Plate 2

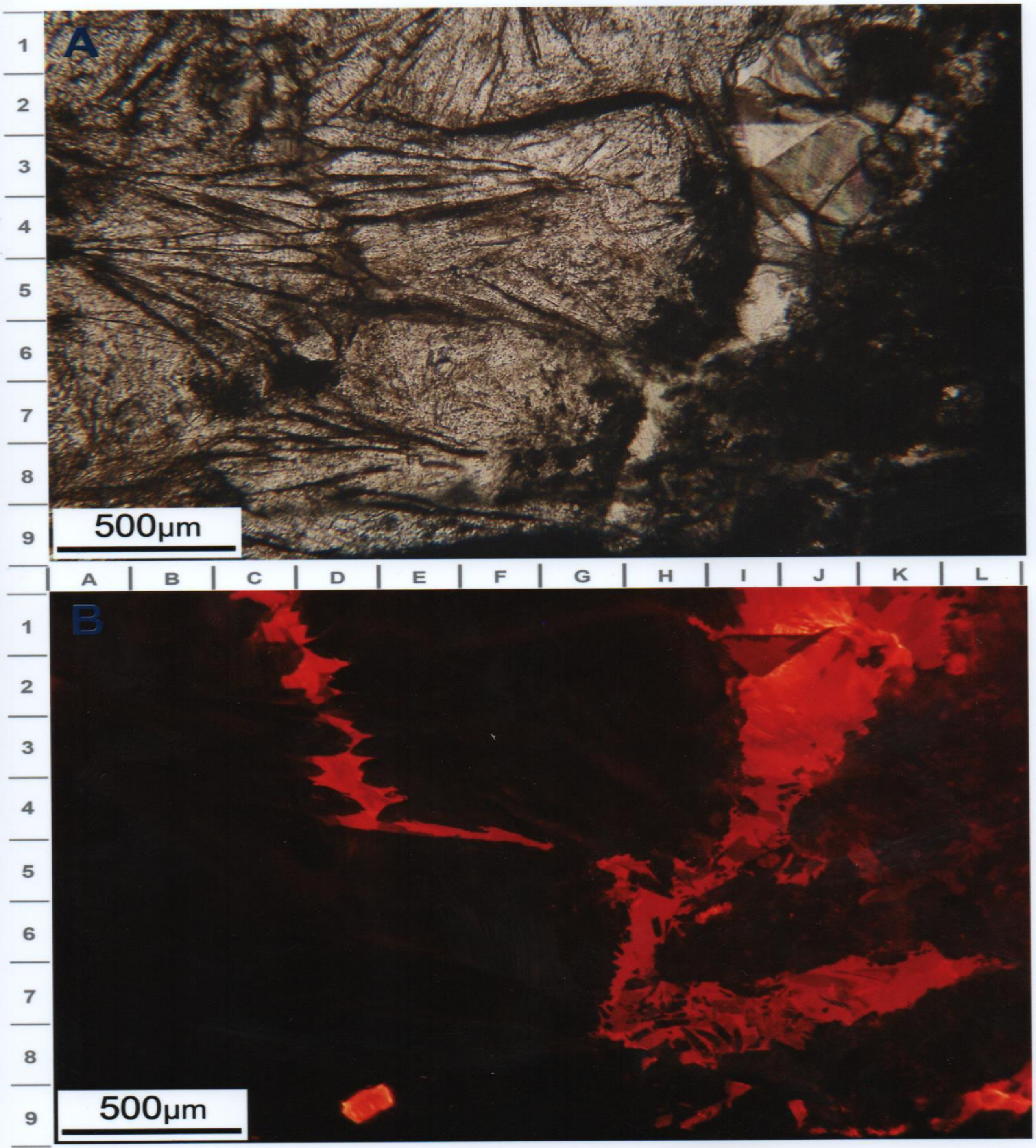


Calgary Rock and Materials Services Inc.

BV-TS

Gun Current: 800 uA
Exposure Time: 5 Sec.

