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TECHNICAL REPORT

ASSESSMENT OF GEMSTONE POTENTIAL

PEDDIE PROPERTY, HAILEYBURY, ONTARIO

December 19, 2019



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Table of Contents

Table of Figures & Tables.....	ii
Summary	1
Location, Access and Ownership	2
Property History and Previous Work	3
Geological Setting	3
Field Sampling	6
Mineralogy Analyses	7
Interpretation	16
Recommendations	16
References	17
Certificate of Qualified Person	18
APPENDIX Statement of Costs.....	19
APPENDIX Basics of Raman Spectrometry	20

Table of Figures & Tables

Figure 1. Location of the Peddie Property in Bucke Township, Larder Lake Mining Division. The yellow diamond depicts location of the Peddie prospect as listed in the Ontario MDI database.....	2
Figure 2. Bedrock geology of the Peddie Property area.....	5
Figure 3. Mineral interpretation of energy spectra from Raman Spectrometer analyses	9
Table 1. Summary of property history and previous work.....	3
Plate 1. Peddie Kimberlite exposure and sample site.....	6
Plate 2. Range of phenocryst grain sizes in surface samples.....	7
Plate 3. Selected samples from the Peddie Kimberlite analyzed using a Raman Spectrometer.....	7

Summary

This report was prepared and submitted by a registered geoscientist employed by First Cobalt Corp., the parent company to Cobalt Industries of Canada Ltd. who holds the mining claim rights where work was conducted.

Bedrock surface sampling and a preliminary mineralogical study were conducted to assess the potential for gemstones within the Peddie Kimberlite pipe. The objective of this work was to determine if weathering has adversely affected the phenocryst minerals to not be suited for gemstone quality.

All work reported here is from bedrock sampling on Claim Cell #116589. A single, 20kg, sample was collected by hand from a well-preserved exposure of the pipe on October 5, 2019. The sample was broken in pieces for visual examination of the phenocryst phases: olivine, pyroxene, amphibole, phlogopite, ilmenite; followed by examination of representative samples using a Raman Spectrometer at the Royal Ontario Museum in Toronto, Ontario on November 13, 2019.

Access to the property is via old highway 558 (West Rd) from Haileybury and via Ramsey Road; both are maintained year-round by the municipality. Existing ATV trails lead to the surface exposures at the Peddie prospect. All spatial data contained in this report reflect a Universal Trans Mercator co-ordinate system using North American Datum83 Zone 17. Field co-ordinates and traverses were measured using a handheld Garmin GPS unit.

The preliminary mineralogy study found chrysotile (serpentine) has replaced many of the olivine phenocrysts but glaucophane (sodic amphibole) has been preserved. The presence of fresh amphibole is a positive indication that olivine may be better preserved at relatively shallow depth and may be suitable for extraction as peridot stone. Follow-up diamond drilling is recommended to obtain a fresh sample to improve the assessment of gemstone potential.

Location, Access and Ownership

The Peddie Property consists of twenty cell mining claims located within Bucke Township, approximately 4 km west of the town of Haileybury within the Timiskaming Shores Municipality (Figure 1). The property lies within the Larder Lake Mining Division, within Provincial Grid 31M05J. The claims are held entirely (100%) by Cobalt Industries of Canada Inc. (a subsidiary of First Cobalt Corp.). The cell block encloses 4 patented claims held by other parties. Surface rights are also held within the cell block; owned by the Crown.

Access to the property is via old highway 558 (West Rd) from Haileybury and via Ramsey Rd; both are maintained year-round by the municipality. Existing ATV trails lead to the surface exposures at the Peddie prospect as located within Ontario MDI Database.

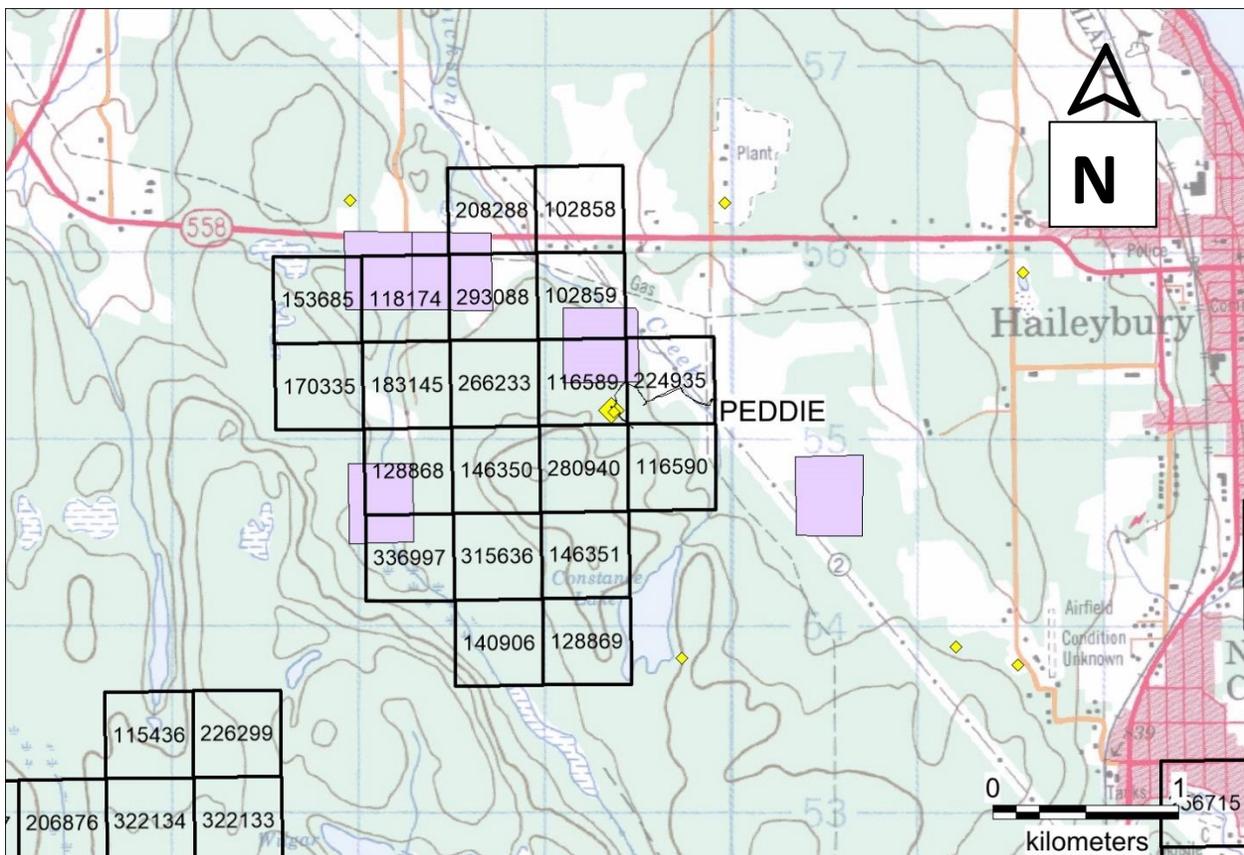


Figure 1. Location of the Peddie Property in Bucke Township, Larder Lake Mining Division. The yellow diamond depicts location of the Peddie prospect as listed in the Ontario MDI database.

Co-ordinates for the Peddie Kimerlite sample are **599,342E - 5,255,165N** (UTM NAD83 Zone17). All numbered claim cells are held 100% by Cobalt Industries of Canada.

Property History and Previous Work

The exploration work history of the Peddie property area is summarized below (Table 1) based on online Government of Ontario assessment files, historical Ontario Resident Geologist notes on file at the District Geologist's office in Kirkland Lake.

Table 1. Summary of previous assessment work filed.

Year	Assessment File Reference	Operator	Description
1995	31M05NE0124	Consolidated Pine Channel Gold Corp	Ground Magnetometer Surveys
2005	20000000620	Paul Gareth Walton & Leonard Wellington Peddie	Mechanical Stripping & Surveying
2006	20000001405	Paul Gareth Walton & Leonard Wellington Peddie	Overburden Stripping and Bedrock mapping

The Peddie Kimberlite pipe was discovered by Consolidated Pine Channel Gold Corp by drill targeting an airborne magnetic anomaly.

In 1999, the Geological Survey of Canada conducted a series of studies on the mineralogy and geochemistry of the kimberlite as well as the surrounding glacial sediments (McClenaghan et al., 1999). As part of these studies several trenches were excavated exposing the kimberlite. The mineralogical work on the kimberlite showed the potential to be low based on the chemistry of the typical indicator minerals for diamond prospectivity. The dispersal train of indicator minerals in the till is well constrained to < 1km from the bedrock source (McClenaghan et al, 2002).

Geological Setting

Clusters of kimberlite intrusions have been known in Kirkland Lake and New Liskeard areas since discovery in 1990 (Karsgaard et al, 2013). Kimberlite is an ultramafic igneous rock that is commonly associated with diamonds and other gemstones. In the New Liskeard area, kimberlite pipes that are generally Jurassic in age cut the Archean and Proterozoic rocks. Near the Peddie kimberlite pipe, Paleozoic limestone and siltstone are also exposed. The Peddie pipe occurs at structural junction between the older country rocks (Figure 2).

