Kamatash Project

Regional Exploration Report

YMEP 17-015

Commodity:	**Nephrite Jade**
Mining District:	**Whitehorse & Dawson**
Lat & Long:	**60.2° - 61.7°N, 131.1° - 135.4°W (Whitehorse district)**
	63.5° - 64.7°N, 137.8° - 141°W (Dawson district)
Project Operator:	**AKG Exploration Inc.**
Author:	**Tao Song, GIT**
Work period:	**June – July 2017**
Submit Date:	**January 31, 2018**

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1 SUMMARY

The Kamatash project was commissioned to evaluate the regional potential of large-scale nephrite deposits in Yukon. Exploration was focused on four regions: Whitehorse, Dawson, Dunite Peak and St Cyr.

Jade is closely related to serpentinized ultramafic units, and therefore numerous serpentinized rock units were examined during the 2017 field season.

Nephrite jade was found within the Riba asbestos trench 75 kilometers southeast of Whitehorse. XRD results prove that the sample contains 75% tremolite - ferro actinolite, consistent with the chemical composition of nephrite jade. Subsequently, six claims were staked to protect the mineral interest. Trenching is suggested to expose any potential nephrite ore body in the next phase of exploration.

The exploration expenditure eligible for the YMEP is $15112.05 (Appendix I).

2 INTRODUCTION

The goal of the Kamatash project is to identify any potential nephrite jade system on a regional scale in Yukon. Numerous oceanic terranes make up the Yukon, which is ideal to form nephrite jade deposits.

By studying ultramafic units and mineral occurrences, four regional targets were generated. These targets were examined by surface prospecting over a period of twelve days during the 2017 field season.

3 NEPHRITE JADE

Jade is a commercial term. The term is commonly referred to two different mineral species: nephrite jade (Figure 1) and jadeite jade (Figure 2). Nephrite jade occurs widely throughout the world, with Canada, China and Russia being the major nephrite jade producers. Jadeite jade in comparison is much rarer worldwide. Burma is the only country that produces commercial grade jadeite.

Nephrite is not a mineral but rather a habit of tremolite. As an assemblage of mineral grains, it is rock. Nephrite is defined by three major characters described below (Harlow, 2005):

1. Chemical composition: tremolite – ferro actinolite, $Ca_2(Mg^{2+}, Fe^{2+})_5 Si_8O_{11}(OH)_2$. Actinolite is no longer a valid mineral species (Hawthorne, 2012).
2. Texture: massive, felted, interlocking
3. Grain size: microcrystalline – cryptocrystalline

Figure 1 Nephrite Jade Product

Figure 2 Jadeite Jade Product

4 NEPHRITE DEPOSIT TYPES

Nephrite jade is formed by contact and/or infiltration metasomatism in two different geological settings (Harlow, 2014):

1. Dolomite replacement by silicic fluids associated with “granitic” plutonism;
2. Serpentinite replacement by Ca-metasomatism at contacts with more silicic rock, such as leucocratic igneous rock, graywacke, argillite or chert.

Serpentinite type nephrite jade has found worldwidely (Figure 3). Dolomite type jade is rare, but is valued at higher prices.

All the known jade occurrences in Canada belong to serpentinite type. No action was taken to explore for dolomite type jade.