CL Plate 3

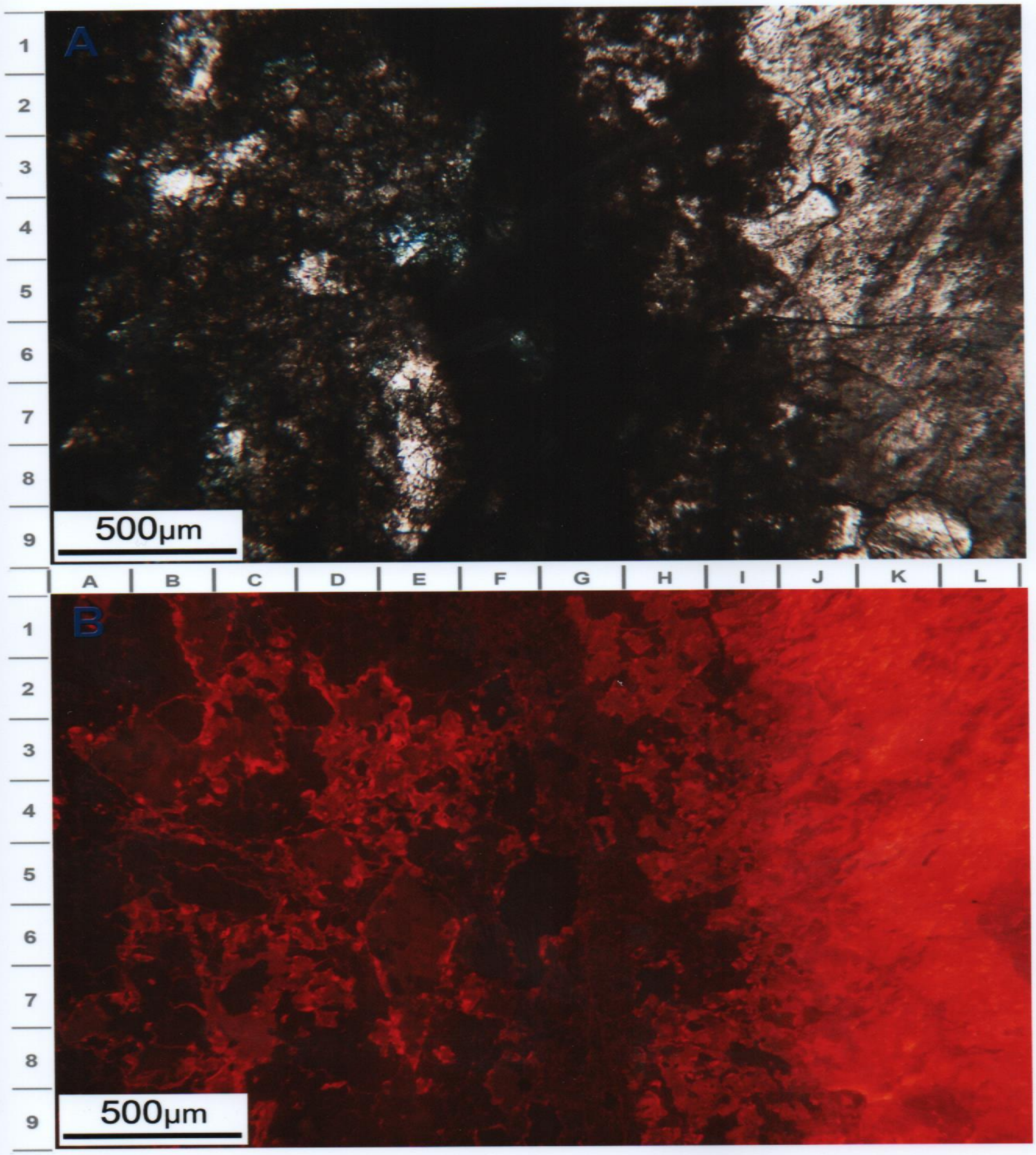


Calgary Rock and Materials Services Inc.

BV-TS

Gun Current: 800 uA
Exposure Time: 5 Sec.