The following is a general description of the Peddie kimberlite pipe directly from McClenaghan et al., 1999:

“The Peddie kimberlite is classified as a hypabyssal-facied phlogopite macrocrystic monticellite kimberlite. A high precision U-Pb perovskite radiometric age determination of 153.6 Ma (Heaman and Kjarsgaard, 1998) indicates the kimberlite is of Late Jurassic age. This age is consistent with kimberlite intruding a Paleoproterozoic age Nipissing quartz diabase sill, and containing rare Paleozoic carbonate xenoliths. The kimberlite contains quite unusual ‘eggs’ (10 to 20 cm in size) consisting of >90% olivine which seems not to be mantle dunite xenoliths and an unusually high volume of large, fresh olivine grains that give it a distinct mineralogical signature.”

Outcrops in the vicinity of the Peddie kimberlite exposures consist of Nipissing Diabase that form the rugged hills between shallow swamps.

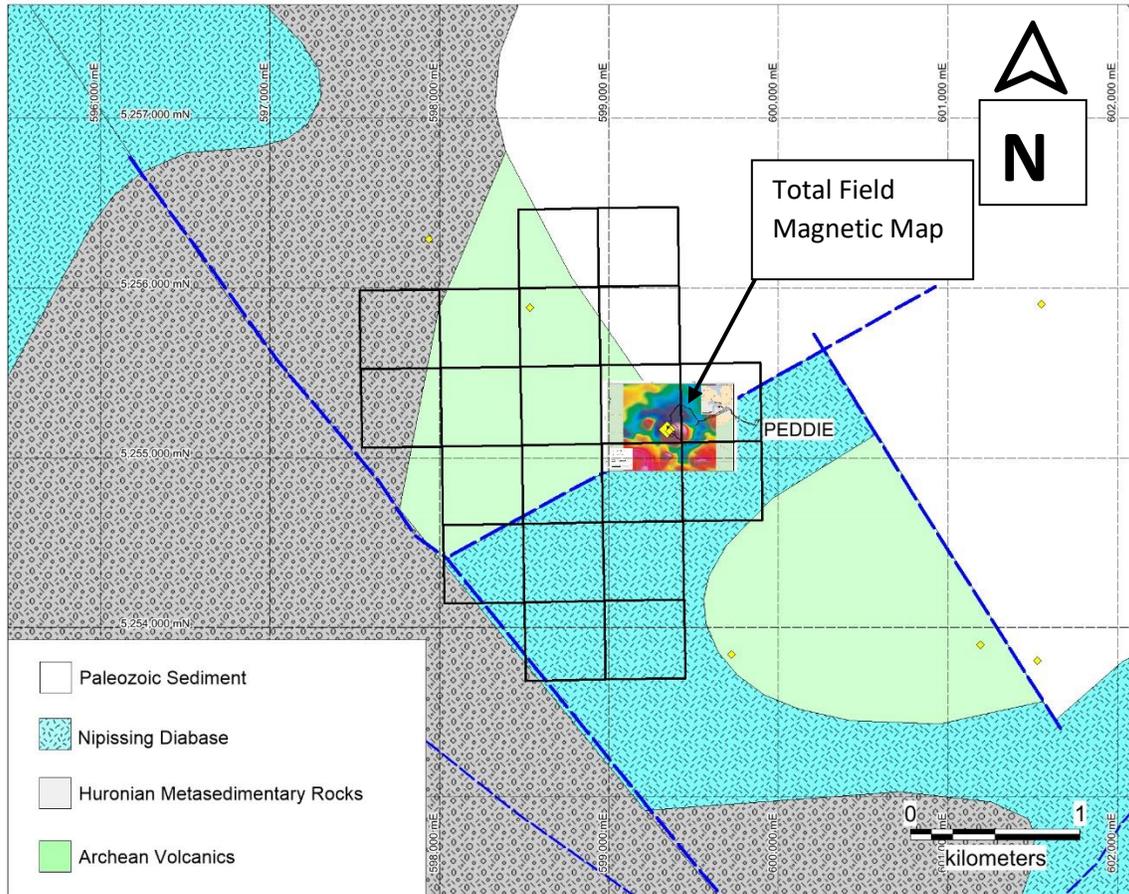


Figure 2. Bedrock geology of the Peddie property area (after Ayer and Chartrand, 2011). The magnetic data map published by the GSC (Kjarsgaard, 2003) shows the relative location of the Peddie Kimberlite relative to the property outlines (in black).

Field Sampling

All work reported here is from bedrock sampling on Claim Cell #116589. A field visit to the location of the Peddie Kimberlite Pipe was made on October 5, 2019. The kimberlite exposed by trenching in 2005-2006 was found to be still outcropping and relatively well preserved. Surface weathering was also deemed not extensive so a single sample (20kg) was collected by hand (Plate 1). The location of the sample is 599,342E - 5,255,165N (UTM NAD83 Zone17).

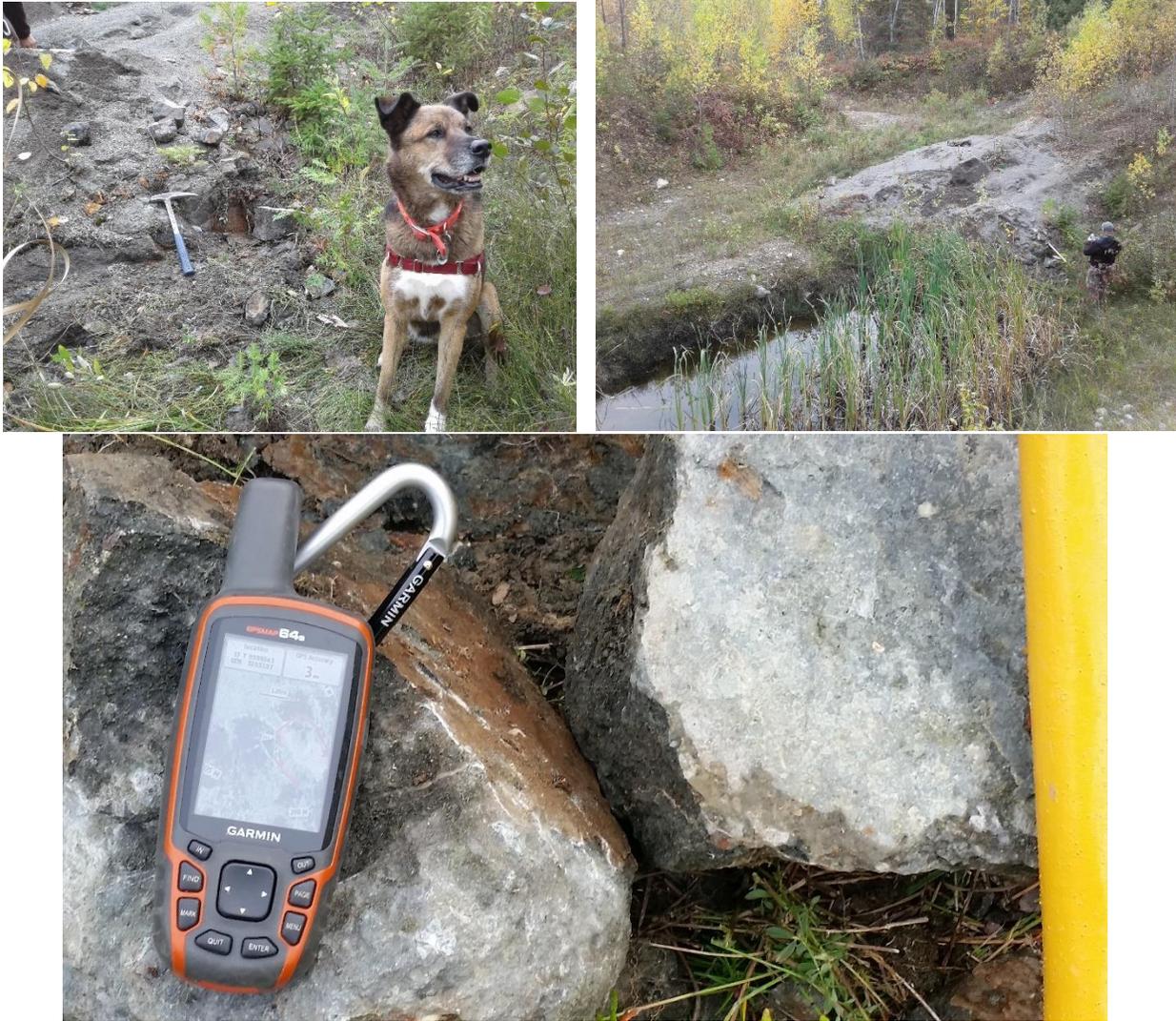


Plate 1. Peddie Kimberlite exposure and sample site (at rock hammer; furry field assistant for scale).

Mineralogy Analyses

Several pieces of the bulk sample were examined with specific attention to the phenocryst and xenocryst phases of the kimberlite. A range of minerals phases and grain sizes were observed (Plate 1). Representative pieces were selected to analyze the largest mineral phase for proper mineral identification using a Raman Spectrometer.