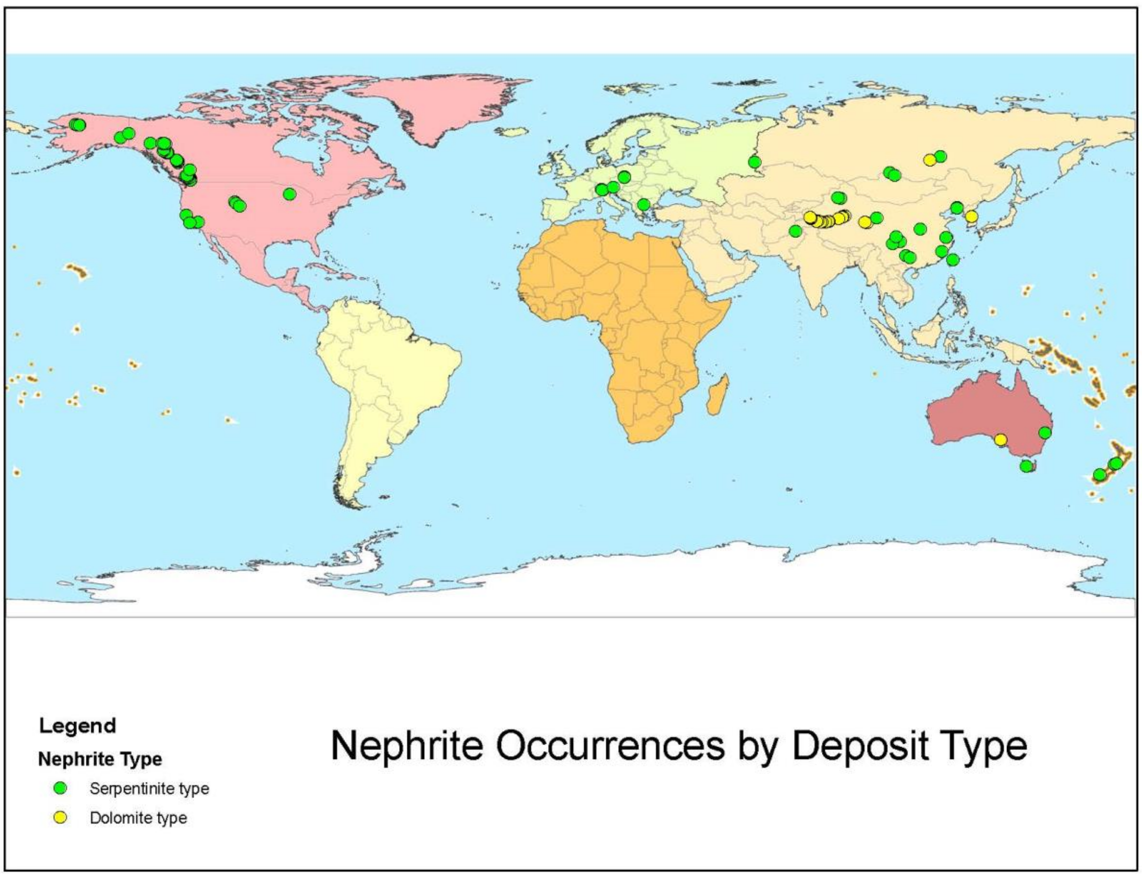

Figure 3 Nephrite occurrences by deposit type

4.1 TEMPORAL & SPATIAL

Most nephrite occurrences are found within the Phanerozoic crust along the edge of orogenies (Figure 4). Two exceptions are Wisconsin nephrite in America and Cowell nephrite in Australia. They formed at around 1600Ma before the assemblage of Rodinia. The youngest nephrite jade was formed three million years ago in Taiwan (Yui, 2014).

Similar to porphyry deposits, the preservation of nephrite poses a challenge. Less nephrite occurrences in Precambrian do not mean nephrite did not form. Instead, it is more a matter of preservation. Considering the widespread greenschist facies and orogenic gold deposits in Precambrian, there is likely abundant in Precambrian aged rocks.

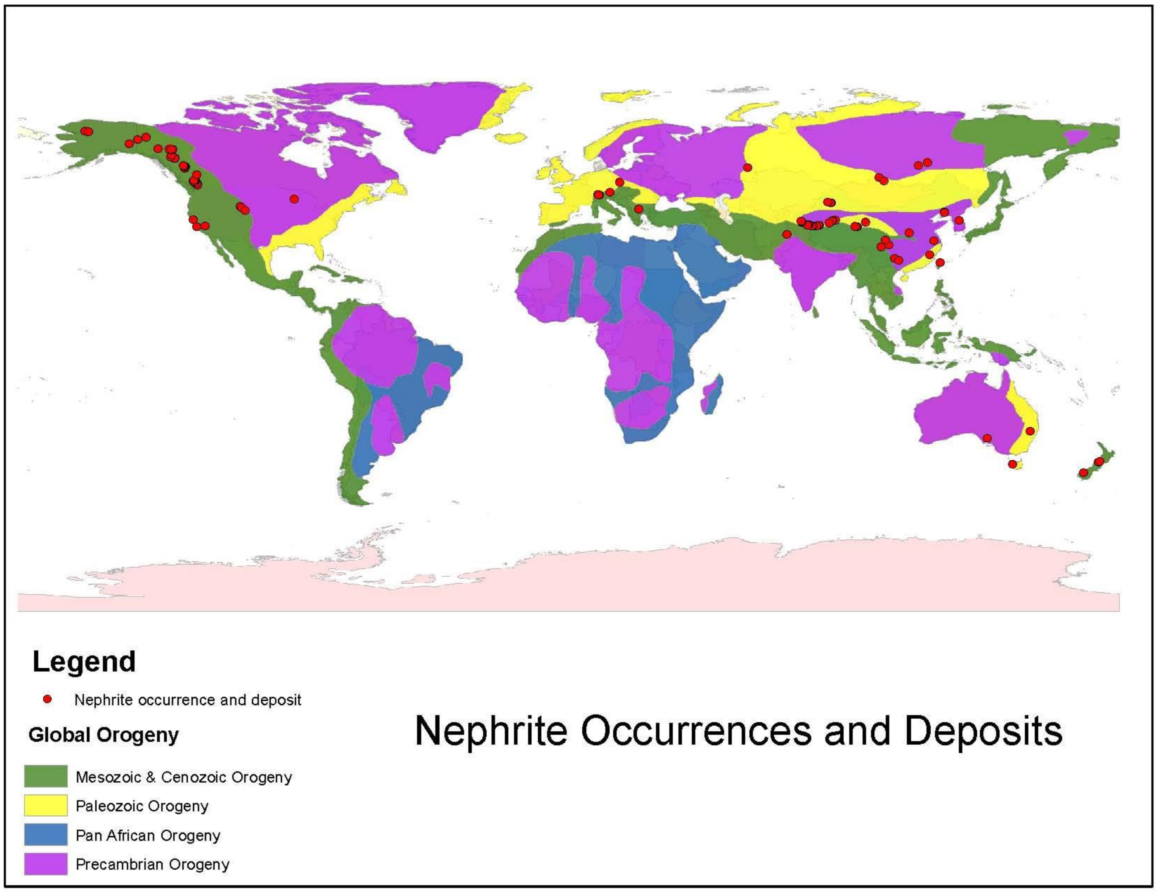

Figure 4 Nephrite occurrences and orogeny

4.2 SERPENTINITE TYPE JADE

Serpentinite type jade was spatially related to ophiolite belts where ultramafic rocks are variably serpentinized (Figure 5). The source of ophiolite belts in Figure 5 is from the University of Texas.

The degree of serpentinization plays a critical role in forming serpentinite type jade. One critical factor to form nephrite is to have ultramafic rock completely serpentinized. Serpentinite usually forms at two stages:

1) partial serpentinization at the ocean floor by retrograde metamorphism to form low - T stable lizardite

2) continued serpentinization at the convergent boundary by prograde metamorphism to form antigorite (Evans, 2010).

Serpentinite type jade forms by Ca and Si metasomatism at greenschist facies, where serpentinite is in contact with Ca rich rock, such as marble and cherty argillite.