CL Plate 4

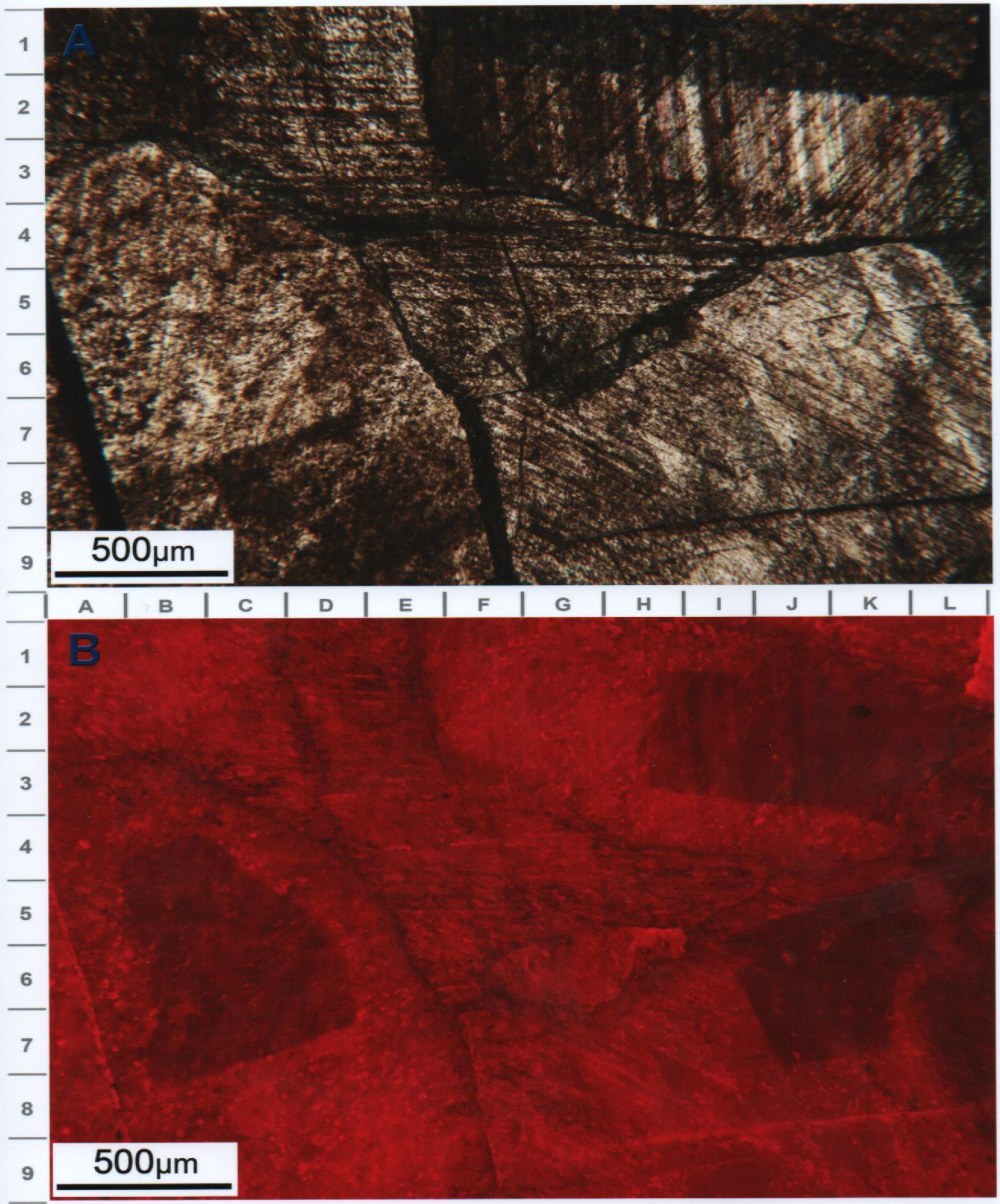


BB-TS

Calgary Rock and Materials Services Inc.

Gun Current: 800 uA
Exposure Time: 5 Sec.

CL Plate 5



Calgary Rock and Materials Services Inc.

BB-TS

Gun Current: 800 uA
Exposure Time: 5 Sec.