Plate 2. Range of phenocryst grain sizes in surface sample.

The left photo in Plate 2 shows a large dark coloured, round phenocryst that consists of both olivine (fosterite) and pyroxene previously described as “eggs”. The finer grained sample on the right in Plate 2 is more phlogopite rich.

A Raman Spectrometer is ideal for basic mineral identification since no preparation of the rock sample is needed; such as preparation of thin section, polished surfacing, carbon coating etc. A basic description of Raman Spectrometry is provided in Appendix 1.

Examples of phenocrysts selected for analyses are shown in Plate 3. Each phenocryst is analysed separately and the spectral results are subsequently interpreted so that a wide range of minerals could be tested.



Plate 3. Selected samples from the Peddie Kimberlite analyzed using a Raman Spectrometer. Individual phenocrysts studied are circled in red.

Analyses of samples were conducted at the Royal Ontario Museum in Toronto, Ontario on November 13, 2019. The instrument used is a Horiba LabRAM ARAMIS from 2010. For the analyses, a 532 nm 50mW laser was used. The energy spectra collected for each analysis is filtered to reduced background effects using software called Crystal Sleuth. This software contains 1000s of spectral patterns corresponding to individual minerals and matches the analyzed data to this library producing a list of suggested mineral identification. The results are shown in Figure 3.

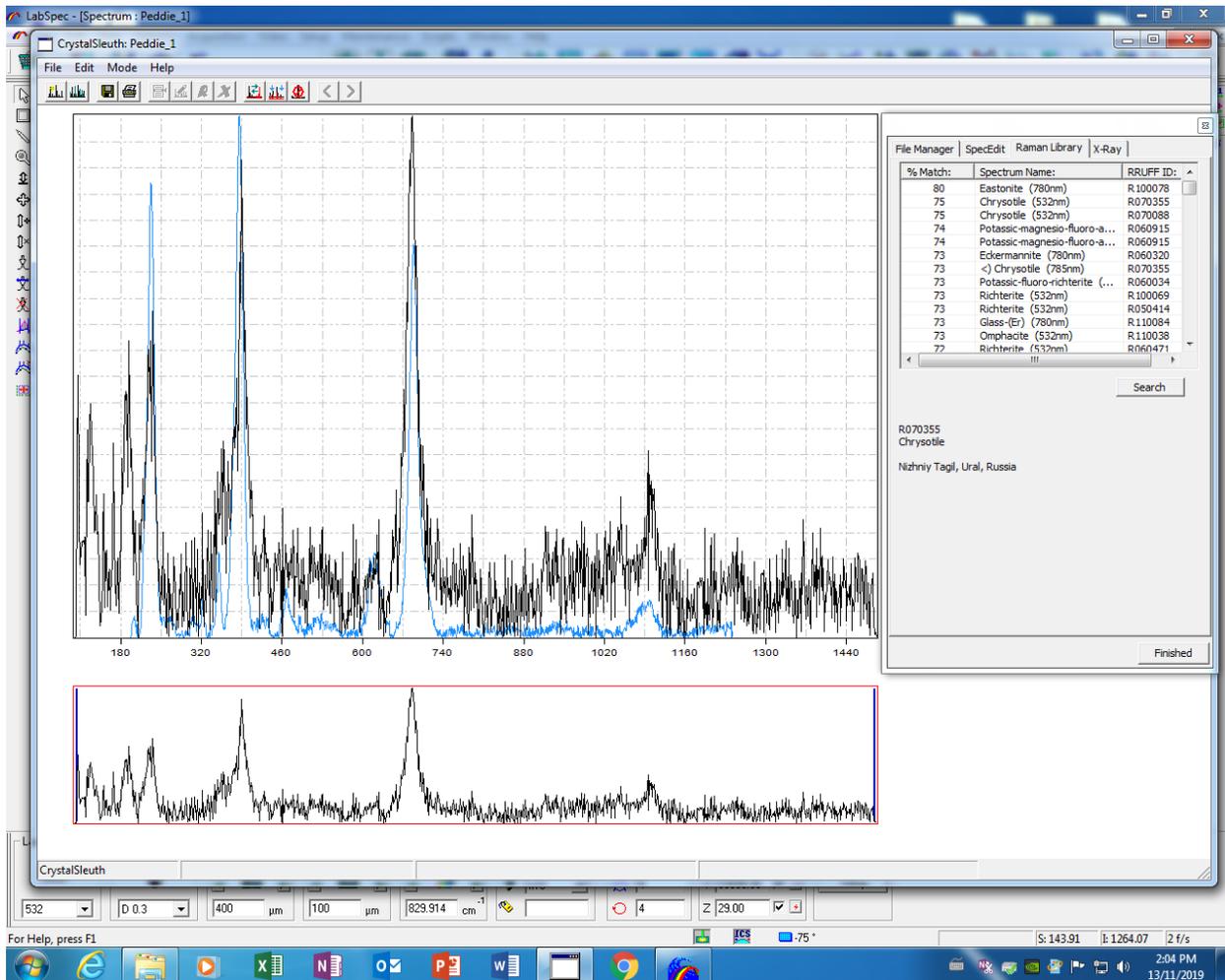


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 1-spot 1. = Chrysotile (spectra in blue)

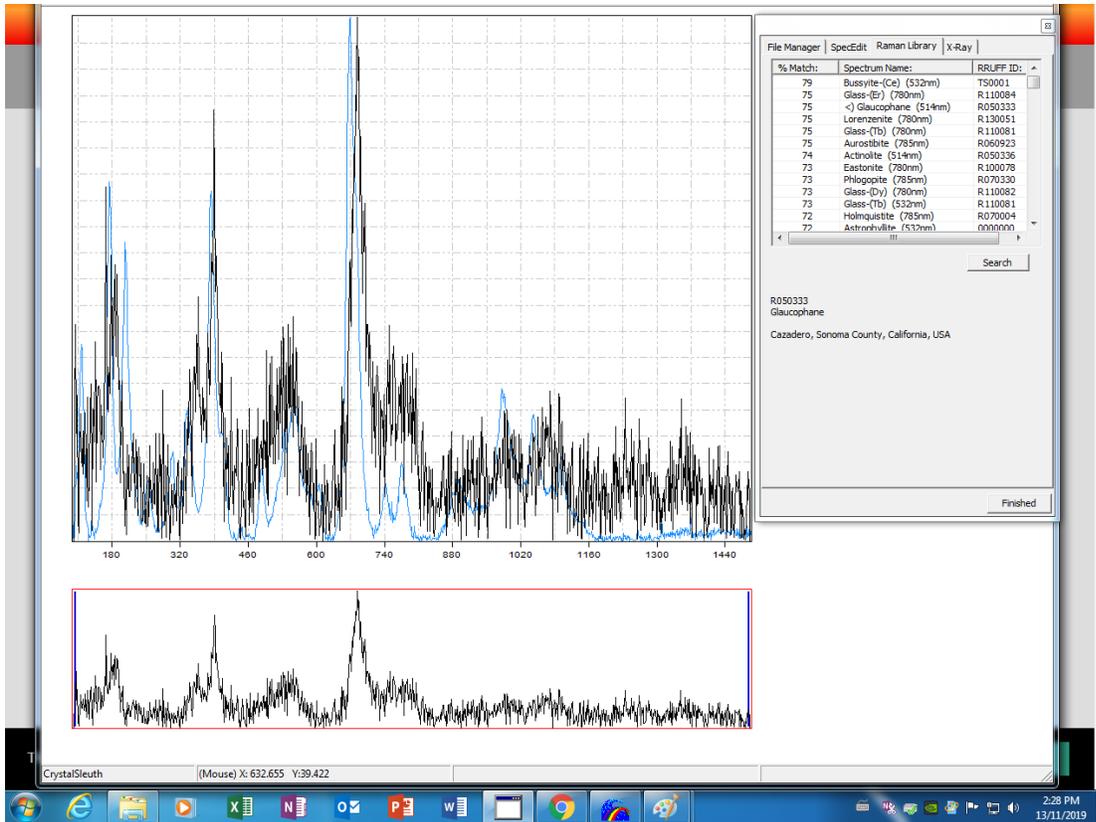


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 1-spot 2a. = Glaucophane (spectra in blue)