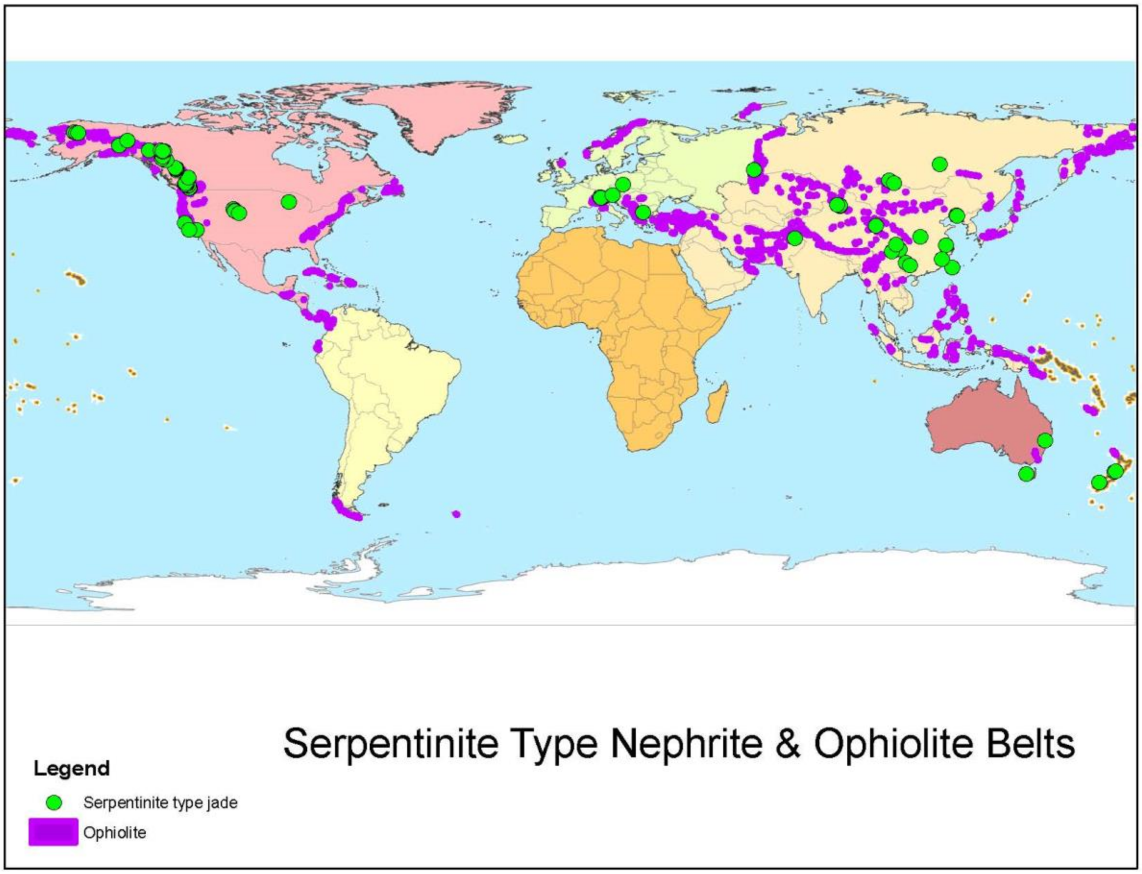

Figure 5 Serpentinite type jade & ophiolite belts

4.3 Related Deposits

Deposits that are genetically related to nephrite include listwanite gold (or its placer equivalent), podiform Cr, asbestos, and Alaskan type ultramafic-mafic intrusions.

Alaskan type ultramafic-mafic intrusions in Alaska, Yukon, BC and Urals are geographically close to nephrite occurrences.

Some nephrite deposits are hosted in chrysotile type asbestos mines, such as the Cassiar asbestos mine in Canada, the Hualian asbestos mine in Taiwan and the Shimian asbestos mine in China. Considering the large number of chrysotile asbestos mines in the world, the correlation between asbestos and nephrite is not strong. The Jeffrey asbestos mine has rodingite but no nephrite.

5 JADE IN CANADA

In Canada, jade mining activities started in the Lillooet area in the 1950s, then moved northwards to Mt Ogden, and eventually arrived in the Dease Lake area (Figure 6). Annual jade production in Canada is estimated at 500 tonnes per year. Dease Lake area accounts for more than 90% of Canadian jade production over the past 20 years.

All the known jade occurrences in Canada belong to serpentinite replacement type, which is associated with oceanic terranes (Figure 6). These jade occurrences form a discontinuous linear shape from southern BC into southern Yukon.

BC has been well explored for nephrite in the past 70 years, while Yukon has not caught much attention for its jade potential. Yukon has four recorded occurrences and only one went into production.

