REPORT ON A PETROGRAPHIC INVESTIGATION

FOR THE HINDON COPPER PROPERTY

Hindon Township, Ontario

Prepared by:

James Atkinson P. Geo.

With Petrographic Investigation by Dr. Andrew Connely

Luminex

For JD Exploraiton INC.

February 2014.

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INTRODUCTION

Sample collection was completed by James Atkinson. Geo and the Petrographic investigation was prepared by Dr. Andrew G. Conly of Lakehead University. The following report details the sample collection and an accompanying report describes the Petrographic Study.

LOCATION AND ACCESS

The Hindon Property (HP) lies in Hindon Township in Southern Ontario approximately 200 kilometers northeast of Toronto, 20 km north of the town of Minden and 5 km west of the village of Carnarvon (Figure 1 – Location Map). National Topographic System (NTS) map number 31E/2 covers the area while Ontario Base Maps (OBM) numbered 10 17 6700 49900 and 10 17 6700 49850 cover the property.

The northern boundary of the property lies close to Ontario Highway 118 and access can be had along an ATV/Four wheel road that leads from Highway 118 southwards to the center of the property at the northern end of the West Zone. A newly identified trail (former drill road?) leads to the area of the east Zone also from Highway 118.

The property is typified by linear ridges and narrow ponds connected by streams. The topography appears to be controlled by the geological features in the subsurface. The bush is typical of the area including mixed deciduous and conifer trees with areas of open forest related to bedrock exposure. There are areas of good bedrock exposure especially along the ridges but overall the bedrock exposure appears to be limited although it is thought that the overburden is mostly shallow except in boggy areas.

CLAIM INFORMATION

The property consists of one claim number 4209954 which comprises 12 units in Hindon Township in the Southern Ontario Mining Division. The claim was staked in March 2011 and is due March 17, 2015. The property is owned by JD Exploration Inc. 4149 Watson Rd. Puslinch, Ontario. The claim is shown in Figure 2.

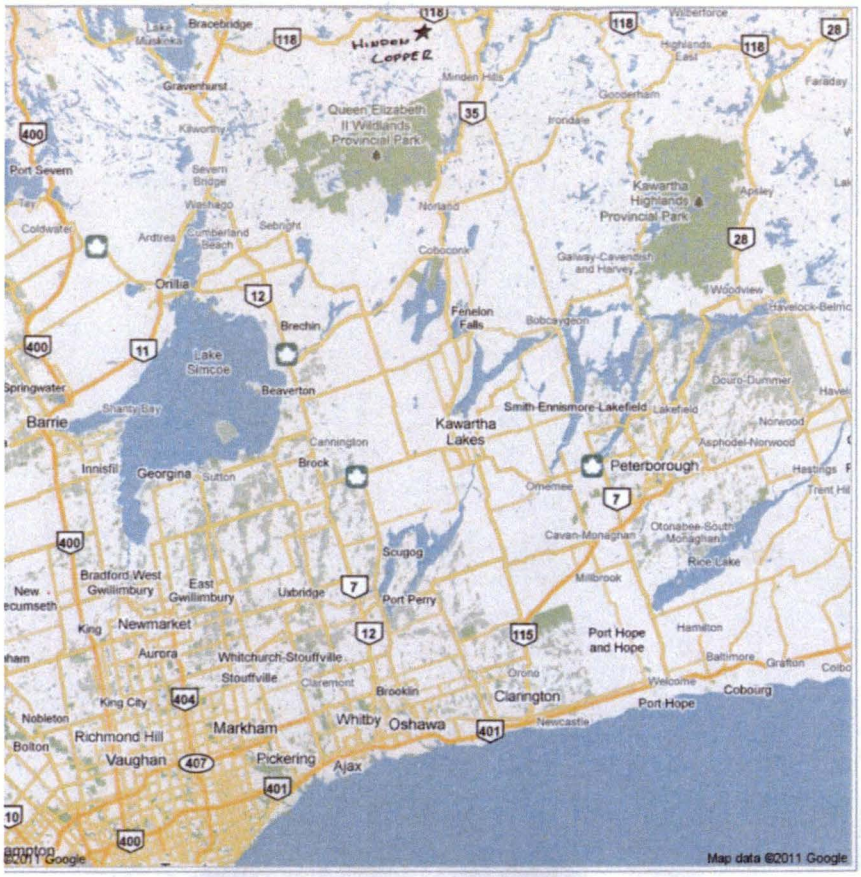

FIGURE 1 – LOCATION PLAN
Hindon Copper Property

The samples collected for petrographic study were all collected on Claim number 4209954 which is the Hindon Copper Property of JD Exploration Inc.

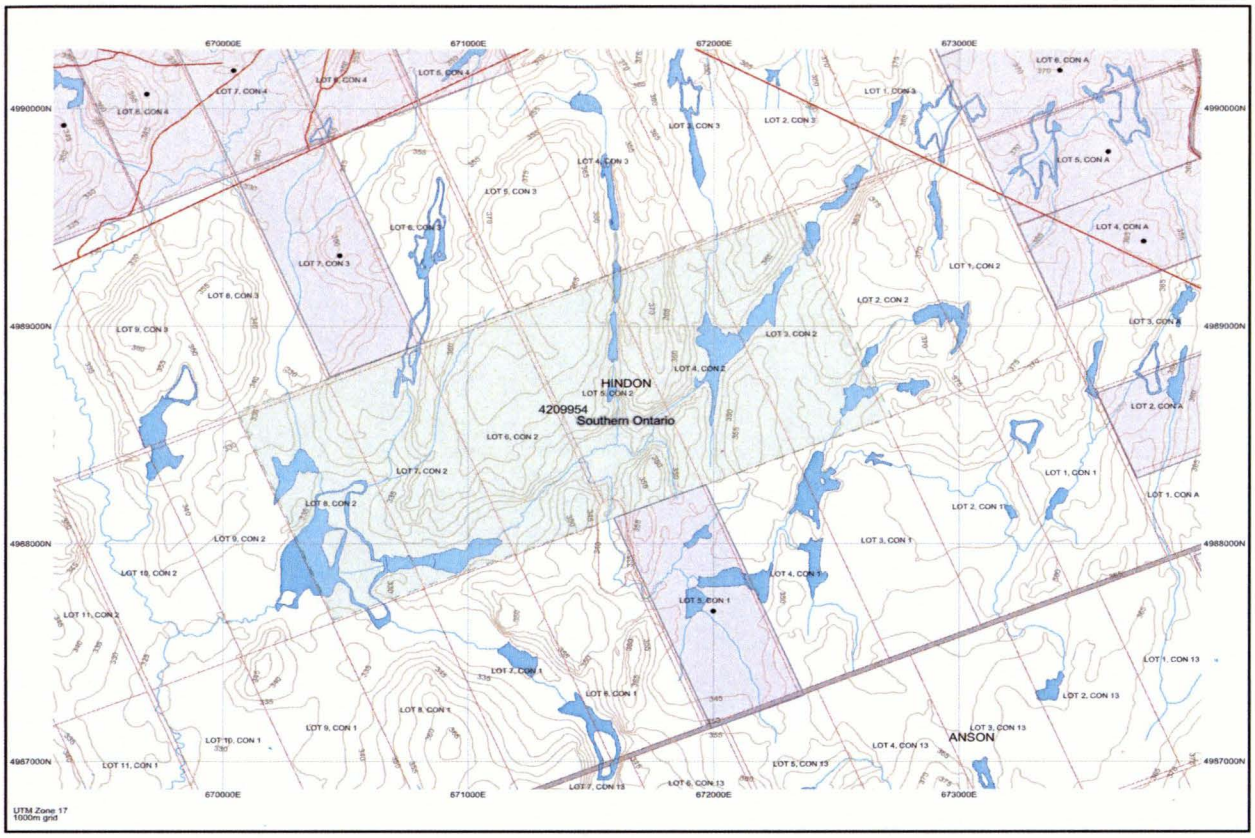

Figure 2: Claim Information

GEOLOGY

A review of the Government of Ontario Mining Assessment Database (Assessment File Research Imaging - ARIS) revealed that the first reported work on the property was conducted in the early 1950s by Dupel Mines Limited and comprised trenching, sampling and drilling of 15 shallow drill holes totaling approximately 1500 m (AFRIFile: 31E02SW0105).

The Hindon Property appears to be underlain by three major rock types based on the regional mapping of Easton1 and can be divided into three general domains. The Eastern part of the property is underlain by Quartzo-feldspathic gneisses (Felsic Gneiss in the terminology of ODM Map P-3416) which are separated from the units of the central part by a regional shear zone which occurs along the eastern part of the property. The central part is dominantly underlain by feldspar-amphibolite mafic gneisses (Mafic Gneiss) which are probably derived from gabbro and dioritic rocks but may include mafic volcanic components. Local sections of anorthositic gabbro are seen in this unit. The western part of the property is underlain by mixed gneisses (Banded Gneiss). The units generally strike in a north-south direction and dip shallowly to the east. All units are cut locally by granitic and pegmatite dikes at various orientations.

[1] R.M. Easton, 2001. Precambrian Geology Halliburton Area. Ontario Geological Survey Preliminary Map P3416 Scale 1:50,000.