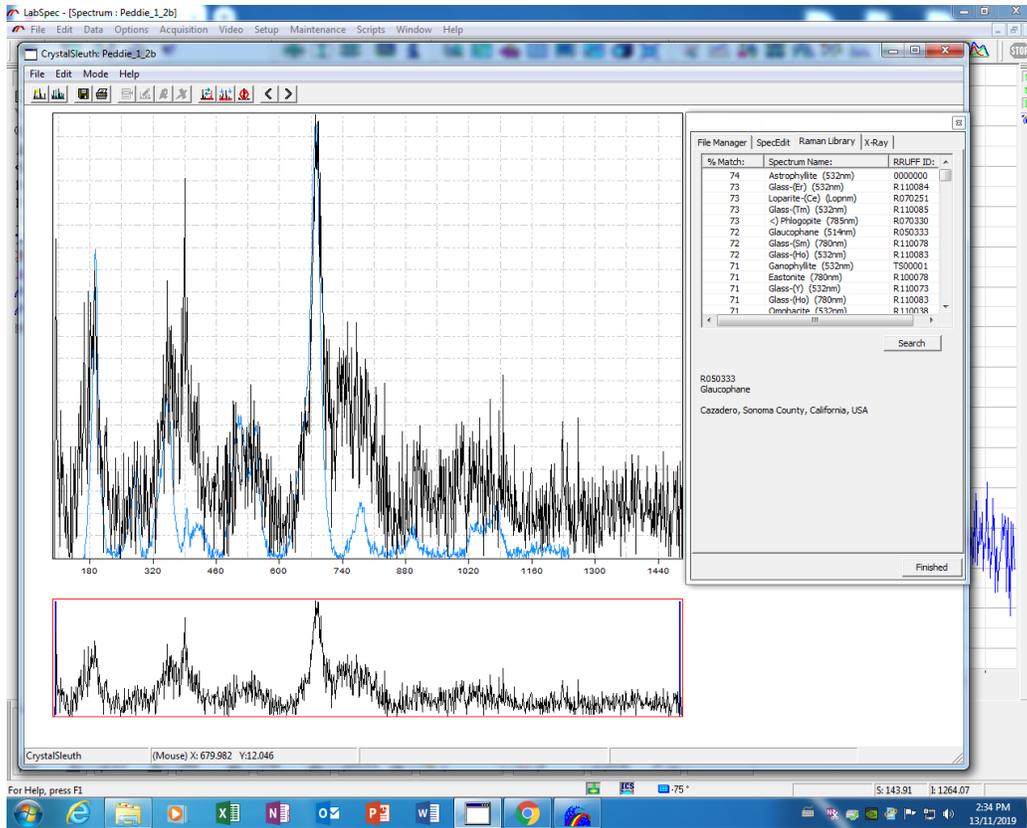


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 1-spot 2b. = Phlogopite (spectra in blue)

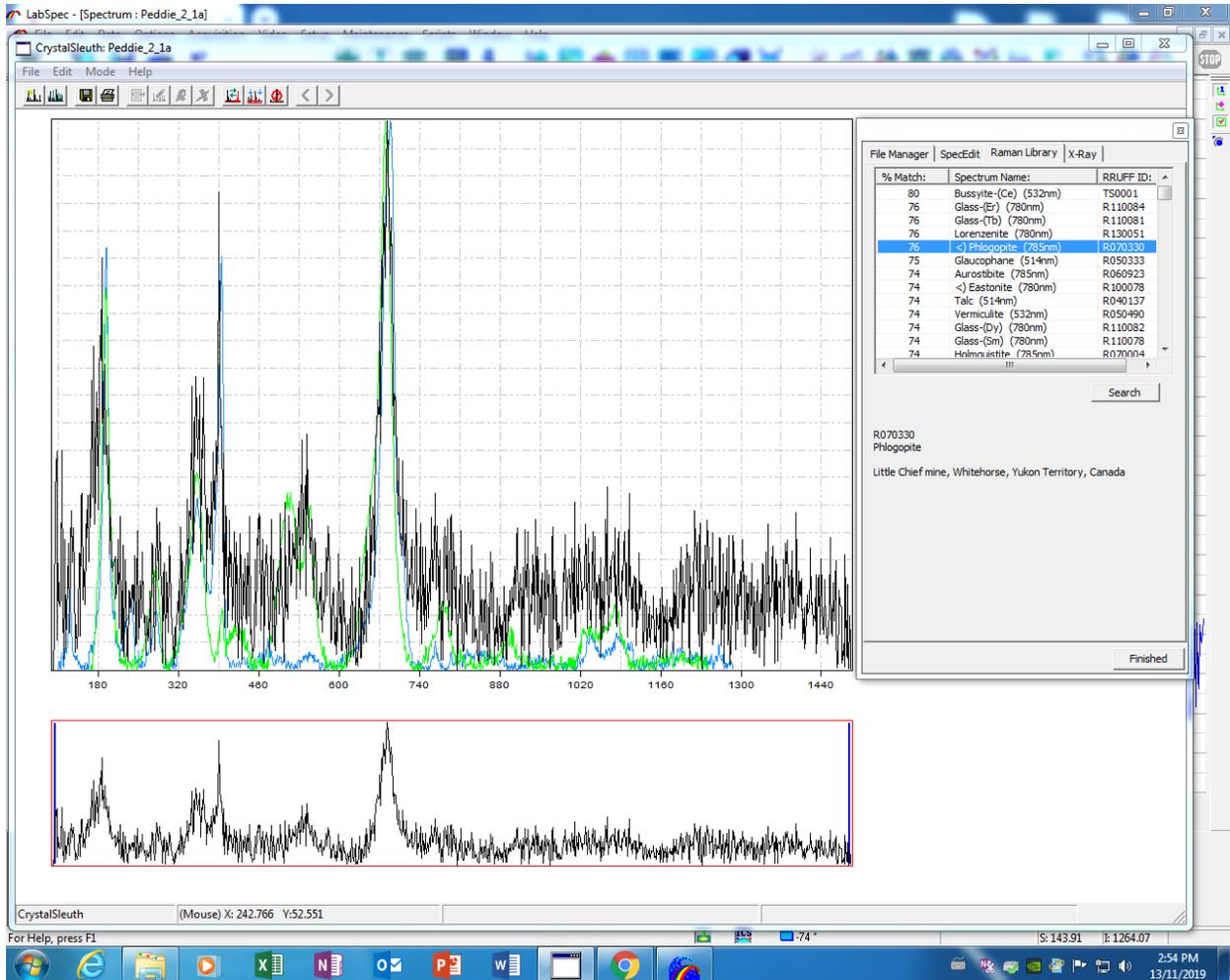


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 2-spot 1. = Phlogopite (spectra in blue)

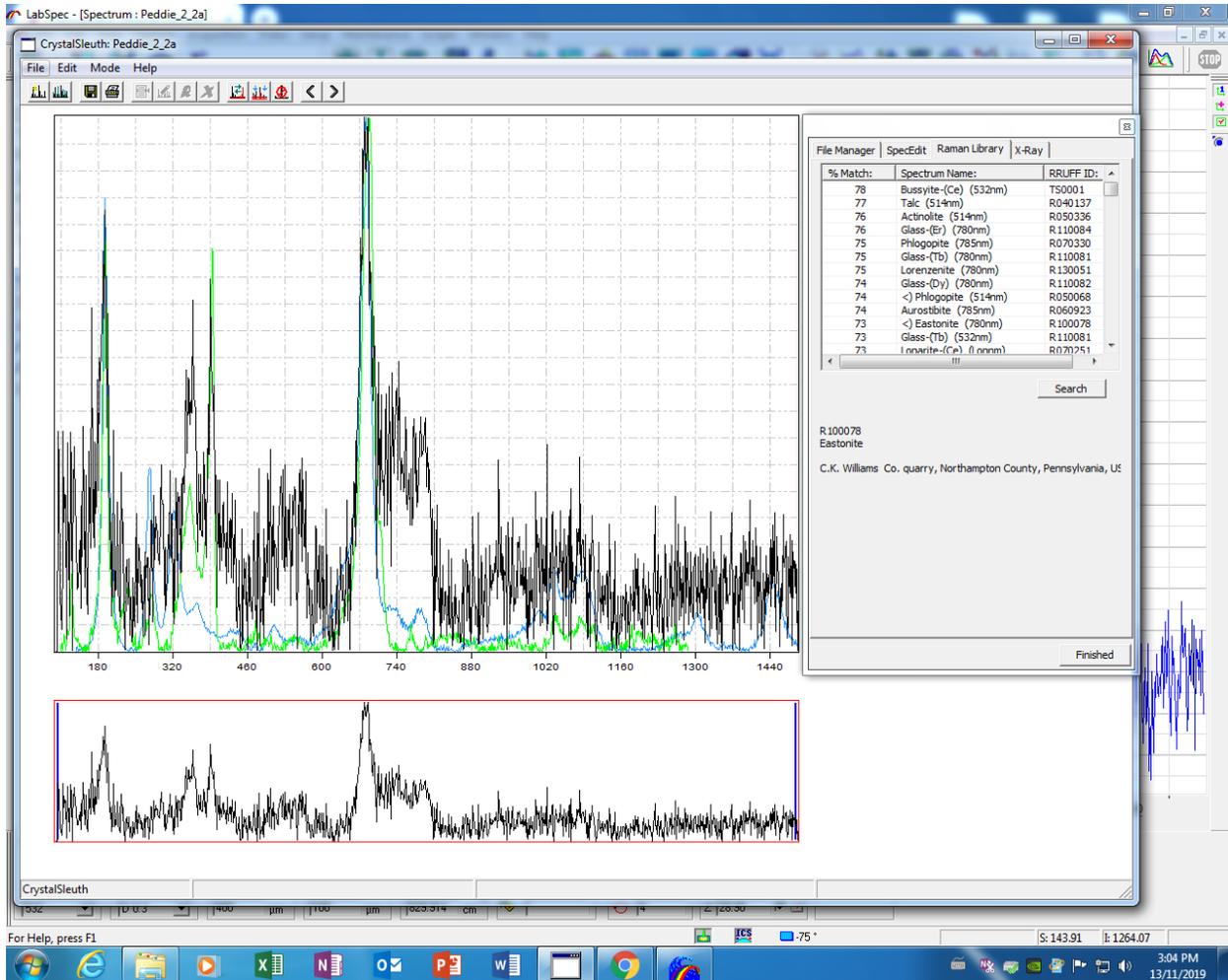


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 2-spot 2. = Mixed Mica Phlogopite (spectra in blue) and Eastonite (green spectra).