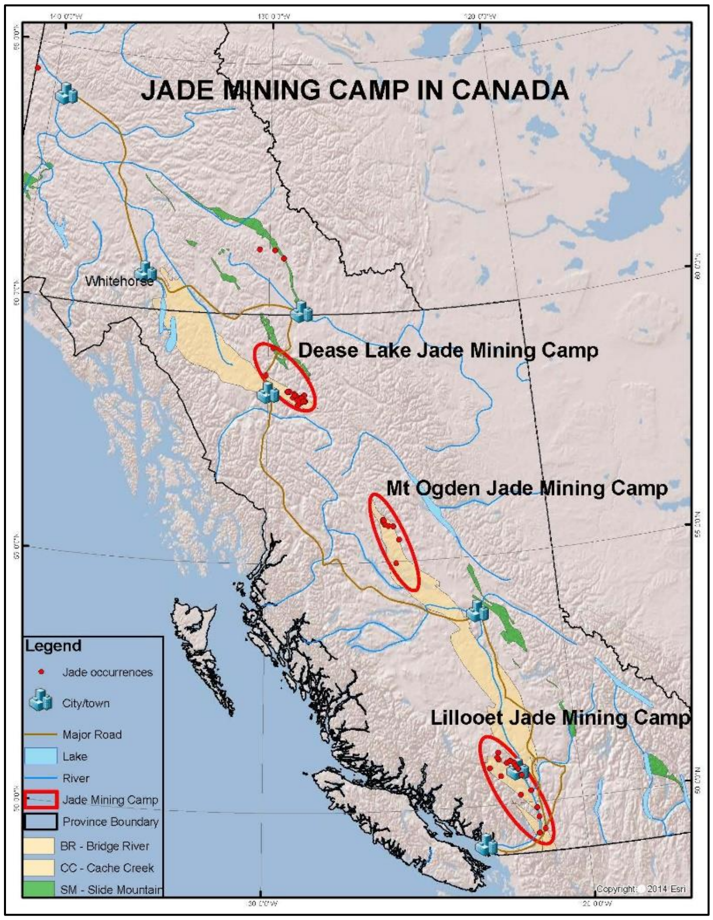

Figure 6 Jade Mining Camps and Oceanic Terranes in Canada

5.1 GRADE CLASSIFICATION

All Canadian jade deposits belong to serpentinite type jade. Based on the price range and geology, commercial quality nephrite jade can be divided into four categories. Varying prices reflect the geological quality of nephrite and the geological quality corresponds to the source rock geology under varying tectonic settings. The accompanying pictures are considered representative and reflect the quality of nephrite.

1) **Polar type**

Host rock: serpentinite, marble, rodingite

Price: highest

Comments: cryptocrystalline, vivid green, vibrant, hard, high purity

Figure 7 Polar Jade

2) **Cassiar type**

Host rock: asbestos, cherty argillite, rodingite

Price: mid high

Comments: cryptocrystalline, vivid chromium green spots, high purity, interlocking fibres

Figure 8 Cassiar Jade

3) **Provencher type**

Host rock: serpentinite, argillite, ± rodingite

Price: mid

Comments: microcrystalline, pale dark green, with some impurities

Figure 9 Provencher type jade

4) **Dease Lake type**

Host rock: serpentinite, argillite

Price: low

Comments: microcrystalline, sheared, high impurities

Figure 10 Dease Lake type jade

6 EXPLORATION

Four regions (Whitehorse, Dunite Peak, St Cyr, and Dawson) were selected to explore for nephrite jade systems. Each region has multiple targets to inspect in the field. Twelve days were spent inspecting all targets in the summer of 2017. All sites were accessed by helicopter or truck and inspected by surface prospecting. No mechanical tool was engaged.

6.1 WHITEHORSE REGION

6.1.1 Regional Geology and Previous Work

This region lies in the north end of the Cache Creek Terrane (CCT). The CCT is an oceanic terrane, extending from southern BC into southcentral Yukon (Nelson, 2007). It consists of ultramafic, clastic and carbonate rocks. The CCT hosts more than 50 jade occurrences in BC.

This region has ultramafic units mapped by YGS, and four asbestos occurrences recorded in Minfile (Figure 11). Ni and chromite occurrences were also recognized in past exploration. Small scale placer gold operations have been active in the Jakes Corner area. As a northern extension of the CCT, no nephrite occurrence was recorded.

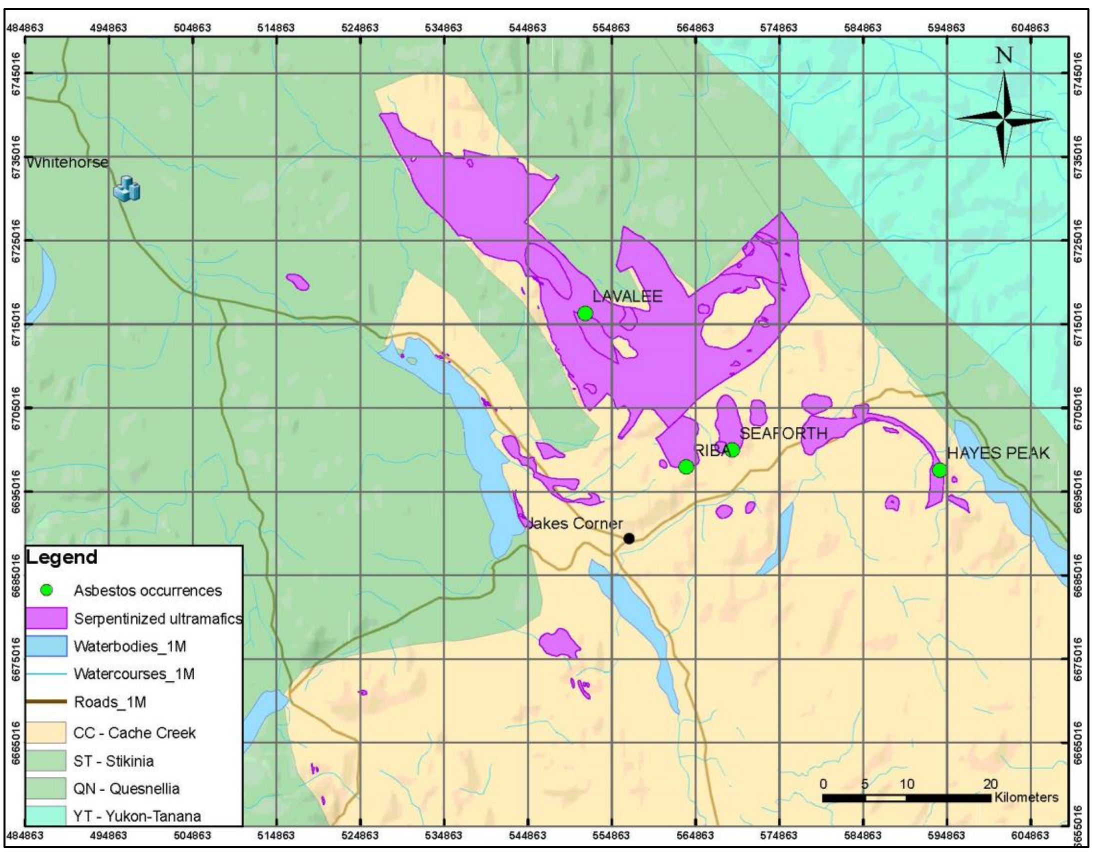

Figure 11 Serpentinite and asbestos in Whitehorse region

6.1.2 Results

Nephritic rock and rodingite were found in historic trenches at the Riba asbestos occurrence (Minfile 105C 010).