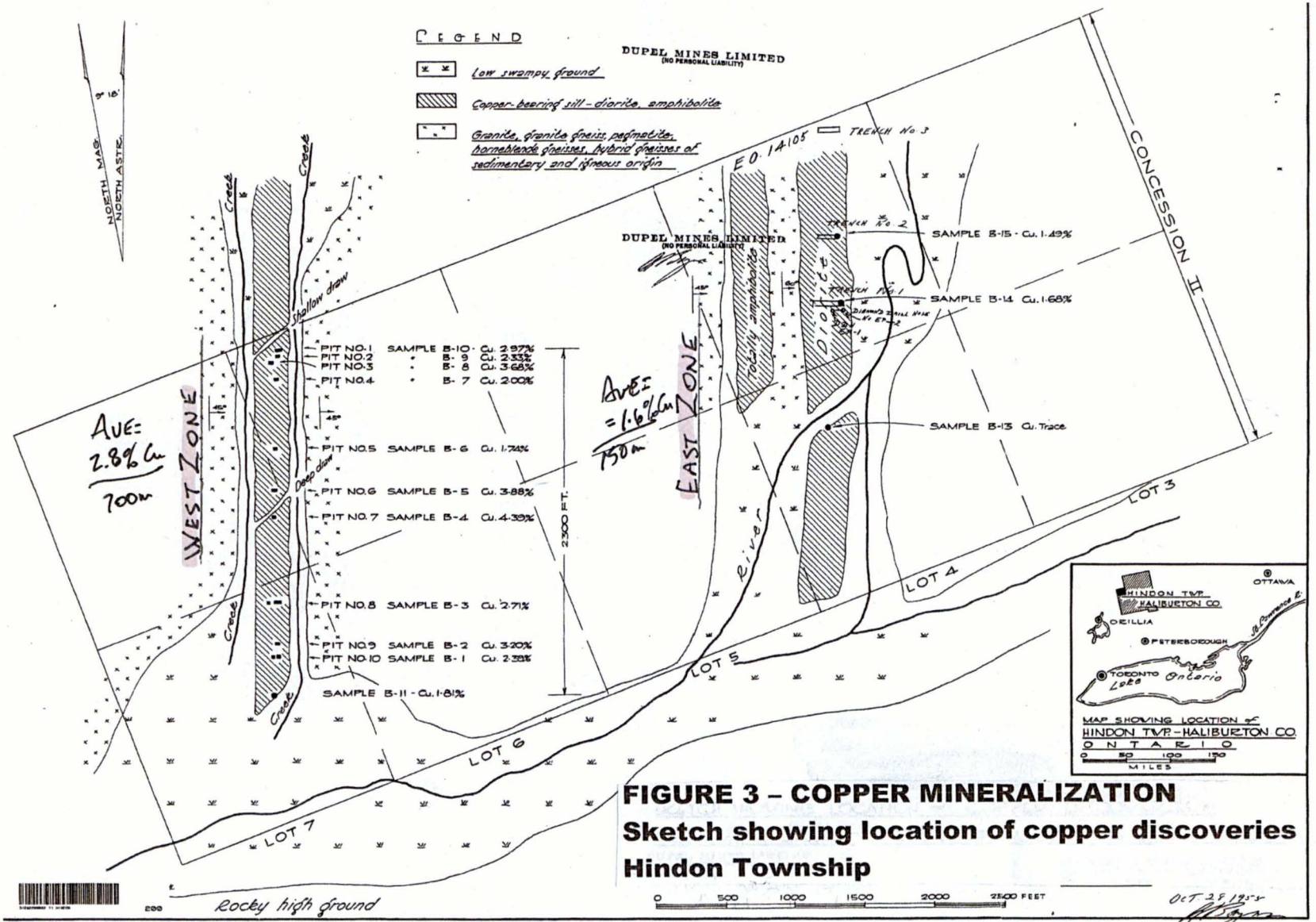

FIGURE 3 – COPPER MINERALIZATION
Sketch showing location of copper discoveries
Hindon Township

(2 x 3)

From MNDMF Assessment Files

The copper mineralization on the Hindon Property occurs as disseminations and stringers of chalcopyrite and bornite within the gabbroic units of the Mafic Gneiss section. To date two significant zones of mineralization have been identified and are called the Dupel West Zone and the Dupel East Zone. Figure 3 shows the Mineralization defined by Dupel Mines (Dupel Mineralization

SAMPLE COLLECTION

The rock samples for the petrographic investigation were collected from the Western Zone of the so called Dupel Mineralization. Figure 4 shows the location of the four samples collected. The locations of the petrographic samples were chosen to give an idea of the distribution of the variation in lithology in the West Zone and to attempt to identify any alteration signatures etc.

The submitted samples were cut, and polished thin sections were prepared for optical mineralogy and x-ray diffraction.

Details of the methodology and results are presented in a report titled "Independent Mineralogical Report #14-002" by Dr. Andrew G. Conly which accompanies this summary.

RESULTS

The results indicate that the mineralogy is consistent in the samples submitted and comprise two principal phases – plagioclase and hornblende. Accessory mineral include clinopyroxene, apatite and biotite. All samples were determined to be hornblende gabbro with orthomagmatic textures. The mineral assemblage does not display any evidence of deuteric, hydrothermal or metamorphic alteration.

The ore minerals include chalcopyrite, bornite and magnetite with exsolution of ilmenite. The copper sulphides have undergone replacement by chalcocite and covellite. Most ore minerals are interstitial to plagioclase and hornblende and are commonly higher in samples of mixed plagioclase-hornblende. The paragenetic relationships between the magnetite and copper sulphides indicate a complex relationship but these phases appear to have formed after the main crystallization of the silicate phases. Further evidenced by the statement: *"Crystallization of magnetite-bornite-chalcopyrite was likely from the residual melt that produced the dominant hornblende-plagioclase assemblage"*

The report concluded:

> *"The Hindon hornblende---gabbro is host to an interesting occurrence of magmatic Cu-PGE mineralization.*
>
> *Copper sulphides (bornite + chalcopyrite) minerals began to crystallize late in the orthomagmatic phase of the intrusion, following crystallization of the main silicate assemblage (hornblende-plagioclase). Subsolidus cooling was responsible for the generation of ilmenite exsolution in magnetic, chalcopyrite exsolution and replacement of bornite and chaclocite-covellite alteration of chalcopyrite and bornite. The nature of PGE and precious metal mineralization was not determined in this study. The mineralogical composition of the host gabbro appears to be critical in terms of copper grade.*

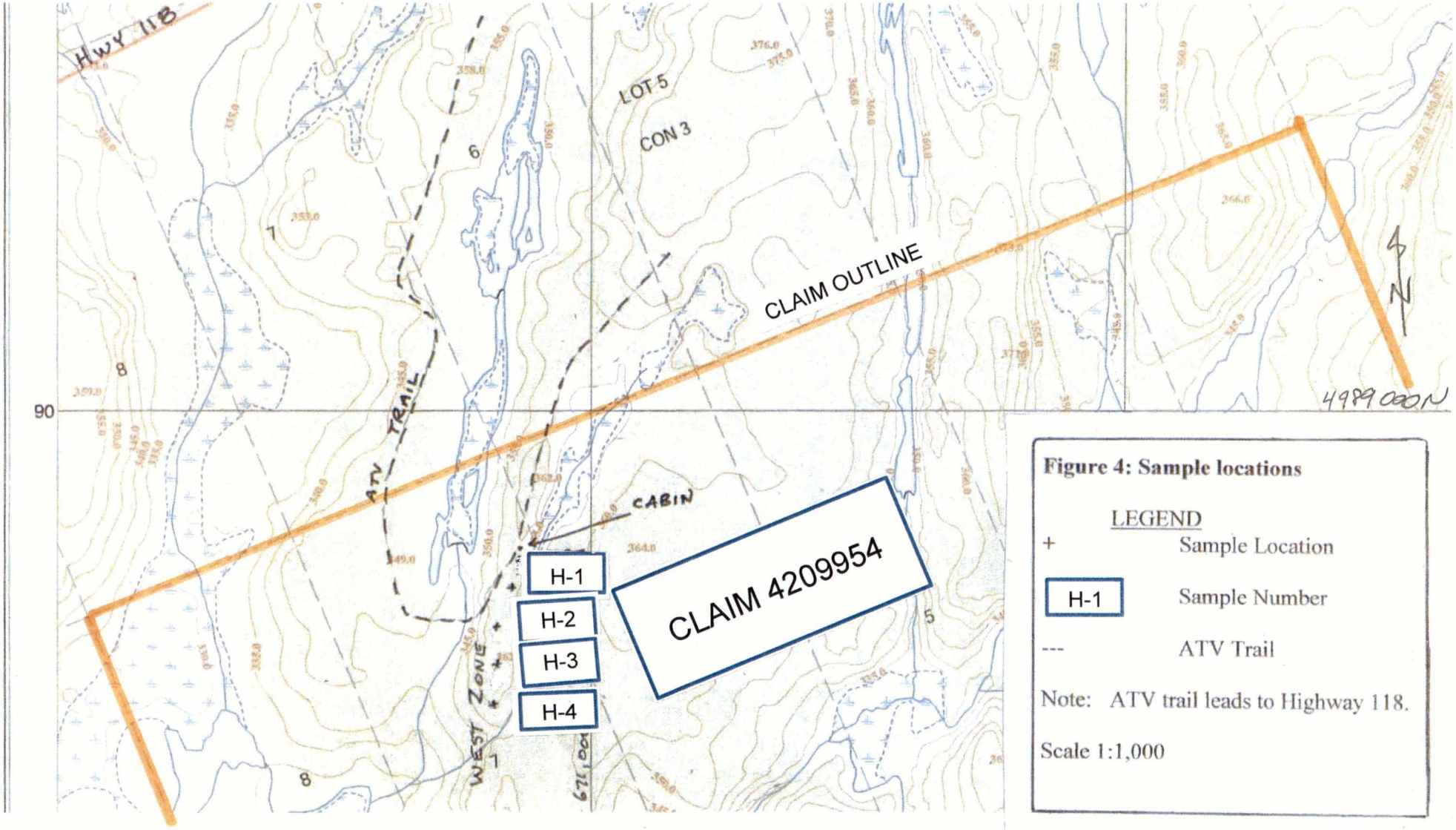

Figure 4: Sample locations

LEGEND

+ Sample Location

H-1 Sample Number

--- ATV Trail

Note: ATV trail leads to Highway 118.

Scale 1:1,000

Hornblendite samples yield only trace amounts of Cu sulphide, while leucocratic gabbro (plagioclase >> hornblende) contain lower concentrations of sulphide. Samples with the greatest amounts of Cu sulphides are characterized with hornblende and plagioclase abundances on the order of 50-60%: 40-0%, respectively. The Hindon Cu-PGE prospect shares many attributes with the magmatic sub-class (versus reef-type) of Cu-PGE deposits. However, one notable difference is the near total absence of Fe-sulphides. This is not typical of most other Cu-PGE deposits, which contain significant amounts of pyrrhotite and/or pyrite."

CONCLUSIONS

The petrographic results appear to indicate that the intrusive which formed the mineralization at Hindon was unusually hydrous as evidenced by the presence of hornblende as opposed to pyroxene as the major mafic mineral. In addition the presence of ilmenite may indicate a highly oxidized melt which may also be supported by the absence of iron sulphide minerals.

The mineralogical study was aimed to determine if the copper mineralization at Hindon could have had a hydrothermal rather than magmatic origin. The absence of alteration in the samples examined and the presence of orthomagmatic textures and minerals seems to preclude this possibility.

This is truly a magmatic deposit – albeit unusual in its silicate mineral content.

RECOMMENDATIONS

The petrographic work herein reported shows that the Hindon copper occurrences have the potential to be magmatic in origin. It is recommended that further work on the property include mapping especially in the area to the south where little is known of the extent of the gabbro. I limited program of induced polarization could be attempted over the known showings to attempt to trace the known mineralization to depth and along strike. A budget for this work will be developed once various contractors are contacted.

CERTIFICATION

I James R. Atkinson M. Sc. P. Geo. of 99 Miller Road, Oakville, ON do Hereby Certify:

1. That I am a Registered Professional Geoscientist (No.1086) of the Association Of Professional Geoscientists of Ontario;
2. That I am a graduate of the University of Toronto (M. Sc.), and Brock University (B. Sc.);
3. I have been practicing my profession as a consultant and employee of mining consulting and exploration companies since graduation;
4. I personally supervised and conducted the work referenced in the enclosed report;
5. I completed the attached report and supervised the collection and submission of the samples;
6. I have an interest in the referenced property as President of JD Exploration Inc.