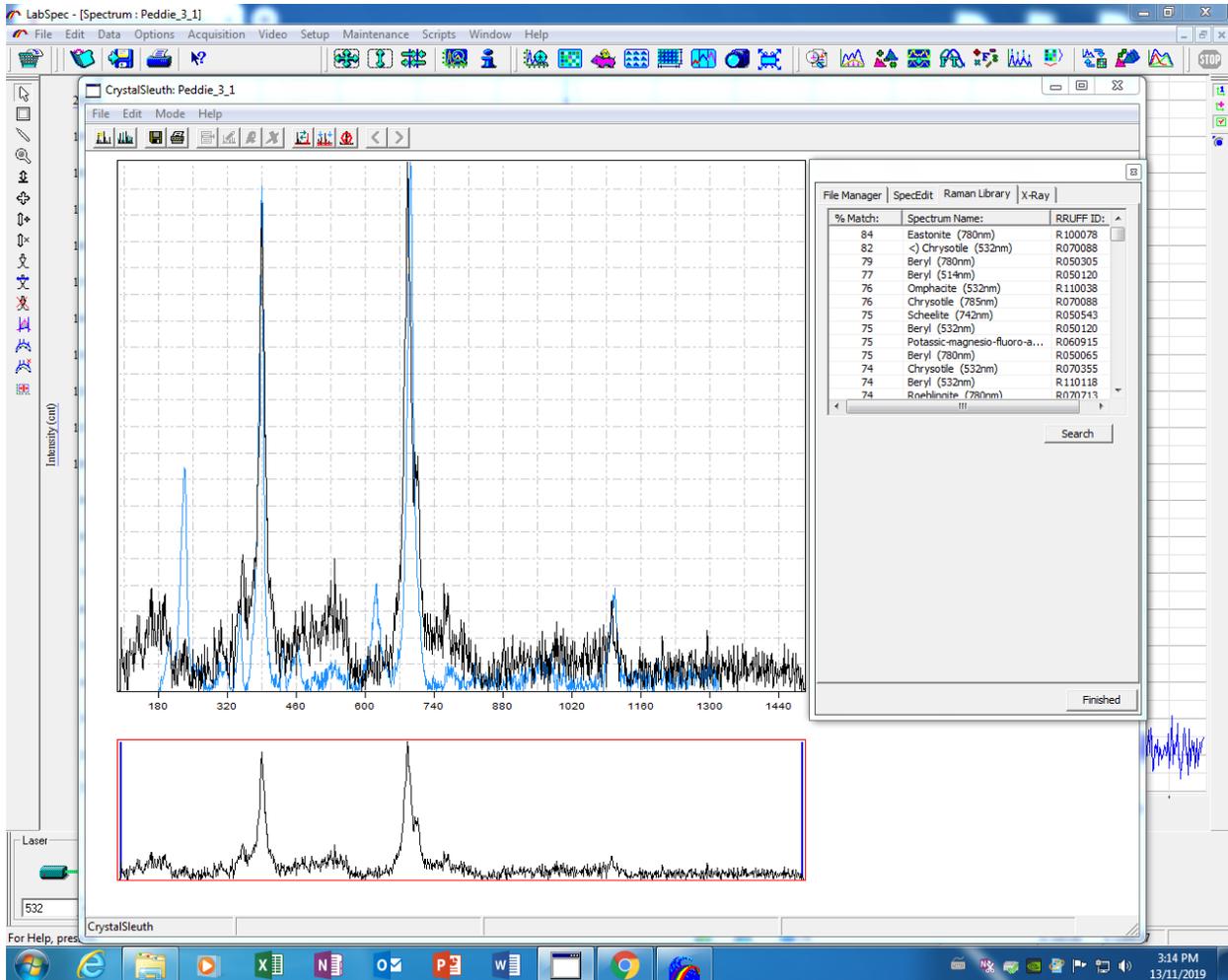


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth mineral interpretation at right: Sample 3-spot 1. = Chrysotile (spectra in blue)

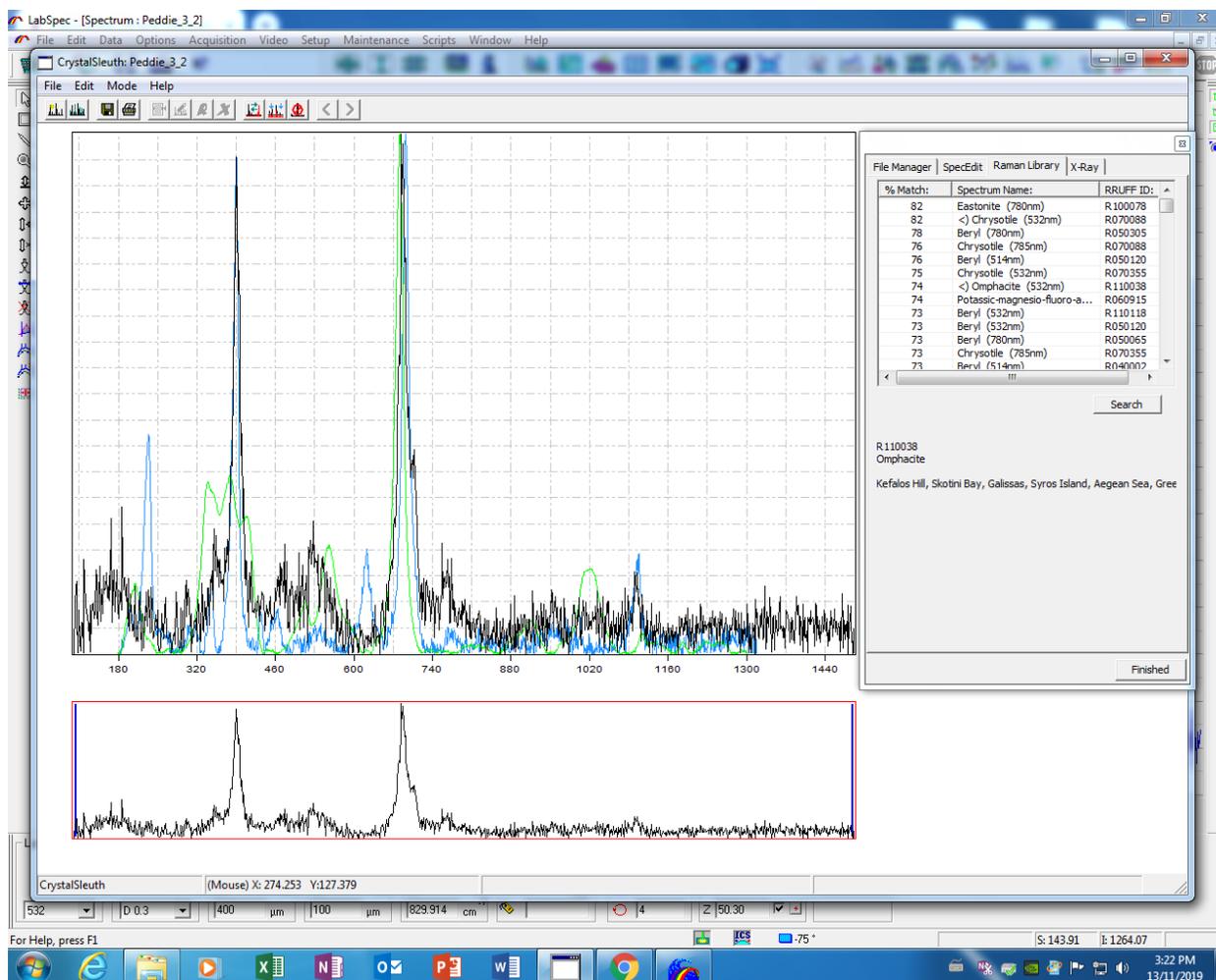


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth mineral interpretation at right: Sample 3-2-spot 1. = Mixed mineral: Chrysotile (spectra in blue) and Omphacite (in green).