Riba was explored for asbestos in the 1970s. Several trenches were done by bulldozer to expose serpentinite body (Figure 12).

Most trenches are located within the serpentinite body and one trench is on the edge of the serpentinite body in contact with another rock unit. This trench has been named Contact trench.

Ultramafics are variably serpentinized. Asbestos fibres are 1cm wide found in serpentinized units (Figure 13).

Figure 12 Riba trenches

Figure 13 Asbestos at Riba

To west of these trenches, geology changes to brown listwanite. Rock is weathered to brown in color (Figure 14). Three kilometers southwest of this listwanite outcrops, a placer gold project has been in operation. Production is unknown.

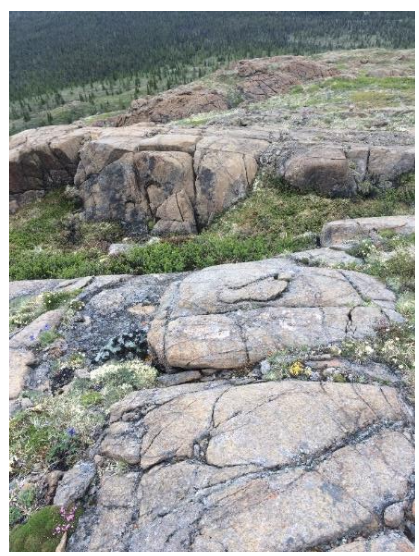

Figure 14 Listwanite

Rodingite was found in the Contact trench. It is 15cm in size and is white-creamy in color (Figure 15 & Figure 16). Rodingite is considered an alteration product at the contact between serpentinite and Ca-rich rock. In BC, the majority of commercial grade jade is associated with rodingite, such as Polar, Kutcho, and Provencher. If a jade lens has no rodingite in its neighborhood, jade is likely to be low grade.

Figure 15 Rodingite found in trench

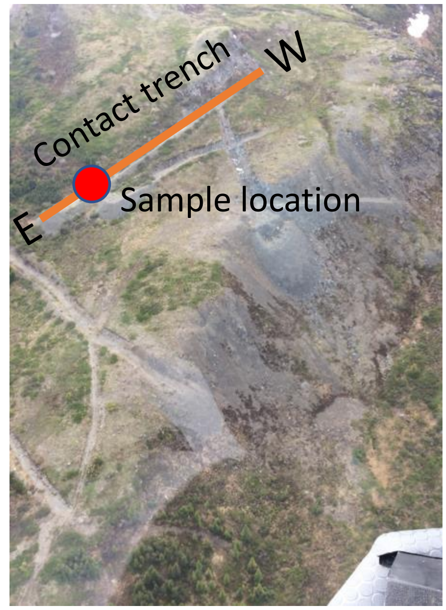

Figure 16 Sample locations

Jade deposit tends to have a zonal pattern, with high quality jade in the core, grading into poor quality jade, rodingite, serpentinite and siliceous rock outwards. The relationship between jade and surrounding rocks is sketched (Figure 17). Rodingite zone is usually thin, less than 0.5m in width, and white in color. The role of rodingite in forming jade deposits is not well understood. The zonal pattern reflects the replacement style of jade deposits. Jade quality is dependent on the fluid composition and local tectonics. In a general sense, a jade deposit is like a boiled egg: egg yolk is jade, egg white is rodingite, eggshell is serpentinite as host rock.

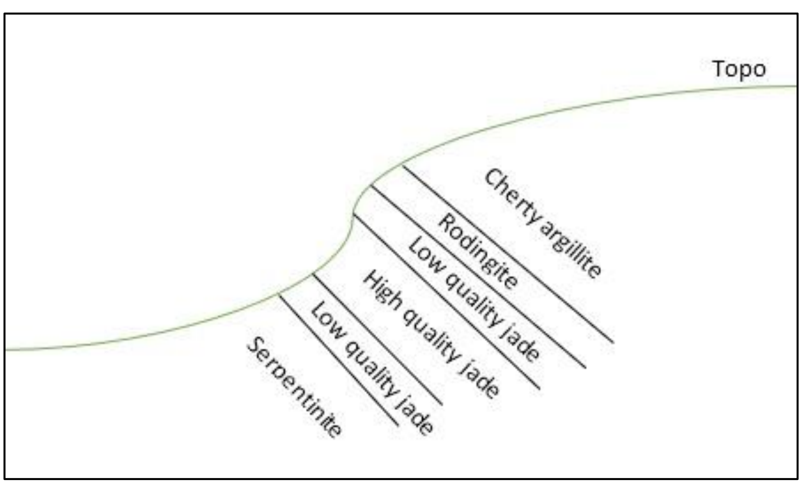

Figure 17 Zonal pattern of jade deposits

Within the Contact trench, a disc shaped rock sample was collected. This sample is about 40 meters from the rodingite sample location. It is 20 cm in size, 3-4 cm thick, dark green in color, non-magnetic (Figure 18). On a hardness test, it has a Mohs hardness of 5.5 and is weakly transparent (Figure 20). Theoretically, the hardness of serpentine varies from 2 to 6. In contrast, nephrite jade's hardness varies between 5.5 and 6.5. It is sometimes difficult to differentiate jade from serpentinite by hardness.