Dated: Feb 1 2014

Signed:

APPENDIX
INDEPENDENT MINERALOGICAL REPORT
BY LUMINIX

INDEPENDENT MINERALOGICAL REPORT
REPORT#: MX14-002

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1. Introduction and Scope of Work

1.1 Introduction

Lakehead University Mineralogy and Experimental Laboratory ("LUMINX") was retained by Mr. Jim Atkison (the "Client")to conduct a mineralogical studying, using optical microscopy and x-ray diffraction methods, to determine the general mineralogical attributes of four grab samples from the Hindon Cu-PGE prospect.

1.2 Basis of the Report

This report summarizes the results of optical microscopy and XRD analysis of the samples made available to LUMINX by the Client. Test results are representative only of material submitted for analysis.

Information that was provided (via email) to LUMINX by the client includes the following table of assay results (note assays are not cross-referenced to specific samples used in this study):

Table 1. Assay results of Hindon hornblende gabbro/hornblendite (provided by the Client)

Analyte	Cu	Pd	Pt	Au	Ni	Ag	Co
Unit Symbol	%	ppb	ppb	ppb	ppm	ppm	ppm
Detection Limit	0.2	1	1	2	0.5	0.05	0.1
Analysis Method	TD-MS	FA-MS	FA-MS	FA-MS	TD-MS	TD-MS	TD-MS
Sample Number							
818013	1.49	100	16	64	71.5	8.82	68.3
818014	1.91	127	20	140	75.4	11.4	62.1
818015	1.79	241	92	308	33.2	13.7	19.3
818016	2.96	33	17	60	62.2	13.3	36.7
818017	3.31	71	49	210	57.7	19.5	30.1
818018	2.40	62	32	221	66.5	11.9	35.4

Explanatory notes: Samples are not cross-referenced to samples used for mineralogical assessment.

1.3 Statement of Qualifications

LUMINX is a member facility of Lakehead University Centre for Analytical Services ("LUCAS"). Through LUCAS, clients have access to the university's analytical testing labs that combine experienced technical staff, internationally recognized researchers and unique technology of the university, offering a wide range of testing, training and consulting services in a single location. All proceeds from LUCAS testing laboratories are used for the non-profit activities of research and teaching at Lakehead University.

LUMINX is designed to serve as a bridge between the minerals industry and university researchers by providing mineralogical and geochemical services that are not routinely available from commercial firms. LUMINX seeks to promote and develop mineralogical-based research in the north, as well as keeping industrial-based funding and highly qualified personnel in northwestern Ontario. LUMINX offers applied mineralogical and geochemical services on a contractual and research basis, including:

- Petrographic analysis of geological samples and synthetic materials
- Characterization of precious metal (Au, Ag, PGE)-bearing phases, sulphides, diamond indicator minerals and metal-oxide species
- Fluid inclusion petrography and microthermometry
- Quantitative and qualitative phase and chemical composition analysis (XRD, SEM-EDS, FTIR) of geological samples and industrial by-products
- Solubility testing of natural and synthetic materials
- Mineralogical and geochemical studies of mine waste materials
- Static and kinetic testing of mine waste materials in accordance with ASTM protocals

The analyst and author of this report is Dr. Andrew Conly, who is the Director of LUMINX and is an Associate Professor in the Department of Geology at Lakehead University, where he has been on staff since 2003. Dr. Conly has more than 20 years of experience in conducting mineralogical and geochemical studies for both research- and consultant-based projects in the mining and exploration sector.

2. Disclaimer

2.1 Disclaimer

This report or portions of this report are not to be reproduced or used for any purpose other than to assist with the Client's exploration activities without LUMINX's prior written permission in each specific instance. LUMINX does not assume any responsibility or liability for losses occasioned by any party as a result of the circulation, publication or reproduction or use of this report contrary to the provisions of this paragraph.

The contents of this report supersede results from any preliminary reports.

Test results are representative only of material submitted for analysis.

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3. Methods and Procedures

3.1 Optical Mineralogy

Polished (22 x 44 mm) thin sections were prepared by the Lapidary Facility at Lakehead University from grab samples provided by the Client. The polished sections were cleaned with 0.2 μm Al_2O_3 and acetone prior examination with an Olympus BX2M transmitted-reflected light microscope.

3.2 X-Ray Diffraction

X-ray diffraction (XRD) analysis was conducted with a Pananalytical Xpert Pro x-ray diffractometer, using CuKα (1.54060 Å) radiation at an operating voltage and current of 45 kV and 40 mA, respectively, scanning in continuous mode from a 2θ of 5° to 90° with a step size of 0.013° 2θ and a rate of 67.3 seconds per step (total scan time ~30 min). In order to limit preferred orientation effects, back-loading powder sample holders and spinner stage, revolving at 8 rpm, were used. Diffraction patterns were processes using Panalytical Highscore Plus search/match software and the ICDD PDF-2 database. Both bulk powders (air dried and untreated) and HF-treated (see below) were analyzed separately.

The approximate minimum detection limit for XRD is typically between 2 and 5 modal%, and is dependent on the operating conditions. The operating conditions for the XRD (see above) were designed to maximum pattern resolution, consequently, the minimum detection limit is around 2 modal%.

4. Results

4.1 Sample Attributes (macroscopic)

The four Hindon samples (denoted as H1, H2, H3 and H4) display a large number of similarities. The samples are classified as holocrystalline, medium-grained, equigranular leuco- to mesocratic hornblende gabbros to hornblendites. The four samples represent a continuum of rock types, with sample H2 being a meso- to leucocratic hornblende gabbro, samples H1 and H3 being mesocratic hornblende gabbros and sample H4 being a (melanocratic) hornblendite.

The observed colour differences are very subtle on cut (fresh) surfaces, and is best observed in thin section. The fresh surfaces are typically mottled grey to dark green, although H4 is more homogeneous in appearance. Owing to their medium grained nature (1-5 mm), the principle rock forming minerals (plagioclase and hornblende) are readily visible in hand specimen. H4 exhibits a slight increase in mean crystal size (medium- to coarse-grained). Disseminated sulphides are readily visible in hand samples H1, H2 and H3. H4 does not contain macroscopically visible sulphides. All samples weather to a dark grey, with patchy "malachite" staining of samples H1 and H3.

4.2 Host Rock Mineralogy

4.2.1 Rock Classification and General Mineralogical Attributes

The modal mineralogy, as determined by optical microscopy, is provided in Table 2. Only plagioclase and hornblende occur in modal concentrations in excess of 15%, and consequently, are the only phases critical in classifying the samples. Based on visually determined modal abundances and following the IUGS classification of gabbroic rocks, sample H2 is a leuco-hornblende gabbro, H1 and H3 are (mesocratic) hornblende gabbros, and sample H4 is a hornblendedite (Figs. 1-4).

Texturally all samples are holocrystalline, fine- to medium-grained (medium to coarse-grained for H4) and equigranular (Figs. 1-4); typical orthomagmatic textures. The key mineralogical difference arise from:

- Variations in the modal abundance of the rock-forming phases, plagioclase and hornblende;
- Slightly larger crystal size for sample H4 (Fig. 4);
- Presence in of biotite in the two compositional extremes (H2 and H4; Figs. 2 and 4);
- Restriction of clinopyroxene and apatite to sample H2 (Fig. 2); and,
- Relative abundance of magnetite and Cu-sulphides, with the sole hornblendite sample (H4) being nearly devoid of both (see section 4.3).

Table 2. Modal mineralogy of Hindon hornblende gabbro/hornblendite samples

Sample	Plagioclase	Hornblende	Biotite	Clinopyroxene	Apatite	Magnetite	Chalcopyrite	Bornite	Covellite + Chalcocite	Pyrite
Hindon 1	35-40%	40-50%	-	-	-	7-10%	1-2%	3-5%	tr	-
Hindon 2	60-65%	20-25%	2-3%	3-5%	<1%	2-3%	2-3%	2-3%	tr	-
Hindon 3	30-45%	45-55%	-	-	-	5-7%	3-5%	3-5%	tr	<<tr
Hindon 4	3-5%	90-95%	3-5%	-	-	tr	tr	tr	-	-

Explanatory notes: tr – trace phase: <<tr – ultra-trace phase, <20 observed crystals.

Figure 1. Cross-polarized, transmitted light photomicrograph (50x magnification) of sample H1 showing the characteristic assemblage of plagioclase + hornblende + opaque.

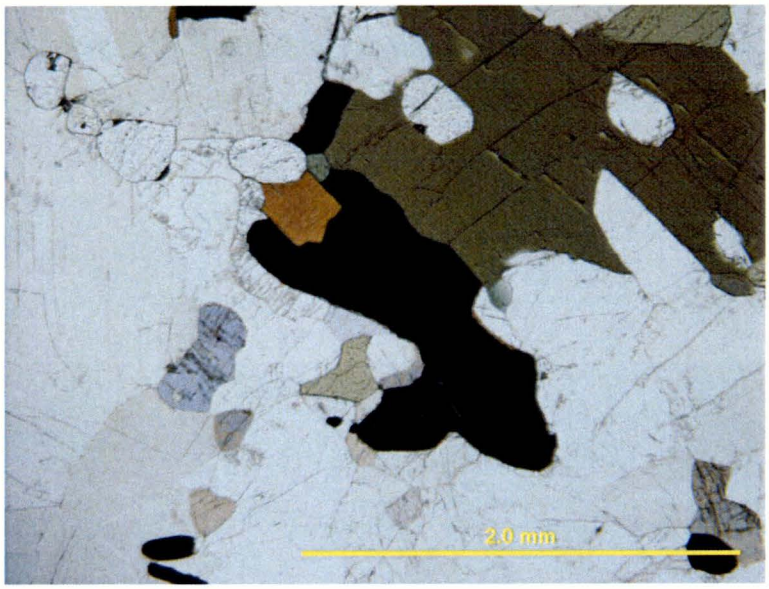

Figure 2. Plane polarized, transmitted light photomicrograph (50x magnification) of sample H2 showing the assemblage of plagioclase (colourless) + hornblende (dark green)+ biotite (orange-brown) + clinopyroxene (bluish-purple) + apatite (colourless, high relief, rounded crystals in the top left region of the photomicrograph) + opaque.