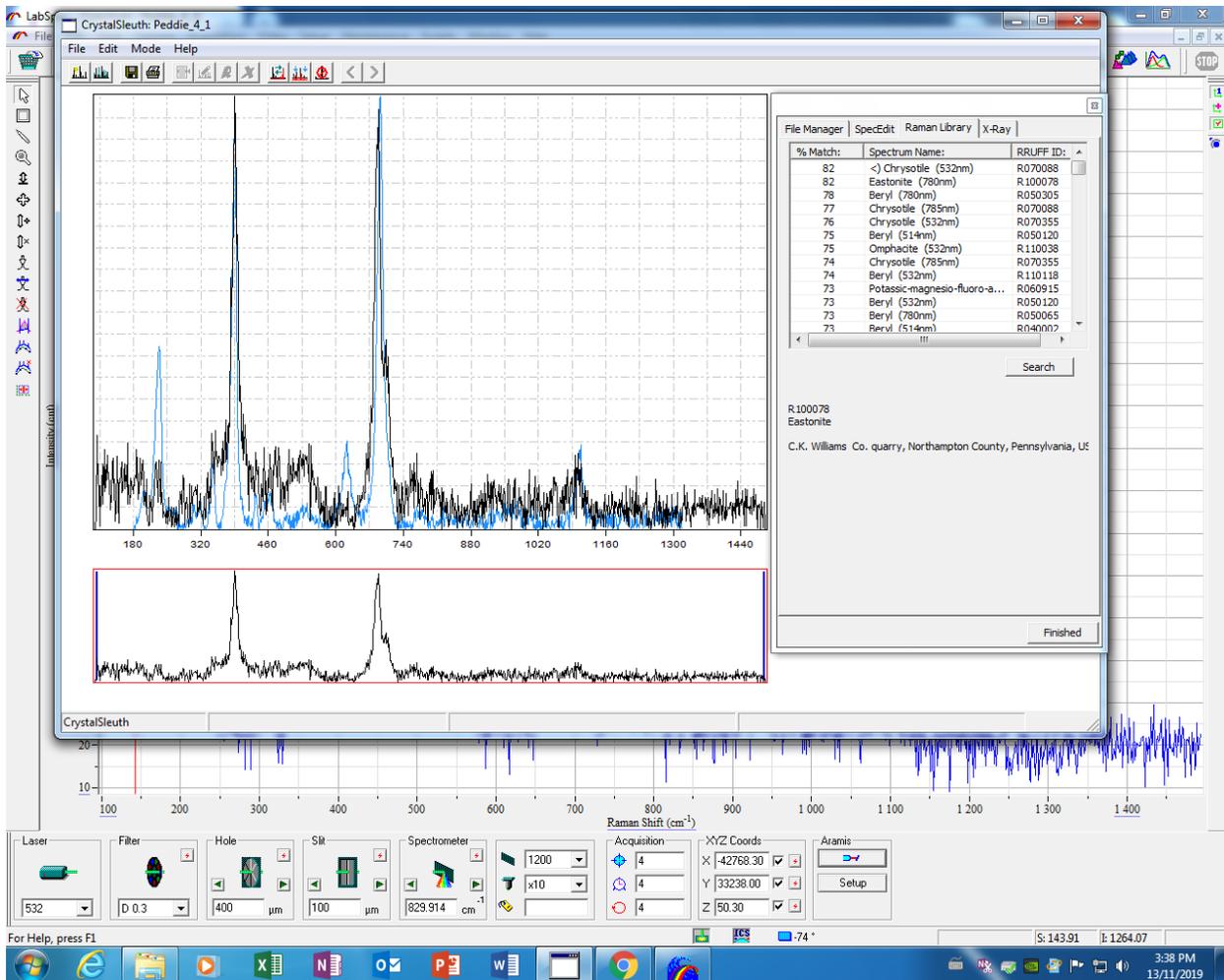


Figure 3. Raman Spectra filtered to reduce background effects. X-Axis = frequency (keV), Y axis units = Intensity (counts per 90 seconds). Crystal Sleuth software mineral interpretation at right: Sample 1-spot 1. = Chrysotile (spectra in blue)

Interpretation

Although the mineralogy study is preliminary, the phenocrysts analyzed by Raman Spectrometry were found to both primary and secondary mineral phases. Phlogopite, glaucophane (Na-amphibole), omphacite (Na-pyroxene) and eastonite (Na-rich mica) are all common minerals in kimberlite intrusions. Chrysotile (serpentine) is a secondary phase that occurs due to weathering of olivine. Fosterite (Mg-olivine) was identified by the software program in two samples, but at low relative abundance (10-15%).

Olivine is easily weathered, but the presence of relatively unweathered phenocryst mineral phases suggests fresh phases may occur at shallow depths and may be suitable for extraction.

Recommendations

Based on the results, a shallow drilling program is recommended to test for fresh olivine that may be suitable as peridot gemstones. The abundance and size of olivine previously found and noted in this single sample is a positive indication that some stones that qualify as peridot may be present.

References

- Ayer, J.A. and Chartrand, J.E. 2011. Geological compilation of the Abitibi greenstone belt; Ontario Geological Survey, Miscellaneous Release—Data 282.
- Kjarsgaard, B.A. 2003. Northern Ontario Field Trip Guidebook. Guidebook prepared for the VIIIth International Kimberlite Conference. 46 p.
- McClenaghan, M.B., Kjarsgaard, BA. Kjarsgaard, I.M., and Paulen, R.C. 1999. Mineralogy and geochemistry of the Peddie Kimberlite and associate glacial sediments, Lake Temiskaming, Ontario, Geological Survey of Canada Open File 3775.
- McClenaghan, M.B., Kjarsgaard, BA. Kjarsgaard, I.M., and Paulen, R.C. 2002. Indicator mineral content and geochemistry of the till around the Peddie Kimberlite, Lake Temiskaming, Ontario. Geological Survey of Canada Open File 4262.

Certificate of Qualified Person

I, Frank Santaguida, Ph.D. P. Geo., residing in Whitby, Ontario, Canada, do hereby certify that:

- 1) I have personally prepared the Technical Report and approve of its contents.
- 2) I am the Vice President of Exploration for First Cobalt Corp. based in Toronto, Ontario at Suite 201, 140 Yonge Street M5C 1X6.
- 3) I graduated with an Honours B.Sc. and M.Sc (Earth Sciences) from University of Waterloo, Ontario in 1991 and 1994 respectively. I obtained my Ph.D. (Earth Sciences) at Carleton University, Ottawa, Ontario in 1999. My Ph.D. dissertation studied igneous and hydrothermal minerals in volcanic and intrusive rocks. I have practiced as a geoscientist continuously since 1991. I have worked on exploration and mining programs throughout Canada, Australia, Panama, Africa, Finland, and Sweden. I have extensive experience with both precious and base metals in various mineral deposit types and geological terranes.
- 4) I am a Practicing Professional Geologist registered with the Association of Professional Geoscientists of Ontario (APGO) since 2005, registration number, 0836
- 5) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all the scientific and technical information that is required to be disclosed to ensure the Technical Report is not misleading.

Toronto, Ontario, Canada

(Signed and Sealed) "Frank Santaguida"



December 19, 2019

Frank Santaguida, Ph.D., P. Geo.

Vice President Exploration

First Cobalt Corp.

APPENDIX Statement of Costs

All work performed in this report was conducted by Frank Santaguida, PhD, PGeo. Analytical work at the Royal Ontario Museum was supervised by staff in the Earth and Minerals Laboratory.

Work (days)	Date	Type	Location	Amount (\$800 per day)
0.5	October 5, 2019	Field work, sampling	Peddie Property	400
0.5	November 12, 2019	Rock cutting, sample description	Whitby, Ontario	400
0.5	November 13, 2019		ROM, Toronto, Ontario	400
3.0	December 17-19, 2019	Report preparation and writing	Toronto, Ontario	2,400

Total costs = \$3600

APPENDIX

Basics of Raman Spectrometry (from Horriba website)