Figure 18 Suspect jade sample

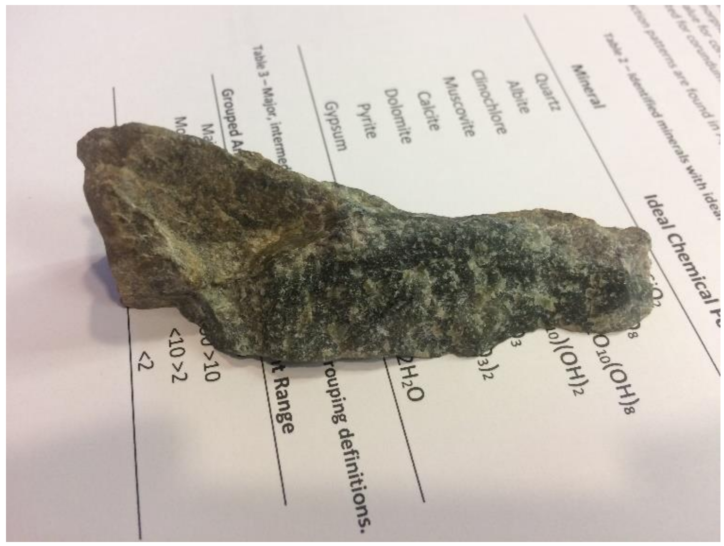

Figure 19 Cut piece

Subsequently, the dark green sample was cut in a jade studio in Vancouver. When it was being cut on a diamond saw, the waste water became light grey indicating the presence of impurities, possibly magnesite and talc. In speaking with those at a jade studio, high quality jade normally with a high purity has clear waste water. The jade carver at the studio also expressed that the quality of this particular jade cut from the sample is low quality jade (Figure 19). This small cut piece was sent to ALS for XRD testing.

Figure 20 Sample semi-transparent

Serpentine and nephrite can be too fine grained to determine under microscope, it becomes necessary to use advanced scientific instruments to determine the sample's content, such as XRD or Raman.

XRD results prepared by AuTec prove that this sample contains 75% tremolite – ferro actinolite (APPENDIX II), consistent with the chemical composition of nephrite jade.

What is also noticing is this sample has no magnesite.
The absence of magnesite means no CO_2 fluids involved in local geology. Since nephrite jade

prefers to form in an alkaline environment, no magnesite suggests the local environment is either neutral or alkaline, which is favorable for nephrite development and preservation.

Subsequent to this finding, six claims were staked to cover the favorable geology (Figure 21). As shown in Figure 21, the Contact trench is at the contact between serpentinite (purple) and another rock unit.

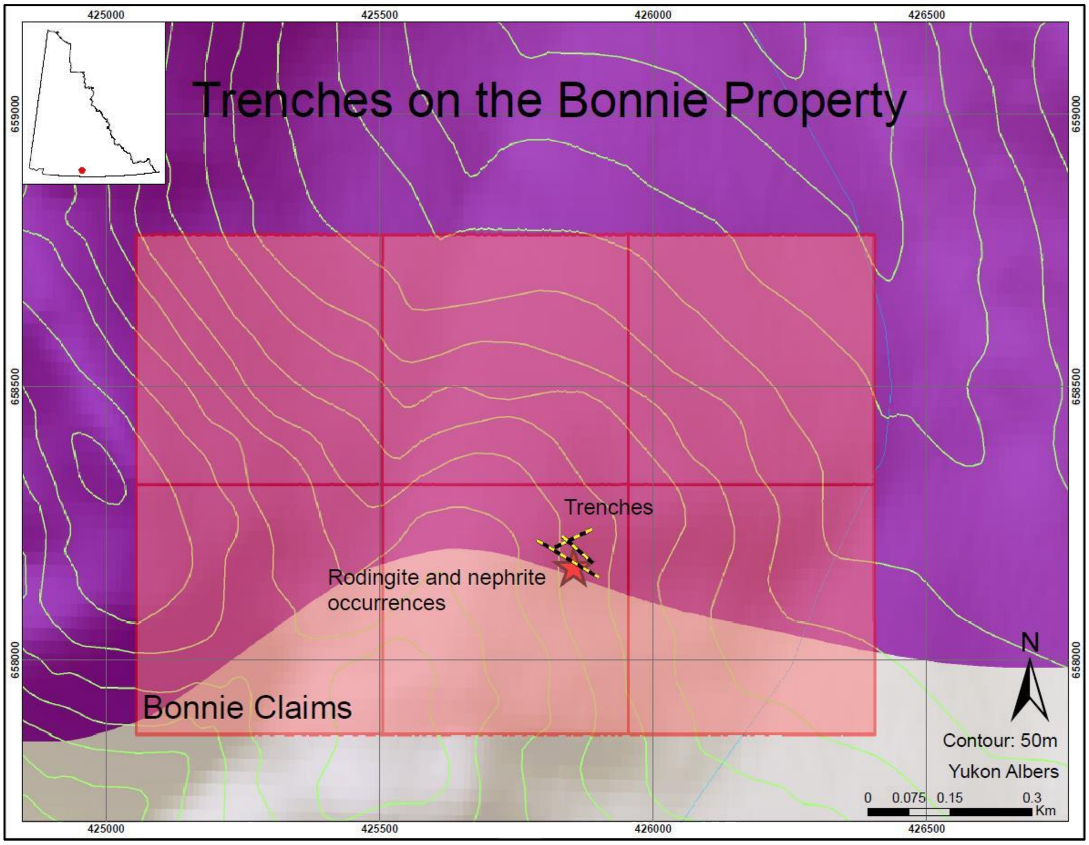

Figure 21 Staked claims

6.2 Dawson Region

6.2.1 Regional Geology and Previous Work

The Dawson region has twenty-three asbestos occurrences and hosts the Clinton Creek asbestos mine. Htoon in his thesis states that all ultramafic rocks in this area are at least 75% serpentinized and most of them about 95% serpentinized (Htoon, 1979). No jade was found during production.

One poor quality jade occurrence was recorded in Minfile. Local placer gold miners encountered multiple low-grade nephrite boulders during production.

6.2.2 Results

From observation, serpentinized rocks can be divided into two categories (Figure 22):

1) Green-black serpentinite

   Green black serpentinite has a high percentage of magnetite and occasional carbonate veinlets (Figure 23). Some green serpentinite has a vivid green and looks alike nephrite jade. But the softness of serpentinite discloses it is serpentinite.