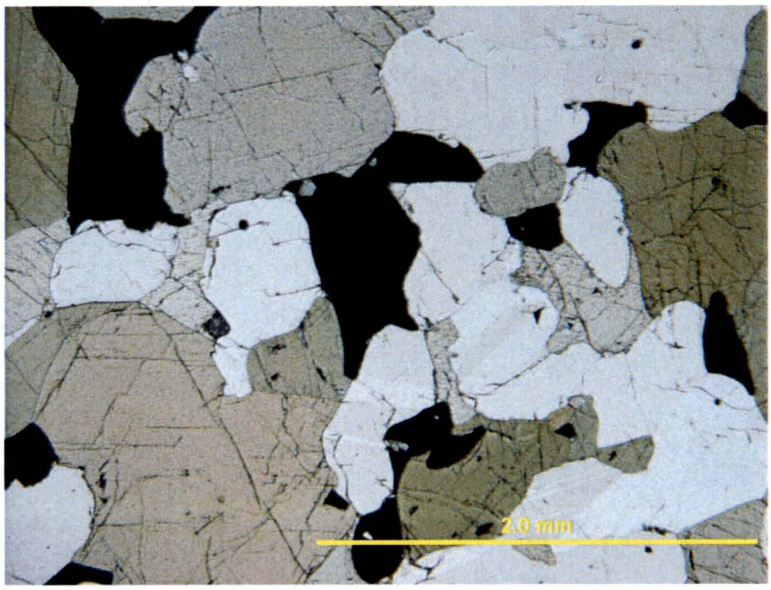

Figure 3. Plane polarized, transmitted light photomicrograph (50x magnification) of sample H2 showing the characteristic assemblage of plagioclase + hornblende + opaque.

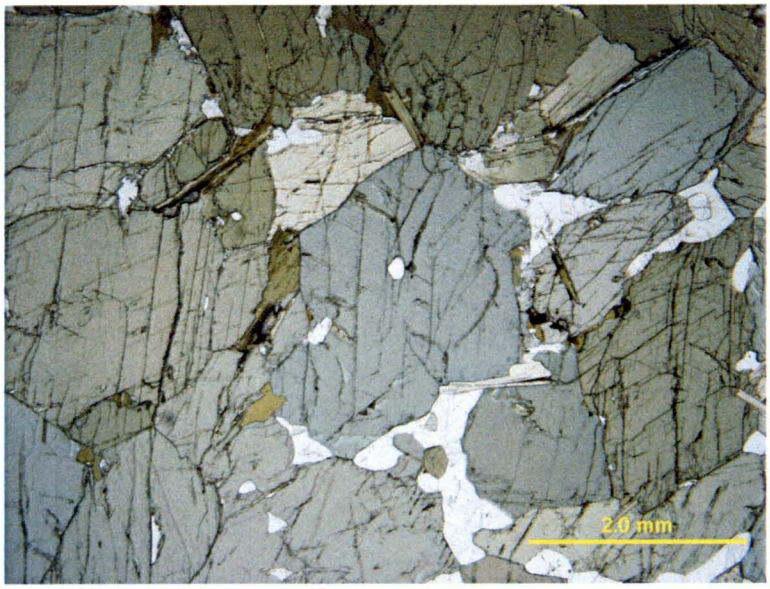

Figure 4. Plane polarized, transmitted light photomicrograph (25x magnification) of sample H4 showing the assemblage of hornblende (green) + plagioclase (colourless) + biotite (greenish-brown). Note the general absence of opaque phases and the increased crystal size of hornblende.

4.2.2 Alteration

The assemblage plagioclase + hornblende ± biotite ± clinopyroxene ± apatite does not display any evidence of deuteric, hydrothermal or metamorphic alteration.

4.2.3 Mineral Attributes

The silicate assemblage is consistent among the four samples. The notable differences are restricted to variances in modal abundances of the two principle phases and the presence of absence of accessory phases (clinopyroxene, apatite and biotite). The optical and textural attributes of non-opaque minerals are as follows:

Plagioclase – Anhedral (less common) to subhedral, equant prismatic crystals, 0.5 to 2 mm in length, with well-developed albite twinning (weak undulatory extinction).

Hornblende – Subhedral, slightly elongated prismatic crystals, 0.5 to 3 mm in length, with pale green to brownish-green pleochroism.

Biotite – Subhedral to euhedral, bladed crystals, up to 1 mm in length, with brown to orange-brown pleochroism.

Clinopyroxene – Anhedral, equant to slightly elongated crystals, <0.2 mm in length, with weak blue-green pleochroism. Compositionally, the clinopyroxene is most likely augite.

Apatite – anhedral, equant, high relief crystals, with sub-rounded form, <0.5 mm in length.

4.3 Oxide + Sulphide Assemblages

4.3.1 General Attributes

Opaques phases account for between 5 and 15 modal% (Table 2) and consists of magnetite (± ilmenite exsolution) + chalcopyrite + bornite (Fig. 5). The copper sulphides have undergone secondary replacement by chalcocite + covellite and subsequent weathering related alteration resulting in malachite staining (only visible in hand sample). Magnetite displays very minor alteration to hematite. Although all opaque phases are interstitial to plagioclase and hornblende, both magnetite and Cu-sulphides are more commonly associated with hornblende.

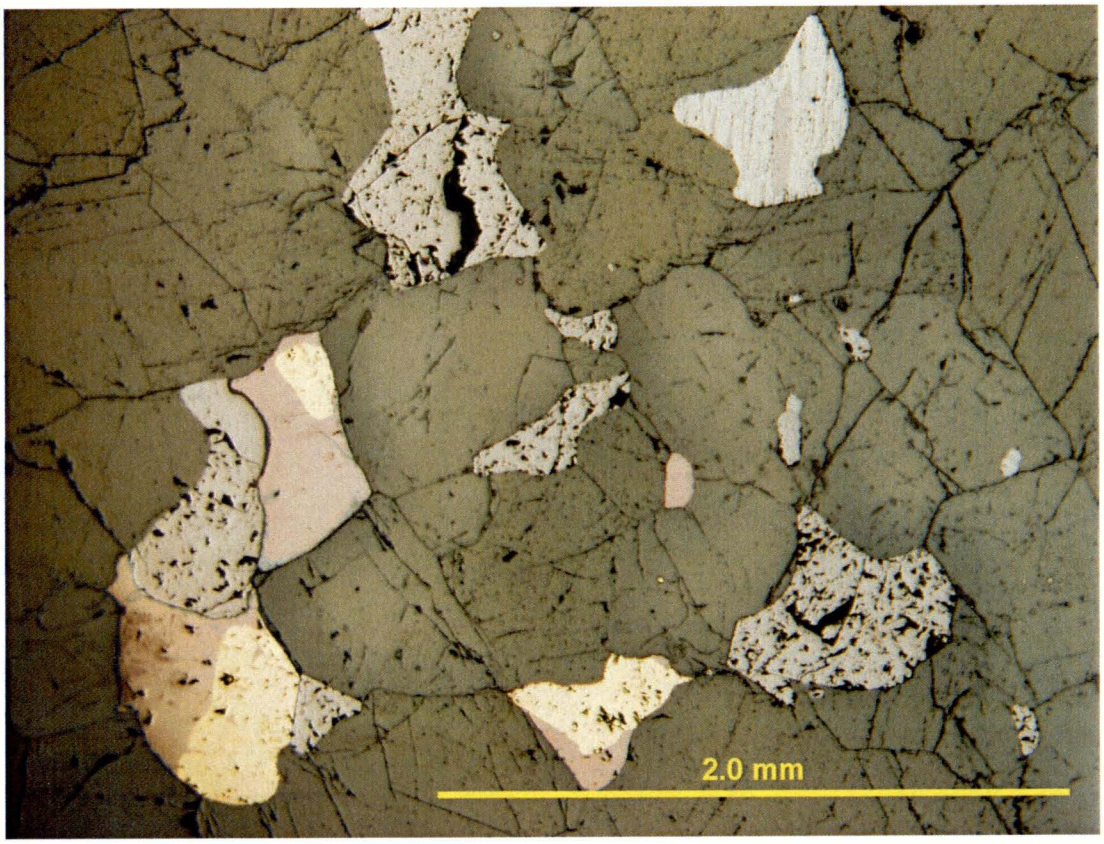

Figure 5. Reflected light photomicrograph (50x magnification) of sample H1 showing the typical opaque assemblage of interstitial magnetite (grey) + magnetite-ilmentite exsolution (large crystal to the top right of the image) + chalcopyrite (yellow) + bornite (pink) + chalcocite-covellite (see thin blue-grey rim along edges of the large bornite crystal, left of centre).

Magnetite, chalcopyrite and bornite modal abundances appear to correlate with hornblende and plagioclase abundances. Hornblende dominant samples, such as H4, are nearly devoid of sulphides and magnetite, and where present only occur as discrete, small (<0.05 mm) interstitial crystals and inclusions (rare). For leucocratic gabbro (sample H2) there is a decrease in theabundance of Cu-sulphides and a significant decrease (~50%) in the modal abundance of magnetite (c.f., hornblende gabbro samples H1 and H3). A corresponding decrease in the crystal size of both Cu-sulphides and magnetite was not observed for the single leucocratic sample (c.f., the H4 hornblendite). Copper sulphide-rich samples (H1 and H3) have nearly equal modal concentrations of Cu-sulphides to magnetite and a hornblende to plagioclase ratio of between 1:1 and 2:1. There are no apparent mineralogical controls that govern the ratio of chaclcopyrite to bornite. The modal concentration of chalcocite+ covellite is directly proportional to modal abundance of bornite.

4.3.2 Oxide-Sulphide Mineral Attributes

Magnetite – Anhedral to rare subhedral crystals that occur interstitially to hornblende and plagioclase (Fig. 6). Small sub-rounded crystals are less common and occur both interstitially and as small isolated inclusions in the main silicate assemblage (Fig. 7). Crystal sizes typically range between 0.5 and 1 mm, although larger crystals, up to 2 mm, and significantly smaller crystals, <0.05 mm, are present in all but sample H4. Crystal sizes for sample H4 are typically <0.05 mm and do not exceed 0.5 mm (Fig. 8).

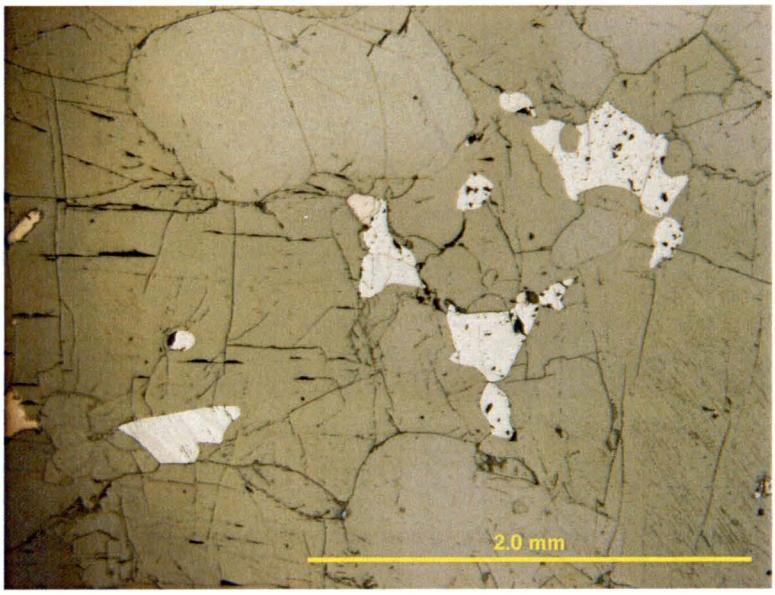

Figure 6. Reflected light photomicrograph (50x magnification) show interstitial nature of magnetite (grey). Note overprinting of bornite (pink) by magnetite (central part of the image) and ilmenite (pinkish-brown) exsolution in magnetite (bottom left).