https://www.horiba.com/en_en/

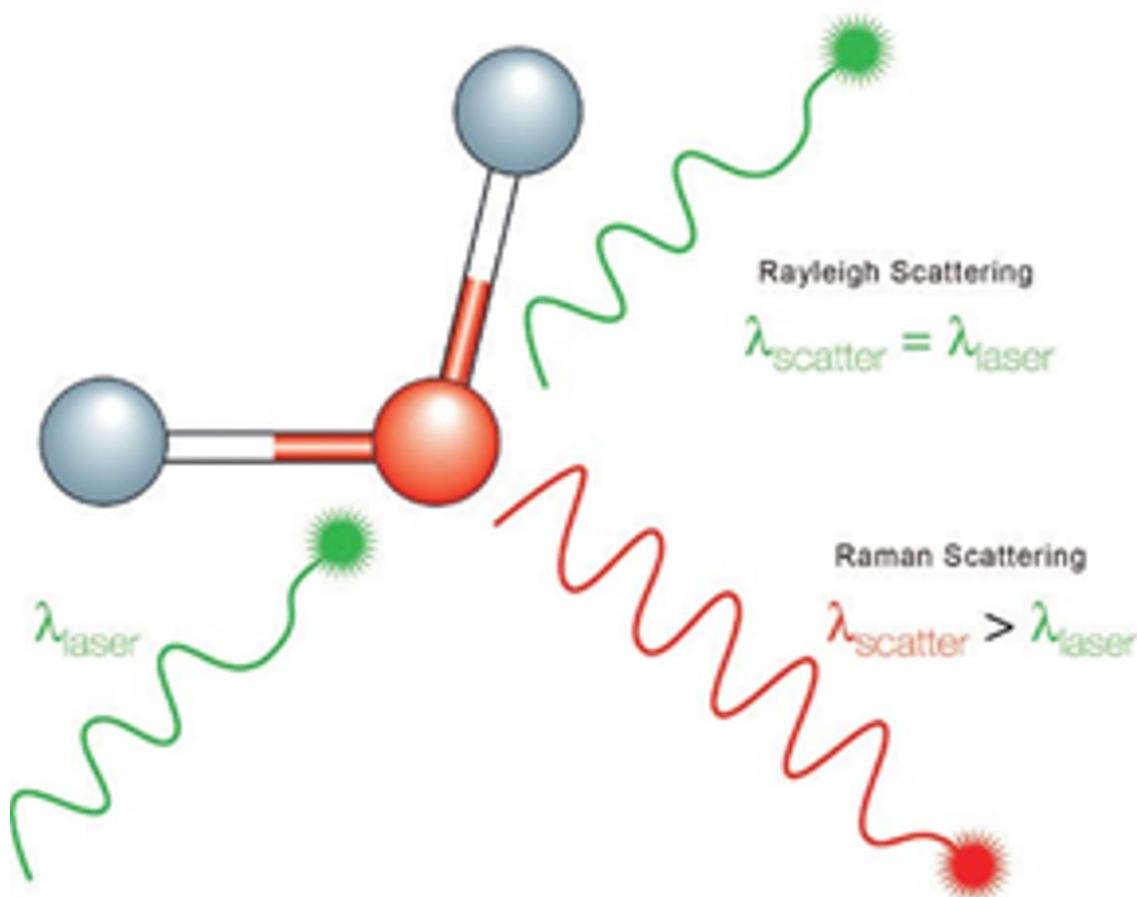


Fig. 1: Raman principle

Raman Spectroscopy is a non-destructive chemical analysis technique which provides detailed information about chemical structure, phase and polymorphy, crystallinity and molecular interactions. It is based upon the interaction of light with the chemical bonds within a material.

Raman is a light scattering technique, whereby a molecule scatters incident light from a high intensity laser light source. Most of the scattered light is at the same wavelength (or color) as the laser source and does not provide useful information – this is called Rayleigh Scatter. However a small amount of light (typically 0.0000001%) is scattered at different wavelengths (or colors), which depend on the chemical structure of the analyte – this is called Raman Scatter.

A Raman spectrum features a number of peaks, showing the intensity and wavelength position of the Raman scattered light. Each peak corresponds to a specific molecular bond vibration, including individual bonds such as C-C, C=C, N-O, C-H etc., and groups of bonds such as benzene ring breathing mode, polymer chain vibrations, lattice modes, etc.

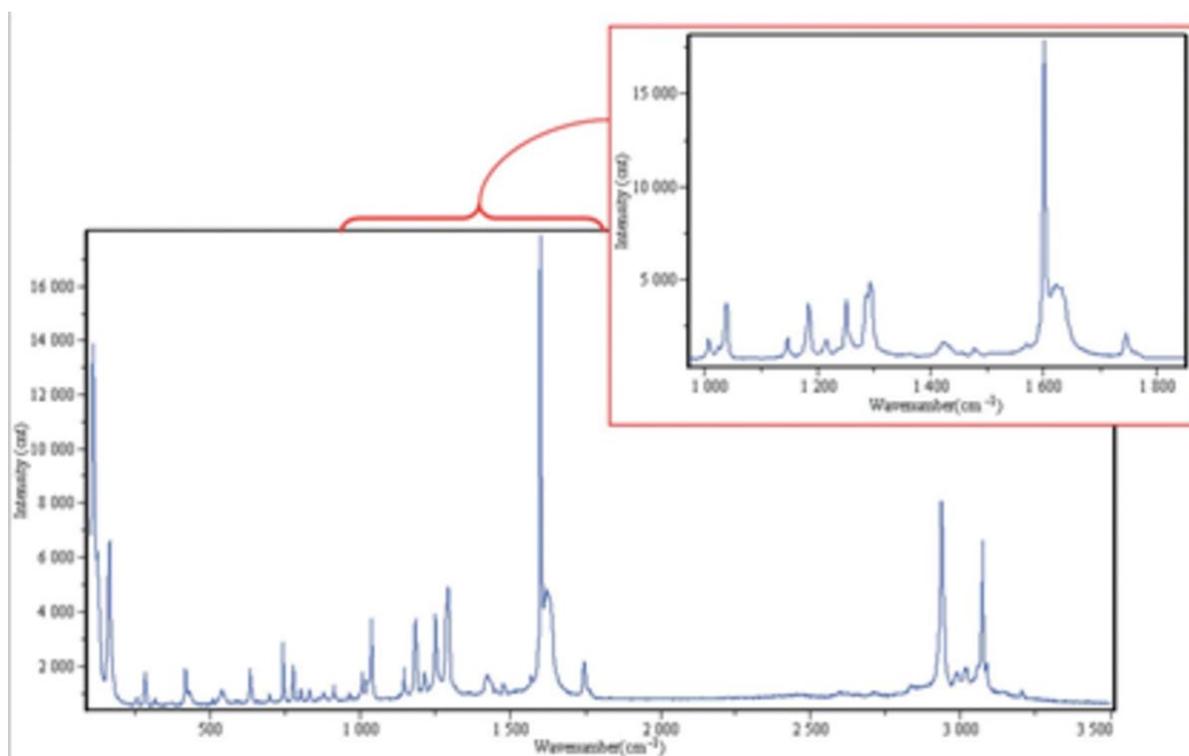


Fig. 2: A typical Raman spectrum, in this case, of aspirin (4-acetylsalicylic acid). The inset image shows the detail which is present in the spectrum

Information provided by Raman spectroscopy

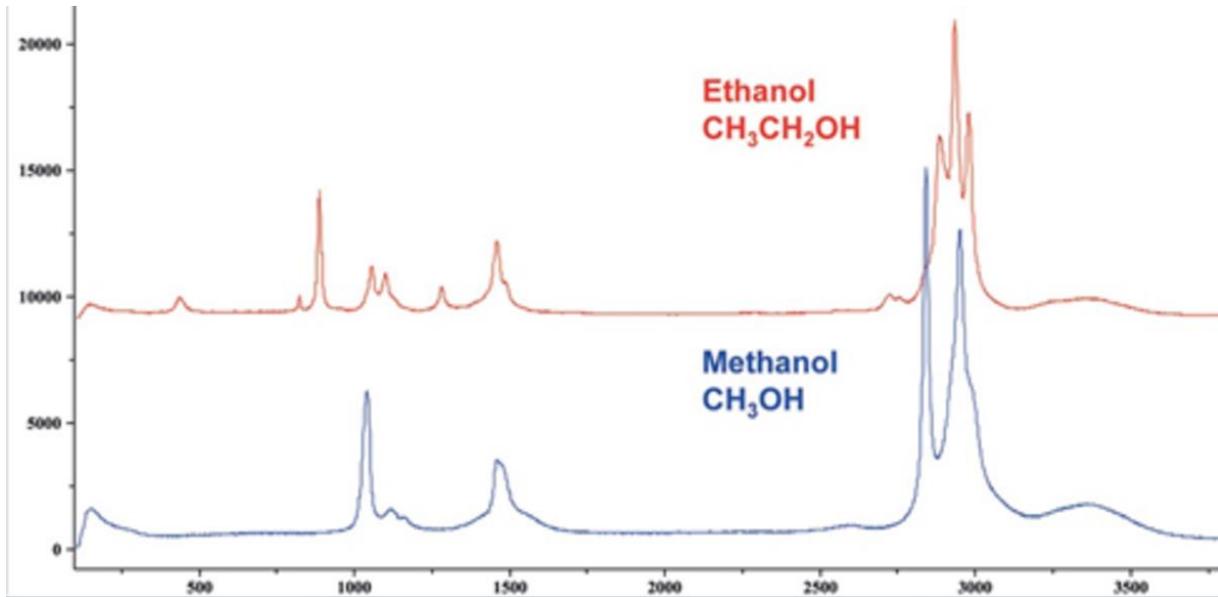


Fig. 3: Raman spectra of ethanol and methanol, showing the significant spectral differences which allow the two liquids to be distinguished.

Raman spectroscopy probes the chemical structure of a material and provides information about:

- Chemical structure and identity
- Phase and polymorphism
- Intrinsic stress/strain
- Contamination and impurity

Typically a Raman spectrum is a distinct chemical fingerprint for a particular molecule or material, and can be used to very quickly identify the material, or distinguish it from others. Raman spectral libraries are often used for identification of a material based on its Raman spectrum – libraries containing thousands of spectra are rapidly searched to find a match with the spectrum of the analyte.