2) Brown rusty serpentinite (listwanite)

   Brown rusty serpentinite is due to the alteration of CO_2 fluids.

The wide presence of carbonates indicates the region was affected by CO_2 fluids. CO_2 fluids tend to be acidic, while in forming jade deposits fluids need to be neutral to alkaline.

No jade, rodingite or nephritic rock was found.

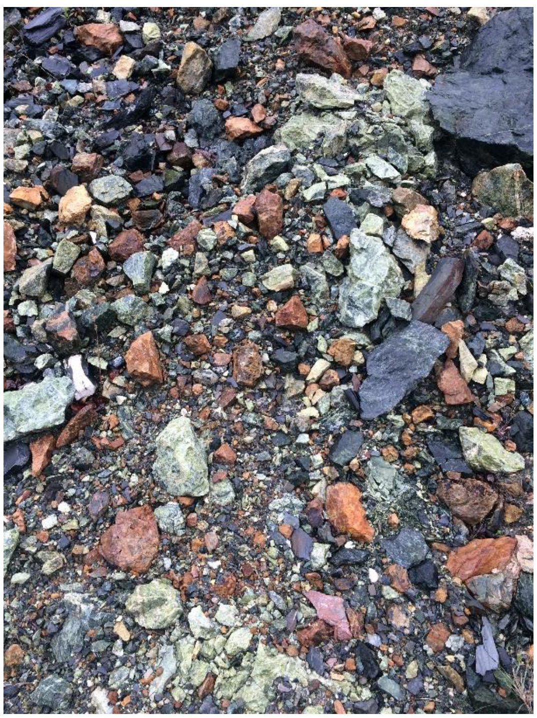

Figure 22 Serpentinite

Figure 23 Green serpentinite

6.3 Dunite Peak Region

6.3.1 Regional Geology and Previous Work

The Dunite Peak area exposes klippen of mafic-ultramafic strata belonging to the Slide Mountain terrane (Parsons, 2016). Eclogite is documented west of Dunite Peak. Two asbestos occurrences are documented in Minfile. No jade exploration is recorded.

6.3.2 Results

Most ultramafic rocks in the Dunite Peak area are weathered to be brown and appear to be blocky. The blocky texture indicates most ultramafic rocks still maintain its intrusive character and were not intensively hydrated. Only a small portion of ultramafics is very weakly altered to serpentinite, giving it a greenish tint (Figure 24).

Eclogite as a HP metamorphic rock has no genetic tie to jade. But one interesting fact is that in BC all jade occurrences are spatially related to eclogite and all eclogites are located to the west of jade deposits. One possible explanation is when eclogite was returning from great depths to shallower depths, the returning mechanism triggered a complete hydration of ultramafics. Completed hydration of ultramafics provides an ideal host to form jade deposits. Unfortunately, even though the Dunite Peak area has an eclogite occurrence, the geology in this area is still dunite, and is not hydrated to serpentinite yet. Therefore, the chance to form jade is low.

Figure 24 Weakly serpentinized ultramafics in Dunite Peak area

6.4 St Cyr Region

6.4.1 Previous Work

Sierra Isard in 2013 mapped the St Cyr area and explored for nephrite jade. The conclusion is that this area has the potential to contain jade deposits, but no large nephrite jade system was found (Isard, 2014).

James Dodge in the 1980s claimed he found a disc shaped jade in a river near St Cyr.

6.4.2 Results

Prospecting for jade was focused on the rivers off the Canol road and upstream along rivers.

No jade, rodingite or nephritic rock was found.

7 CONCLUSION & RECOMMENDATION

By prospecting four regions in Yukon, one nephrite jade occurrence was identified. Jade and rodingite are exposed on surface, serving as good indicators for jade exploration.

Trenching by bulldozer is recommended to expose the nephritic ore body in the next phase. The adjacency to an active placer gold project may facilitate equipment mobilization. Grade determination should be carried out onsite to minimize transportation cost.

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STATEMENT OF QUALIFICATION

I, Tao Song, submit the following information to support my competence that is required to carry out the field work and prepare for the assessment report on the Kamatash project.

Education

- Bachelor of Computer Engineering degree, specialized in database, Yanshan University, China, 2005
- Bachelor of Science degree in Geology, University of British Columbia, 2010

Experience

- 4 years of experience as a company geologist with Merit Mining, Vancouver
    - Resource modeling
    - Drill ready exploration projects and grassroot programs in Canada
    - Project evaluation from early stage to producing (Au, Cu, Pb, Zn)
    - Development of a global mining and geology database

- 3 years of experience as a consulting geologist, Vancouver
    - Drill program supervision
    - Regional targeting
    - Project evaluation
    - Resource evaluation

Professional Affiliations

- Geoscientist in Training with the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Canada, System ID 164368, since February 2011.
- Member of AME BC
- Member of PDAC

APPENDIX I

SUMMARY OF EXPENDITURES

Wages	Rate	Day	Subtotal
Tao Song	$400	12	$4,800.00
Field supplies	Rate	Day	Subtotal
12 person days	$100	12	$1,200.00
Travel	Rate	Day	Subtotal
4X4 truck	$100	12	$1,200.00
Helicopter			$4,496.20
Assay	Rate	Unit	Subtotal
XRD	$257.85	1	$257.85
Claim staking			Subtotal
Staking	$150	6	$900.00
Air transportation			$1,458.00
Report	Rate	Day	Subtotal
Tao Song	$400	2	$800.00
Total Eligible			**$15,112.05**

APPENDIX II

XRD RESULTS

AuTec
INNOVATIVE EXTRACTIVE SOLUTIONS

Quantitative XRD Results for One Sample – ALS Workorder #VA18001833

Date:	31 January 2018
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Distribution:	ClientServicesCANW@alsglobal.com
Document #:	R2018-016
Revision #:	0
AuTec project #:	100433

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1 Introduction

One sample was received from ALS for quantitative X-ray diffraction (QXRD) analysis. The ALS sample description along with the corresponding AuTec mineralogy sample number is given in Table 1.