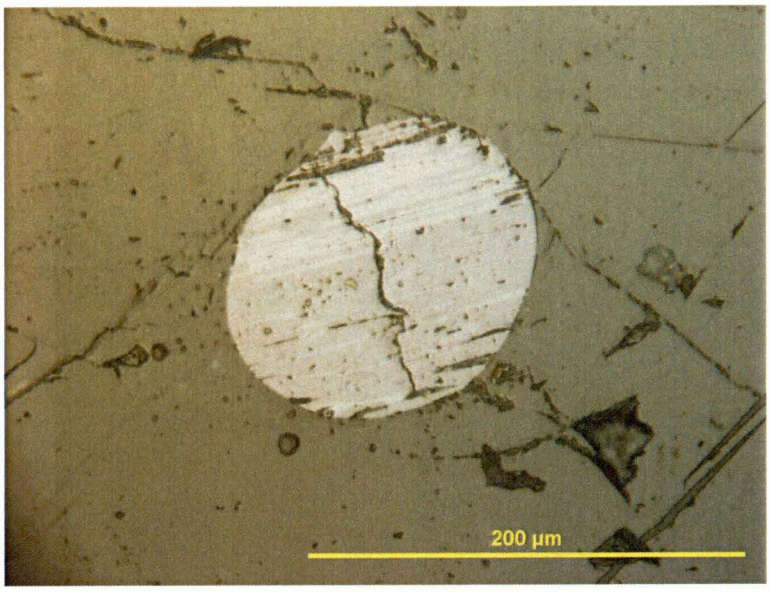

Figure 7. Reflected light photomicrograph (500x magnification) of a rounded inclusion of magnetite (grey) with ilmenite (pinkish-brown) exsolution.

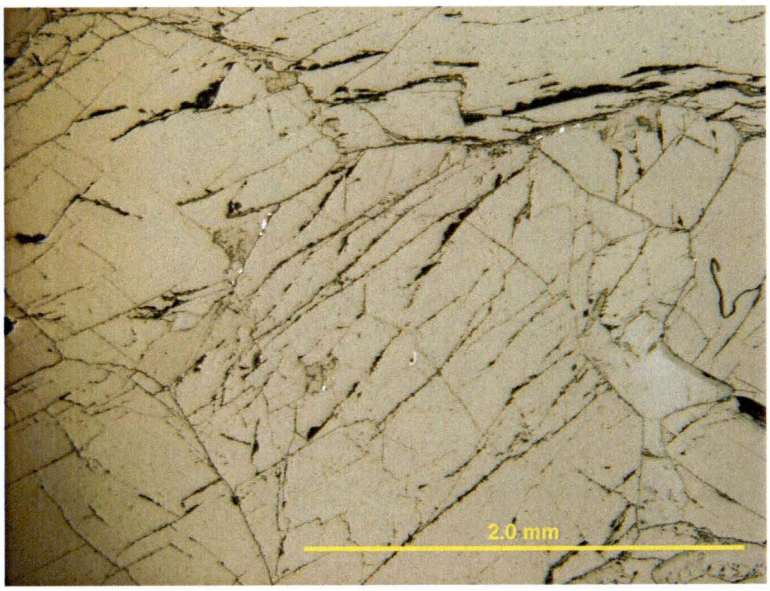

Figure 8. Reflected light photomicrograph (50x magnification) showing the very fine-grained nature of magnetite in sample H4.

Ilmenite – Occurs only as exsolution lamellae in magnetite (Figs. 6-8). Ilmenite exsolution is common in samples H1 and H3, where it is occurs in approximately 25% of the magnetite crystals. Ilmenite exsolution in sample H2 is significantly less abundant and was not observed in sample H4. Ilmentite exsolution occurs in both anhedral to subhedral interstitial magnetite (Fig. 6) and rounded magnetite inclusions (Fig. 7).

Bornite – Anhedral crystals, typically between 0.1 and 0.5 mm in size (although much smaller crystals, <0.1 mm are not uncommon), that are interstitial to the host

silicate assemblage (Fig. 9). Rounded crystals are also present as inclusions in silicates (Fig. 10).

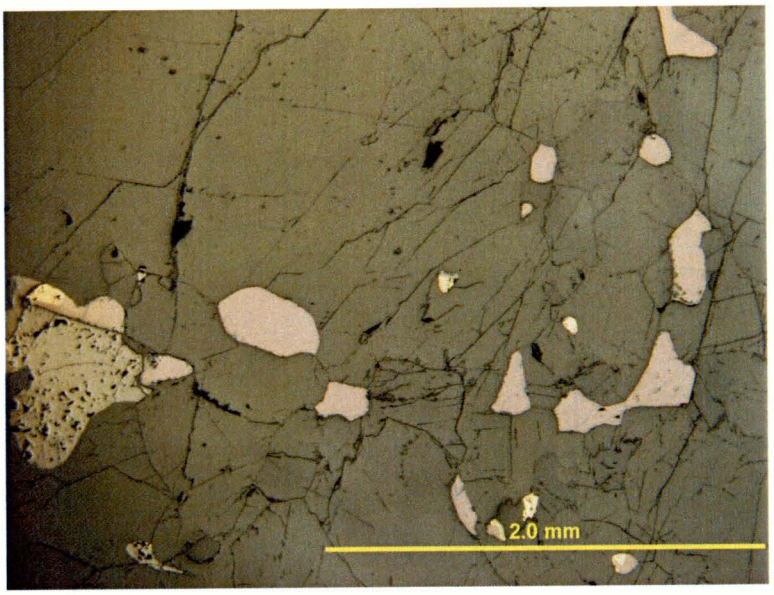

Figure 9. Reflected light photomicrograph (50x magnification) showing the nature of interstitial bornite (pink), with associated magnetite (grey) and chalcopyrite (yellow).

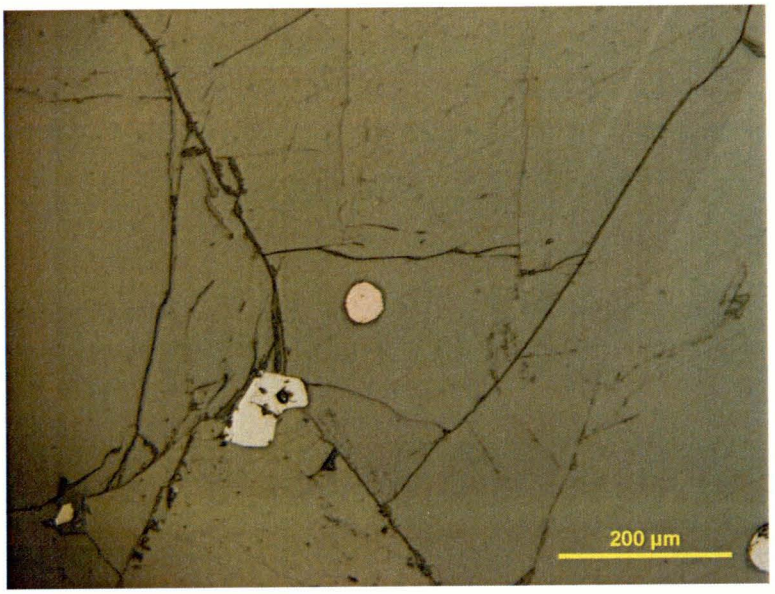

Figure 10. Reflected light photomicrograph (200x magnification) showing a rounded bornite (pink) inclusion in plagioclase with interstitial magnetite (grey).

Chalcopyrite – Anhedral crystals, typically between 0.1 and 0.5 mm in size (although much smaller crystals, <0.1 mm are not uncommon in all samples and typify sample H4; Fig. 11), that are interstitial to the host silicate assemblage (Fig. 12) and occur as

a replacement of bornite. Although not common, some bornite crystals display extensive chalopyrite exsolution (Fig. 13).

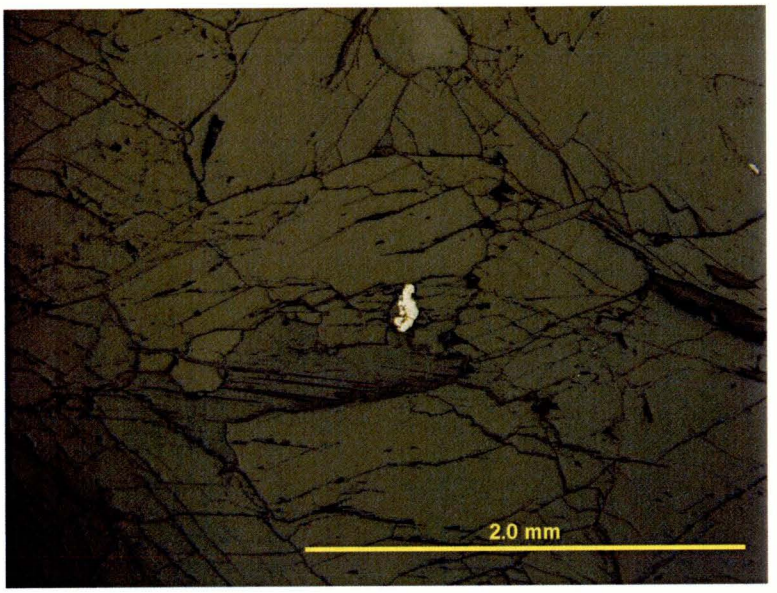

Figure 11. Reflected light photomicrograph (50x magnification) showing very-fine grained interstitial chalcopyrite in hornblendite sample H4.