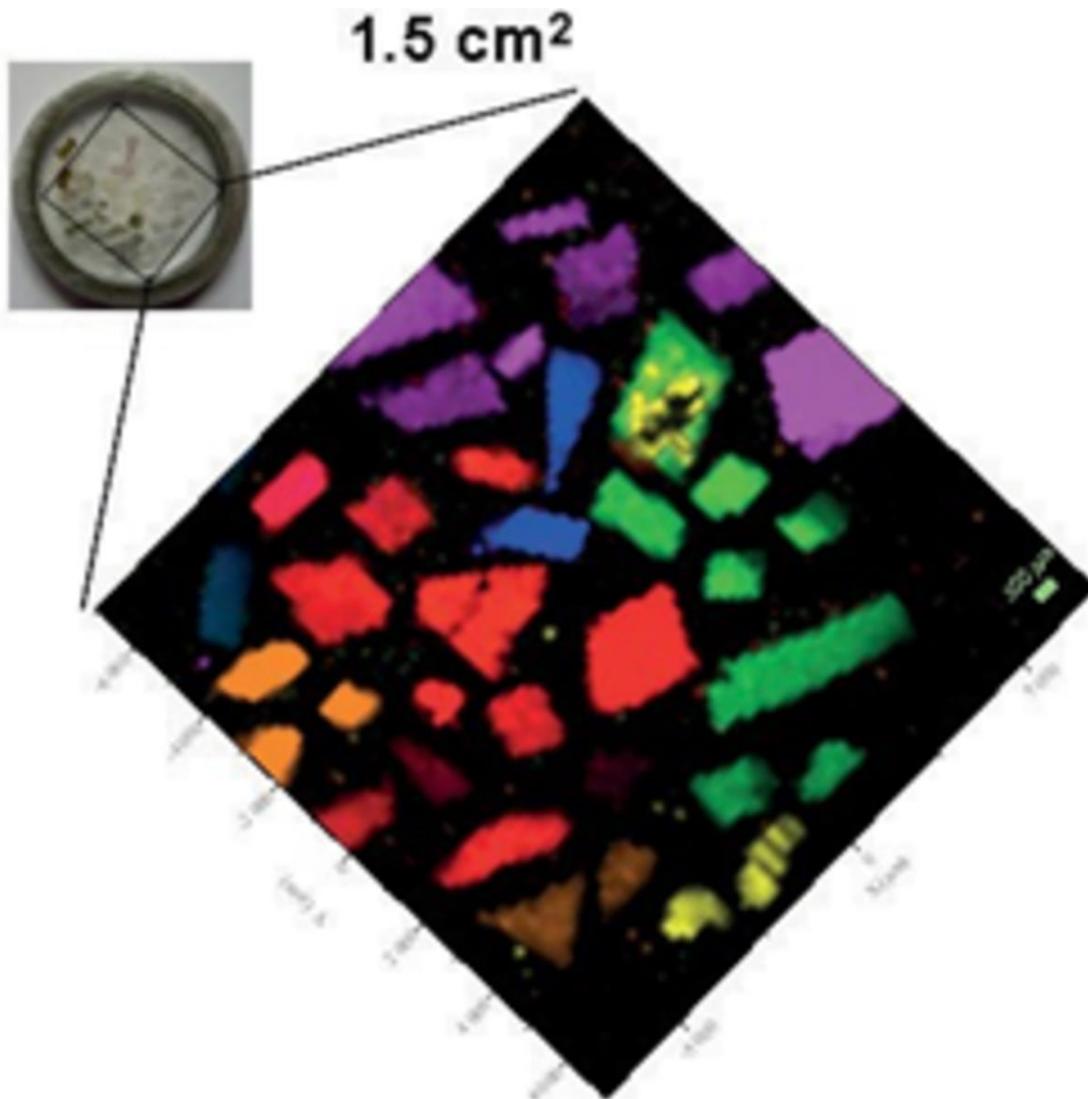


Fig. 4: Mineral distribution

In combination with mapping (or imaging) Raman systems, it is possible to generate images based on the sample's Raman spectrum. These images show distribution of individual chemical components, polymorphs and phases, and variation in crystallinity.

Raman spectroscopy is both qualitative and quantitative.

The general spectrum profile (peak position and relative peak intensity) provides a unique chemical fingerprint which can be used to identify a material, and distinguish it from others. Often the actual spectrum is quite complex, so comprehensive Raman spectral libraries can be searched to find a match, and thus provide a chemical identification.

The intensity of a spectrum is directly proportional to concentration. Typically, a calibration procedure will be used to determine the relationship between peak intensity and concentration, and then routine measurements can be made to analyze for concentration. With mixtures, relative peak intensities provide information about the relative concentration of the components, while absolute peak intensities can be used for absolute concentration information.

Raman is used for microscopic analysis



Fig. 5: A modern Raman microscope system

Raman spectroscopy can be used for microscopic analysis, with a spatial resolution in the order of 0.5-1 μm . Such analysis is possible using a Raman microscope.

A Raman microscope couples a Raman spectrometer to a standard optical microscope, allowing high magnification visualization of a sample and Raman analysis with a microscopic laser spot. Raman micro-analysis is easy: simply place the sample under the microscope, focus, and make a measurement.

A true confocal Raman microscope can be used for the analysis of micron size particles or volumes. It can even be used for the analysis of different layers in a multilayered sample (e.g., polymer coatings), and of contaminants and features beneath the surface of a transparent sample (e.g., impurities within glass, and fluid/gas inclusions in minerals).

Motorized mapping stages allow Raman spectral images to be generated, which contain many thousands of Raman spectra acquired from different positions on the sample. False color images can be created based on the Raman spectrum – these show the distribution of individual chemical components, and variation in other effects such as phase, polymorphism, stress/strain, and crystallinity.

History of Raman microscopy

HORIBA Scientific now incorporates the major innovators of Raman instrumentation from the 1960s to the 1990s - Spex Industries, Coderg/Lirinord/Dilor, and Jobin Yvon. From these beginnings through to the present day, HORIBA Scientific and its associated companies have been at the forefront of the development of Raman spectroscopy.

The Raman microscope was developed in Lille, France under the direction of Professor Michel Delhay and Edouard DaSilva, and was commercially produced as the MOLE™ (Molecular Optics Laser Examiner) by Lirinord (now HORIBA Scientific). It developed as the molecular analog of Castaing's electron microscope. As such it provides bonding information on condensed phase materials; in addition to detection of molecular bonding, identification of the crystalline phase and other more subtle effects also proved of significant interest.

The microscope was initially integrated with the scanning double grating monochromator (c. 1972). When high sensitivity, low noise multichannel detectors became available (mid 1980s), triple stage spectrographs were introduced with the microscope as an integrated component. In 1990 the holographic notch filters were demonstrated to provide superior laser rejection so that a Raman microscope could be built on a single stage spectrograph and provide enhanced sensitivity. Compared with the original scanning double monochromators, collection times for comparable spectra (resolution and signal to noise for a given laser power) is now at least two to three orders of magnitude higher than what it was 35 years ago.

These core innovations have been pioneered in the HORIBA Scientific labs in northern France by the scientists and engineers who were trained in Professor Delhay's laboratory, taking advantage of hardware as it came available. This included holographic gratings, notch filters, air-cooled lasers, multichannel detectors (first intensified diode arrays and then CCDs), high power computers, and associated developments in electronics and software.

More recent developments in the Raman technique include SRS (Stimulated Raman Scattering), SERS (surface enhanced Raman scattering), TERS (tip enhanced Raman scattering), integration with electron microscopes and atomic force microscopes, hybrid single bench systems (e.g., Raman-PL, Epifluorescence, Photocurrent), Transmission Raman (for true bulk material analysis).

Because of the leadership that HORIBA Scientific and its associated companies have played in the industry, well- equipped applications laboratories with highly qualified scientists have been employed continuously for more than 30 years in developing the applications of these innovative instruments.

Type of samples analyzed with Raman

Raman can be used to analyze many different samples. In general it is suitable for analysis of:

- Solids, powders, liquids, gels, slurries and gases
- Inorganic, organic and biological materials
- Pure chemicals, mixtures and solutions
- Metallic oxides and corrosion

In general it is not suitable for analysis of:

- Metals and their alloys

Typical examples of where Raman is used today include:

- Art and archaeology – characterization of pigments, ceramics and gemstones
- Carbon materials – structure and purity of nano-tubes, defect/disorder characterization
- Chemistry – structure, purity, and reaction monitoring
- Geology – mineral identification and distribution, fluid inclusions and phase transitions
- Life sciences – single cells and tissue, drug interactions, disease diagnosis
- Pharmaceuticals – content uniformity and component distribution
- Semiconductors – purity, alloy composition, intrinsic stress/strain microscope.

Analysis of solids, liquids and gases

Raman spectra can be acquired from nearly all samples which contain true molecular bonding. This means that solids, powders, slurries, liquids, gels and gases can be analyzed using Raman spectroscopy.

Although gases can be analyzed using Raman spectroscopy, the concentration of molecules in a gas is typically very low, so the measurement is often more challenging. Usually specialized equipment such as higher powered lasers and long path length sample cells are necessary. In some cases where gas pressures are high (such as gas inclusions in minerals) standard Raman instrumentation can easily be used.

Analysis from a mixture of materials

The Raman spectrum from a material will contain Raman information about all of the molecules which are within the analysis volume of the system. Thus, if there is a mixture of molecules, the Raman spectrum will contain peaks representing all of the different molecules. If the components are known, the relative peak intensities can be used to generate quantitative information about the mixture's composition. In case of complex matrixes, chemometrics methods might also be employed to build quantitative methods.