Table 1 – ALS and corresponding AuTec mineralogy sample description and number.

ALS Sample Number	Mineralogy Sample Number
Ribal	M180166

2 Sample Preparation

The sample was ground for approximately five minutes in a McCrone Micronizing Mill using reagent alcohol. Grinding in the Micronizing Mill reduces particles to between 5 and 10 µm in size without distorting the crystal lattices which are critical for diffraction of X-rays.

Diffraction data was collected over the range of 5-75°2θ with CoKα radiation using a Bruker D8 Focus Bragg-Brentano diffractometer. The diffractometer uses a 0.6mm divergence slit and incident and diffracted-beam Soller slits. The system is equipped with a LYNXEYE - Super Speed Detector.

Diffraction data produced is analyzed and peaks are identified using HighScore Plus software by Panalytical using the Crystallography Open Database. Refinement of diffraction data is done using Topas 5.0 by Bruker AXS.

Detection limits for X-ray diffraction depend on multiple factors, but as a general rule, if the peak to background ratio is low, the detection limit is approximately 2.0 wt%. For samples in which the peak to background ratio is high and there is good crystallinity, the detection limit can be less than 0.5 wt%. If a phase is present at less than 0.5 wt%, it could still be identified, but confidence decreases.

3 Results

The minerals identified in the sample along with their ideal chemical formulae are included in Table 2.

Table 2 – Identified minerals with ideal chemical formulae.

Mineral	Ideal Chemical Formula
Quartz	SiO_2
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$
Caminite	$Mg_7(SO_4)_5(OH)_4 \cdot H_2O$
Ilmenite	$FeTiO_3$
Talc	$Mg_3Si_4O_{10}(OH)_2$
Tremolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$

The major phases identified were actinolite and tremolite, and the moderate phase was talc. The minor phases identified were quartz, caminite, and ilmenite. Actinolite and tremolite form a solid solution series, and essentially share the same chemical formula. Actinolite has a greater presence of iron over magnesium and tremolite has a greater presence of magnesium over iron.

The modal abundances of the major, intermediate, minor, and trace phases (Table 3) vary between samples (Table 4).

The minerals used during refinement were selected with no knowledge of provenance but were selected based on best fit. QXRD values are normalized to 100% of the minerals that are detected after removal of the corundum spike value.

Corundum spikes are a known crystalline phase added at a known weight percent that can then be used to quantify amorphous content if it is present in a sample. Amorphous material will show as a hump in the background intensity between 20 and 30 °2θ. Amorphous content is not apparent in the scan data for the current sample. The Rietveld refinement plot show a value for corundum. The values in Table 4 have been normalized to 100% after removing the value that was calculated for corundum.

The diffraction pattern is found in Appendix I.

Table 3 – Major, intermediate, minor, and trace phase grouping definitions.

Grouped Amount	Weight Percent Range
Major	>30
Moderate	<30 >10
Minor	<10 >2
Trace	<2

Table 4 - Quantitative XRD results, modal wt%.

Mineral	M180166 Ribal
Quartz	3.7
Actinolite	39.6
Caminite	5.2
Ilmenite	5.8
Talc	11.5
Tremolite	34.1
Total	**100.0**

APPENDIX I

DIFFRACTION PATTERN

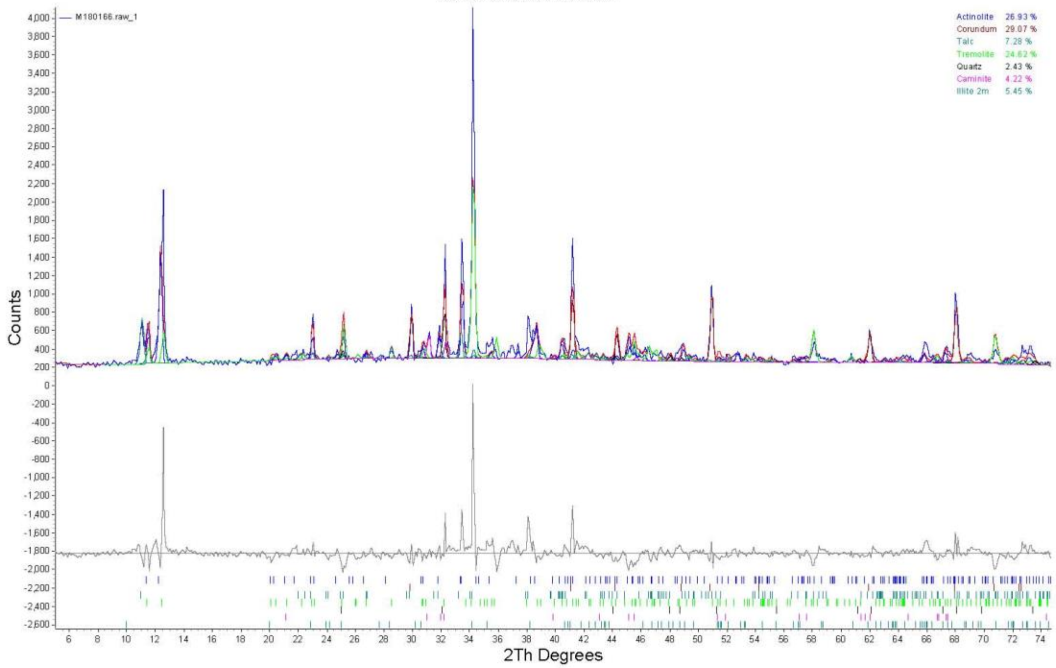

Figure 1: Rietveld refinement plot of Ribal (M180166). The blue line is the measured intensity, the red line is the calculated pattern, other coloured lines are individual mineral patterns, the grey line is the difference profile and the vertical bars are the reflection positions. The peak at 9°2θ is associated with the corundum spike.