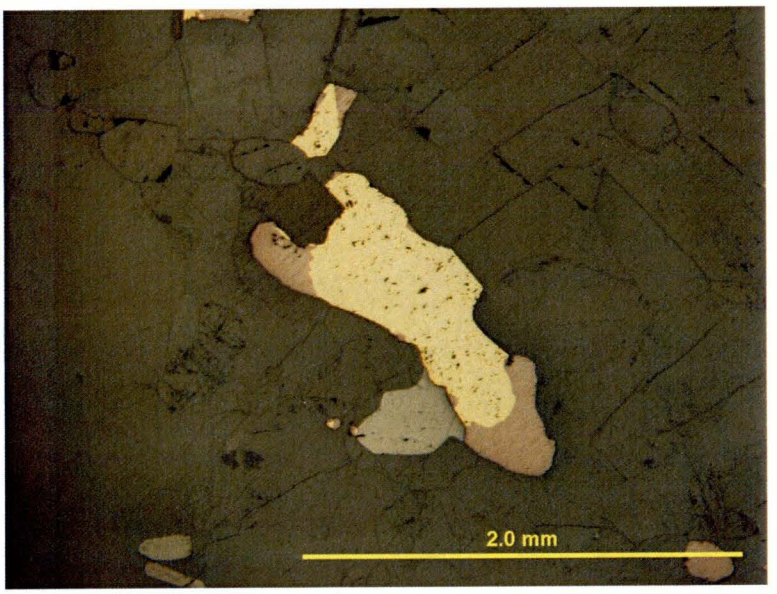

Figure 12. Reflected light photomicrograph (50x magnification) showing interstitial chalcopyrite (yellow) replacing bornite (pink), with magnetite (grey).

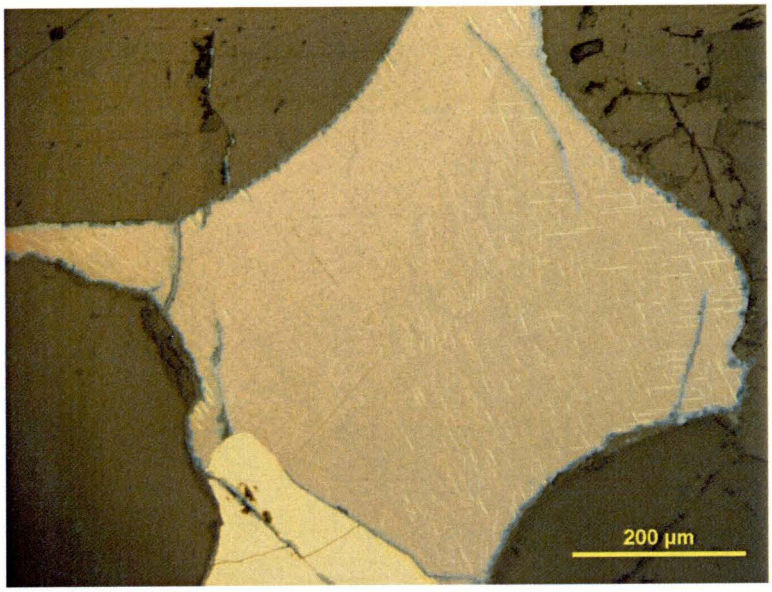

Figure 13. Reflected light photomicrograph (200x magnification) chalcopyrite (yellow) exsolution in bornite (pink) with chalcocite (blue-grey) and covellite (blue) replacement along crystal edges and intragranular fractures.

Chalcocite-Covellite – Fine intermix of anhedral crystals of chalcocite and covellite that most commonly occur as a rim and fracture replacement in bornite (Fig. 14) and to a substaintially lesser degree, rim replacement of chalcopyrite (Figs. 14-16) 15). Chalcocite is typically more abundant than covellite (Fig. 16)

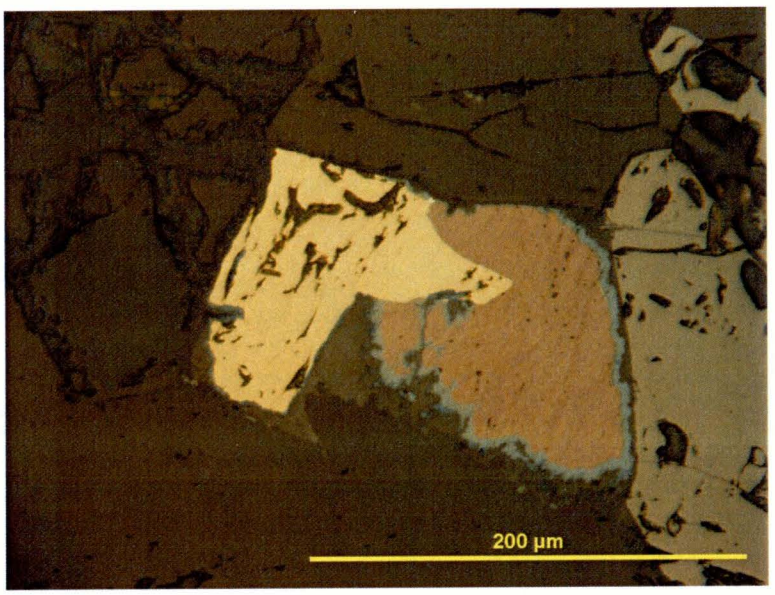

Figure 14. Reflected light photomicrograph (50x magnification) showing rim and fracture replacement of bornite (pink) by chalcocite (blue-grey) and covellite (blue). Rim replacment of chalcopyrite (yellow) by chalcocite and covellite is also showing, but the extent of alteration is always significantly less than what is observed for bornite.

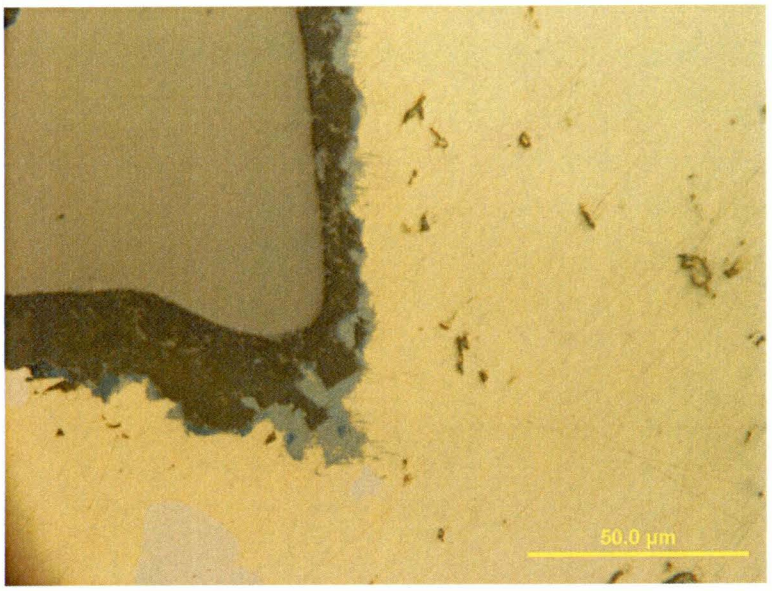

Figure 16. Reflected light photomicrograph (1000x magnification) showing rim and fracture replacement of chalcopyrite (yellow) by chalcocite (blue-grey) and covellite (blue). Note the rare occurrence of pyrite (white).

Pyrite – Sample H3 is the only sample for which pyrite was observed. It occurs as irregular shaped inclusions in chalcopyrite (Figs. 16 and 17).

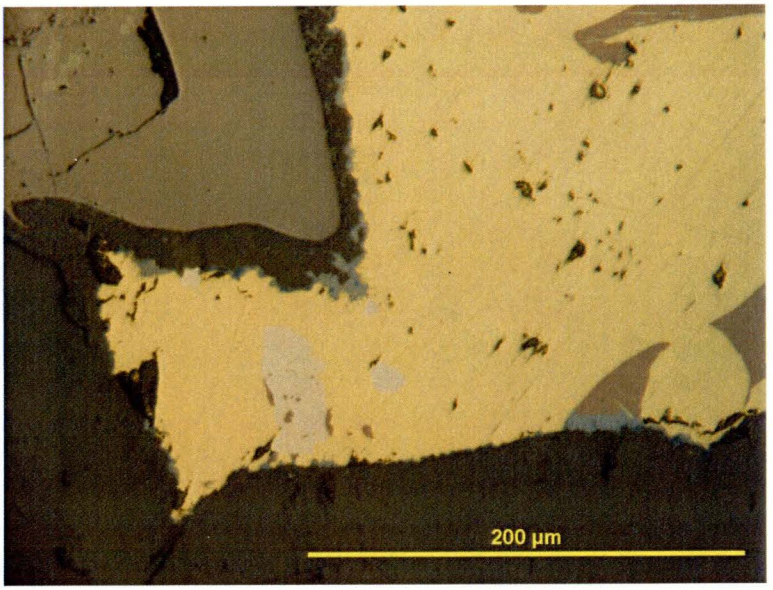

Figure 17. Reflected light photomicrograph (500x magnification) showing the rare occurrence of pyrite (white) as inclusions in chalcopyrite (yellow) in hornblende gabbro sample H3.

4.3.3 Precious Minerals

The PGE and precious metal (Au + Ag) concentrations of Hindon rocks (Table 1) show very promising total precious metal abundances ~~(123 to 684 g/t PGE+Au+Ag~~

~~or 3.9 to 21 oz/t),~~ with moderate to high Pd:Pt ratios (1.4 to 6.4). However, no precious metal-bearing minerals (PGMs, native Au, native Ag or electrum) were identified. Although it is possible that some concentration of precious metals occur as elemental substitutions in Cu sulphides, such a scenario is not consistent with the total precious metal content of the rocks. In all likelihood these phases occur as micro-inclusions in host sulphides, which are not readily distinguishable optically, or occur as discrete crystals, at a size that is below the resolution of the optical microscope.

4.5 X-Ray Diffraction

X-ray diffraction (XRD) was conducted in order to confirm the results of optical mineralogy. XRD results was able to confirm optical results for the majority of phases that exceeded 5 modal% (bornite being an exception; Figs. 18 and 19). From the XRD the feldspar is Na-anorthite (bytownite to labradorite composition) and the amphibole is Mg-bearing hornblende. However, caution should be exercised when attempting to deduce mineral compositions for low symmetry phase such as plagioclase.

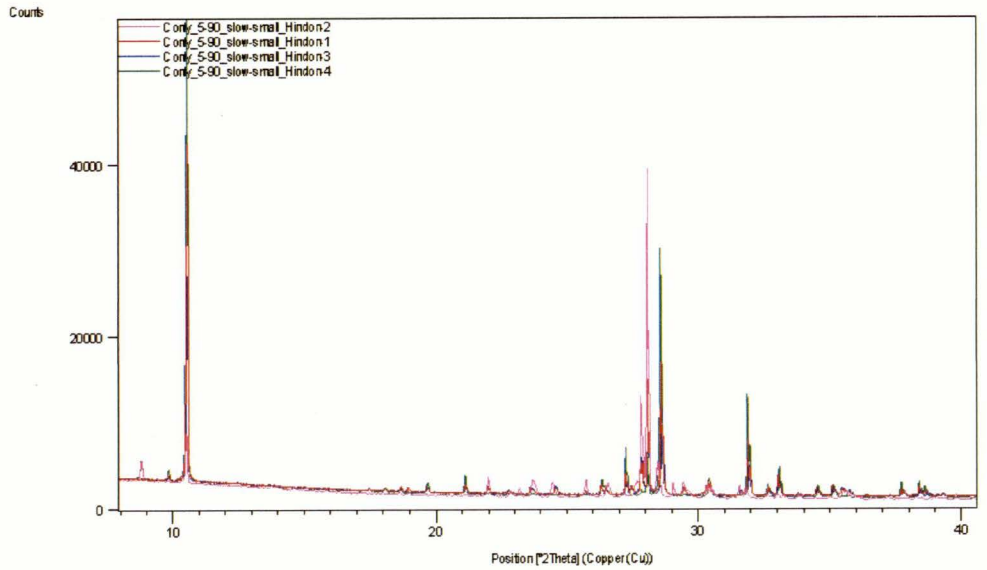

Figure 18. Powder XRD patterns for Hindon samples 1-4, for the range 8 to 40 °2θ, showing the mineralogical variability between samples.

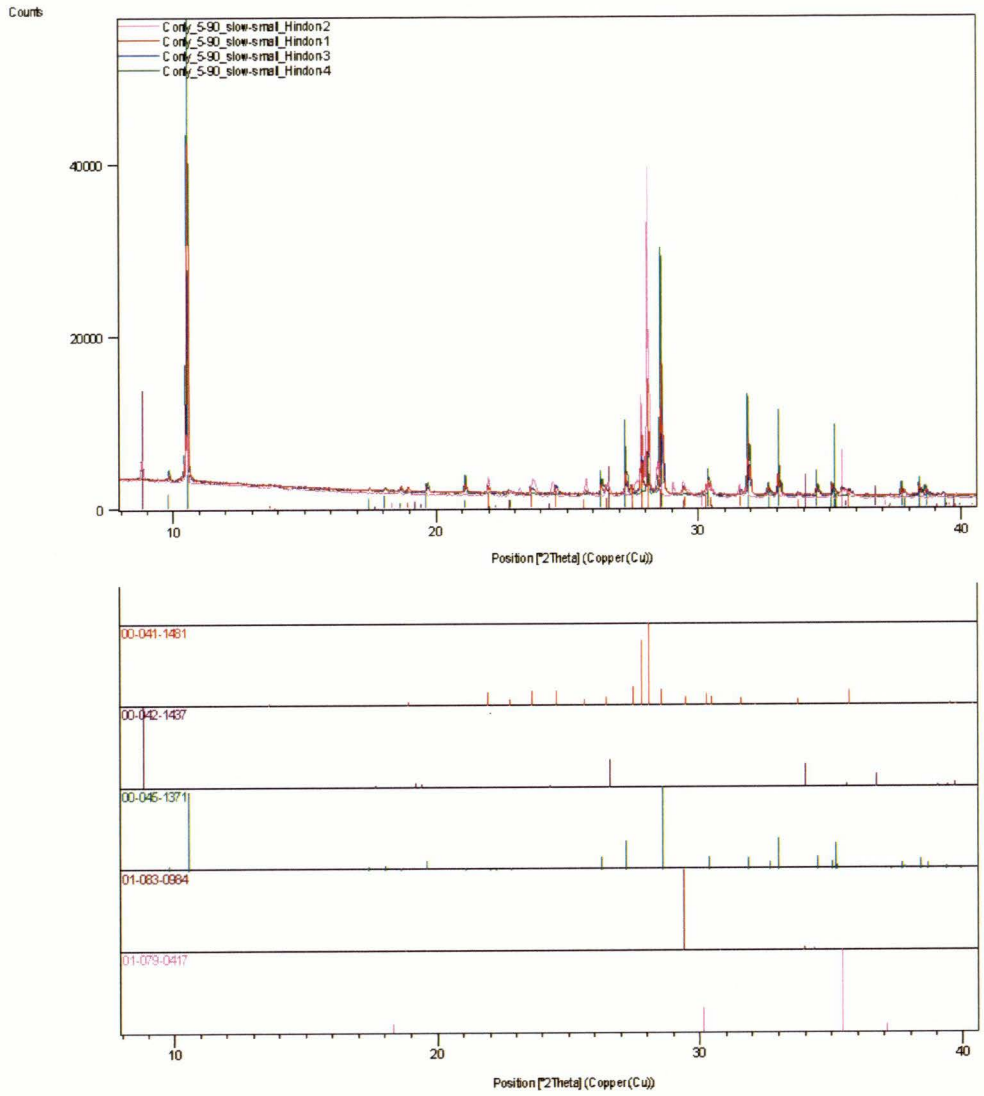

Figure 19. Powder XRD patterns for Hindon samples 1-4, for the range 8 to 40 °2θ, showing the mineralogical variability between samples. The relative peak intensities confirm visually estimated modal abundances for essential minerals. The most distinct mineralogical feature is the change in hornblende abundance and the absence/presence of biotite. Reference patterns: 00-041-1481 Na-anorthite; 00-042-1437 biotite; 00-045-1371 magnesiohornblende; 01-083-0984 chalcopyrite; 01-079-0417 magnetite.

4.6 Paragenetic Considerations

Textural features of the main silicate assemblage (Figs. 1-4) show that the essential assemblage of hornblende and plagioclase are co-magmatic. An exception to this is the hornblendite sample, H4, where hornblende is the earliest phase to crystallize followed by interstitial plagioclase. Clinopyroxene, biotite and apatite are late orthomagmatic crystallizing phases, as these formed interstitially to hornblende and plagioclase.

The interstitial nature of magnetite-chalcopyrite-bornite (Figs. 5 and 6) indicates that these phases crystallized as late-stage orthomagmatic assemblage that formed following the bulk of the crystallization of hornblende and plagioclase. However, rounded inclusions of magnetite, chalcopyrite and bornite (Figs. 7 and 10) in hornblende and plagioclase indicate that Fe oxide and sulphide formation commenced during crystallization of the main orthomagmatic silicate assemblage.

The relative timing of magnetite (± ilmenite) and Cu-sulphides illustrates a more complex paragenesis. The paragenetic relationships between the Fe-Ti oxides and Cu-sulphides are as follows:

- Magnetite replacement of bornite (common)
    - Figures 5, 9
- Magnetite replacement of chalcopyrite (rare)
    - Figure 21, 22
- Ilmenite exsolution in magnetite (occurs in up to 25% of magnetite crystals)
    - Figures 6, 7, 22
- Calcopyrite replacement of and exsolution in bornite
    - Replacement: Figures 5,9, 12, 13, 14, 17
    - Exsolution: Figures 13, 14, 17
- Chalcocite-covellite replacement of bornite (common)
    - Figures 5, 13, 14, 17, 21, 22
- Chalcocite-covellite replacement of chalcopyrite (not common)
    - Figures 14, 16, 17, 22
- Replacement of pyrite by chalcopyrite (very rare)
    - Figures 16 and 17

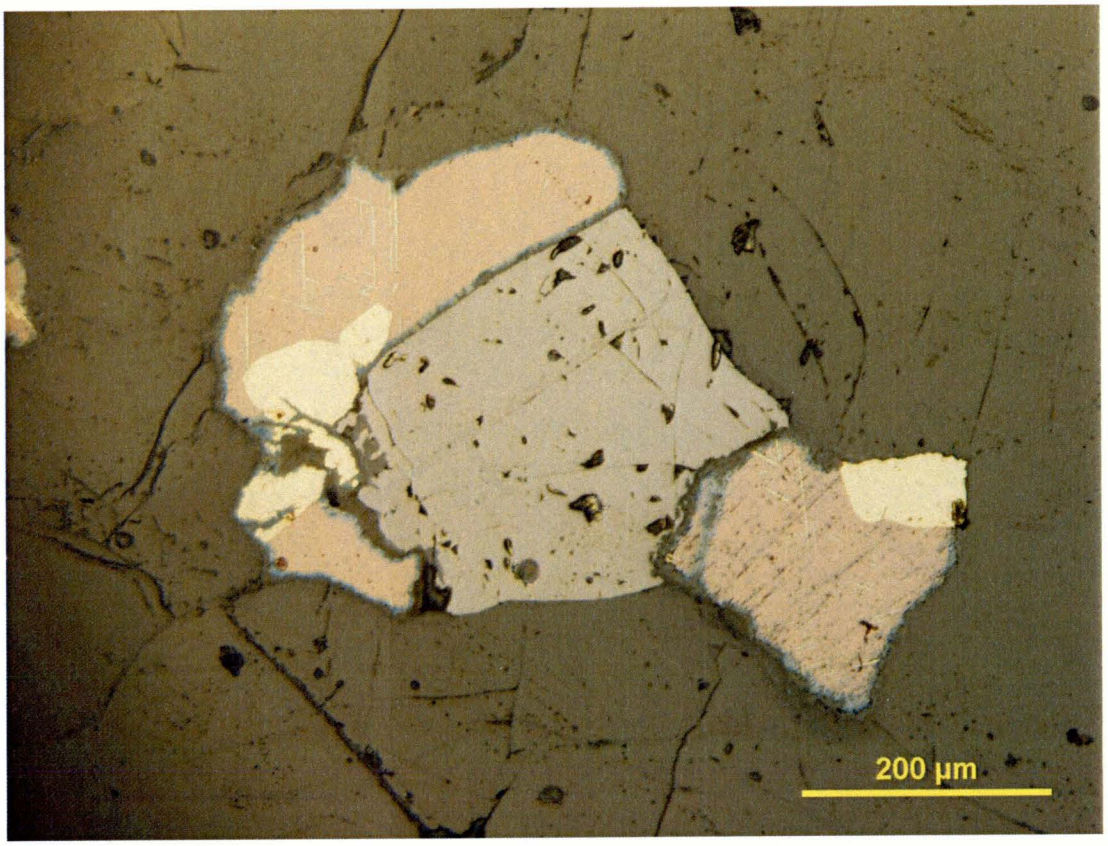

Figure 20. Reflected light photomicrograph (500x magnification) showing the most commonly observed paragenetic relationships between magnetite and Cu-sulphides: i) magnetite (grey) replacement of bornite (pink); ii) chalcopyrite (yellow) exsolution in bornite; iii) chalcopyrite replacement of bornite; and, iv) chalcocite (blue-grey) and covellite (blue) replacement along crystal edges and intragranular fractures of bornite and to a lesser degree chalcopyrite.

Typically, magnetite that replaces bornite (Figs. 5, 9 and 20) and chalcopyrite (Fig. 21) is devoid of exsolved ilmenite. However, there are rare occurrences of magnetite with exsolved ilmenite replacing Cu-sulphides (Fig. 22).

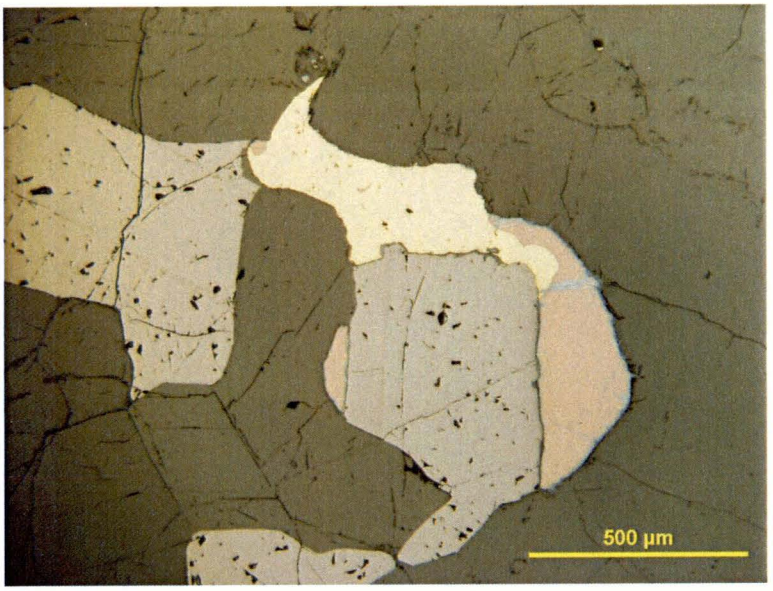

Figure 21. Reflected light photomicrograph (100x magnification) showing replacement of bornite (pink) and chalcopyrite (yellow) by magnetite (grey). In addition, rim and fracture replacement of bornite by chalcocite (blue-grey) and covellite (blue) is also shown.

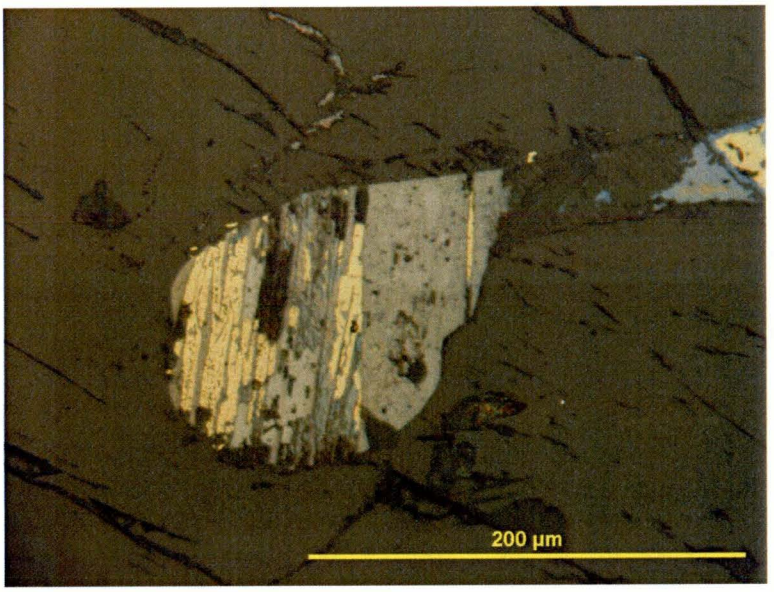

Figure 22. Reflected light photomicrograph (500x magnification) showing replacement of chalcopyrite (yellow) and by magnetite with ilmenite exsolution (grey). In addition, rim and fracture replacement of bornite (pink) and chalcopyrite by chalcocite (blue-grey) and covellite (blue) is also shown.

From the observed textures, magnetite formed throughout the late-stage orthomagmatic period for the Hindon intrusion, and is both contemporaneous with and post-dates the crystallization of orthomagmatic sulphide (chalcopyrite + bornite). The relative sequence of orthomagmatic sulpide deposition is that chalcopyrite is both coeval and post-dates bornite crystallization.

Exsolution of ilmenite from magnetite, exsolution of chalcopyrite from bornite and replacement of orthomagmatic sulphides by chalcocite-covellite represent phases that form in response to slow, low-temperature (sub-magmatic) cooling. Such

textures could be related to sub-solvus cooling of the Hindon intrusion or low-grade metamorphism. Based on the texture of the silicate assemblage, the former process is most likely responsible for forming secondary oxides and Cu-sulphides.

Paragenesis of likely PGMs and Au-Ag-hosting phases cannot be assessed, as these phases were not identified in this study.

Although not extensively documented in this study, Hindon rocks do display evidence of near surface weathering, through the formation of malachite staining. However, the effects of weathering are minor, and are restricted to the rock surface and penetrative fractures.

5. Interpretations & Recommendations

5.1 Petrogenetic Considerations

The Hindon intrusion is a heterolithic gabbroic system that compositionally ranges from plagilocase-dominent leucogabbro to hornblende gabbro to hornblendite. The essential rock forming minerals, plagioclase (likely a Ca>Na composition) and magneisohornblende, are coeval and constitute the main orthomagmatic phase of the intrusive complex. The variation in gabbro composition, leucogabbro and hornblende, is often observed in other Cu-PGE hosting intrusions. For example, Stillwater's Marathon Cu-PGM deposit is primarily hosted in a clinopyroxene-plagioclase pegmatitic leucogabbro, but displays magmatic segregation into anothrositic and pyroxenetic pods within the gabbro. The spatial nature and chemical composition of the Hindon leucogabbro and hornblende has not been disclosed to LUMINX. Consequently, the petrogenetic relationship among these units is difficult to constrain solely on the basis of optical mineralogy.

Late orthomagmatic phases, following hornblende and plagioclase crystallization, include clinopyroxene, biotite and apatite in leucogabbro and biotite in hornblendite. Hornblende (mesocratic) gabbro does not can any of these later orthomagmatic phases. All gabbro types do contain varying amounts of magnetite, bornite and chalcopyrite, which are also part of the late orthomagmatic assemblage. Crystallization of magnetite-bornite-chalcopyrite was likely from the residual melt that produced the dominant hornblende-plagioclase assemblage. Silicate crystal fraction ultimately resulted in sulphur saturation and the formation of an immiscible sulphide melt, which Cu, PGE, Au and Ag would have partitioned into. The relatively slow sulphide content (<10 modal%) is similar to other mafic-hosted Cu-PGE deposits, and likely reflects mantle-derived sulphur. However, sulphur isotopes and S/Se geochemistry are necessary in order to determine the source of sulphur and potential role of crustal contamination.

Subsolidus cooling had a dominant effect on oxide and sulphide mineralogy and textures. Ilmenite exsolution in magnetic represents a high-temperature cooling effect (500-800°C). On the other hand, secondary Cu sulphides likely formed at significantly lower temperatures. Most of the chalcopyrite occurs as both partial replacements of bornite and as exsolution lamellae bornite. Chalcopyrite exsolution occurs suggest temperatures of ~250°C. However, isolate chalcopyrite gains could either represent total replacement of bornite and/or a coeval orthomagmatic phase. Chalcocite-covellite are low-temperature (<150°C) phases that exsolved along the rims and within fractures in bornite and chalcopyrite. Deposition of PGM and precious metal-bearing phases cannot be constrained, as these phases were not observed in this study. However, subsolidus cooling is likely in their formation.

5.2 Conclusions

The Hindon hornblende-gabbro is host to an interesting occurrence of magmatic Cu-PGE mineralization. Copper sulphides (bornite + chalcopyrite) minerals began to crystallize late in the orthomagmatic phase of the intrusion, following crystallization of the main silicate assemblage (hornblende-plagioclase). Subsolidus cooling was responsible for the generation of ilmenite exsolution in magnetic, chalcopyrite exsolution and replacement of bornite and chaclocite-covellite alteration of chalcopyrite and bornite. The nature of PGE and precious metal mineralization was not determined in this study. The mineralogical composition of the host gabbro appears to be critical in terms of copper grade. Hornblendite samples yield only trace amounts of Cu sulphide, while leucocratic gabbro (plagioclase >> hornblende) contain lower concentrations of sulphide. Samples with the greatest amounts of Cu sulphides are characterized with hornblende and plagioclase abundances on the order of 50-60% : 40-50%, respectively. The Hindon Cu-PGE prospect share many attributes with the magmatic sub-class (versus reef-type) of Cu-PGE deposits. However, one notable difference is the near total absence of Fe-sulphides. This is not typical of most other Cu-PGE deposits, which contain significant amounts of pyrrhotite and/or pyrite.

5.3 Recommendations

1. Assay values (Table 1) show significant concentrations of PGE. However, no PGM were identified using standard optical methods. This is not unusual as the crystal sizes of most PGE mineralization tends to be below the optical resolution of the light microscope. Consequently, SEM-EDS analysis should be undertaken in order to determine the PGM assemblage and the distribution of PGM.
2. The equigranular nature of the gabbros would permit the use of whole-rock trace element geochemistry in order to constrain magma petrogenesis. The Client could consider submitting a small suite of samples (10-12) for whole-rock

analysis by a commercial laboratory. LUMINX recommends that an XRF/ICP-AES/ICP-MS package that ensures total digestion of the sample be used.

3. Both stable sulphur isotopes and whole-rock S/Se geochemistry would be beneficial in constraining the petrogenesis of the Hindon gabbro. Used conjointly, both methods would provide an assessment of the source of sulphur, in particular the role of crustal contamination. The S/Se geochemistry could be conducted separately or included in a whole-rock geochemistry package. LUMINX could arrange for S isotopes through one of our routinely used partner labs. Typical cost for stable isotopes is approximately $30-50/sample.
4. Electron microbeam (SEM-EDS or EMP) analysis of silicate phases in order to better constrain petrogenesis. Such analyses are not low cost and should be only considered after evaluation whole-rock geochemical data. While *in situ* mineral chemical analyses are essential for cumulate rocks, the granular nature of the Hindon gabbro does not necessitate the need for such analyses. *In situ* analyses would provide a means of assessing evolutionary changes through compositional zoning (if present). The occurrence of ilmenite exsolution in magnetite would permit for the determination of the redox conditions of the melt.

5.4 Statement of Account

The following summarizes all costs related to work completed as of 02-10-2014. LUMINX is to be notified immediately of any discrepancies or changes to billing information. This is not an invoice. No payment is to be remitted at this time. Dr. Andrew Conly will issue an invoice for remittance of payment within 30 days from the issuing of this report.

Client: **Jim Atkinson, P.Geo.**
President JD Exploration Inc.
Phone: 416 874 1703
Mobile: 647 278 7502
E-mail: jatkinson@us-silver.com

Job Number: MX14-002

Job Description: Optical mineralogy and XRD mineralogical assessment of Hindon Cu-PGE-bearing gabbro

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Service	Unit Cost	Quantity	Total
Thin section preparation	$35.00/section	4	$140.00
Optical microscopy*	$125.00/sample	4	$500.00
XRD*	$150.00 (flat rate)		$150.00
Report preparation	$100.00	1	$100.00
Subtotal			*$890.00*
Total			**$890.00**

- Normal price is $150 per sample for petrography and $150 per sample for basic XRD phase identification

Amount to be invoiced: $890.00