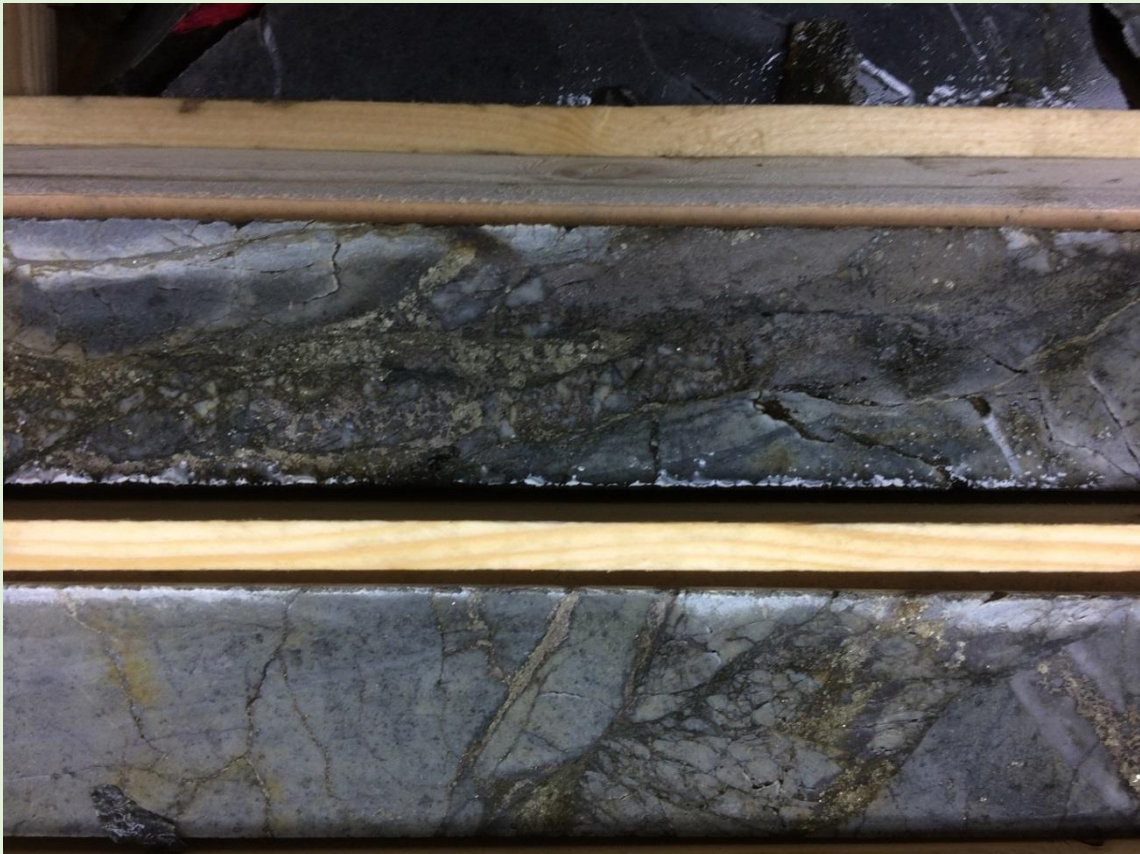


# Exploration Potential of the Copperstone Svartliden Project

24 January 2017





# Exploring the Economic Potential of the Copperstone Svartliden Project

## Abstract

*“On behalf of Copperstone Resources AB, the compilation, validation and geological interrogation of an extensive drill-core exploration dataset (spread out across contiguous tenements owned by the Company in northern Sweden) has been carried out over the past 4.5 years.*

*After nearly half a century since exploration activities first began there is now sufficient progress to highlight and advance the exploration potential of vein-styled copper, zinc, silver and gold sulphide-hosted mineralization found at shallow depth across the property.*

*Through generation of new structural geological data, the recognition of widespread phyllic alteration patterns, and the identification and mapping of inferred phreato-magmatic breccia bodies, the property has been identified as prospective for the presence of blind porphyry-style Cu-Au-Zn mineralization.*

*Based on this working exploration model it is proposed that this potential for deeper seated mineralization is examined further through deep core drilling at key locations identified through this study.”*

## INTRODUCTION

The Copperstone project is located approximately 50 km southeast of Arvidsjaur and 700 km north of Stockholm in northern Sweden. Geologically the project is hosted within volcanic and volcanoclastic supracrustal rocks of Paleoproterozoic age, bound regionally by volumous crystalline granite intrusions which constitute the bedrock of the Fennoscandian Shield. This undulating afforested terrain has been eroded in more recent times through repeated glacial advances and today is largely mantled by unconsolidated sediments of Quaternary age.

The project area also lies some 15-20km north of the famous ESE-WNW trending Skellefte-field region that hosts more than twenty (20) volcanogenic massive sulphide ore bodies which are either being mined or were mined previously, making this one of Sweden’s major base-precious metal ore producing belts.

The various permit boundaries (100% owned by Copperstone Resources AB) are shown in the two figures below (Figures 1a and b). The Svartliden (“SV”) project area reported on in this document falls largely within the Svartliden K nr 1 exploitation concession outlined in blue.



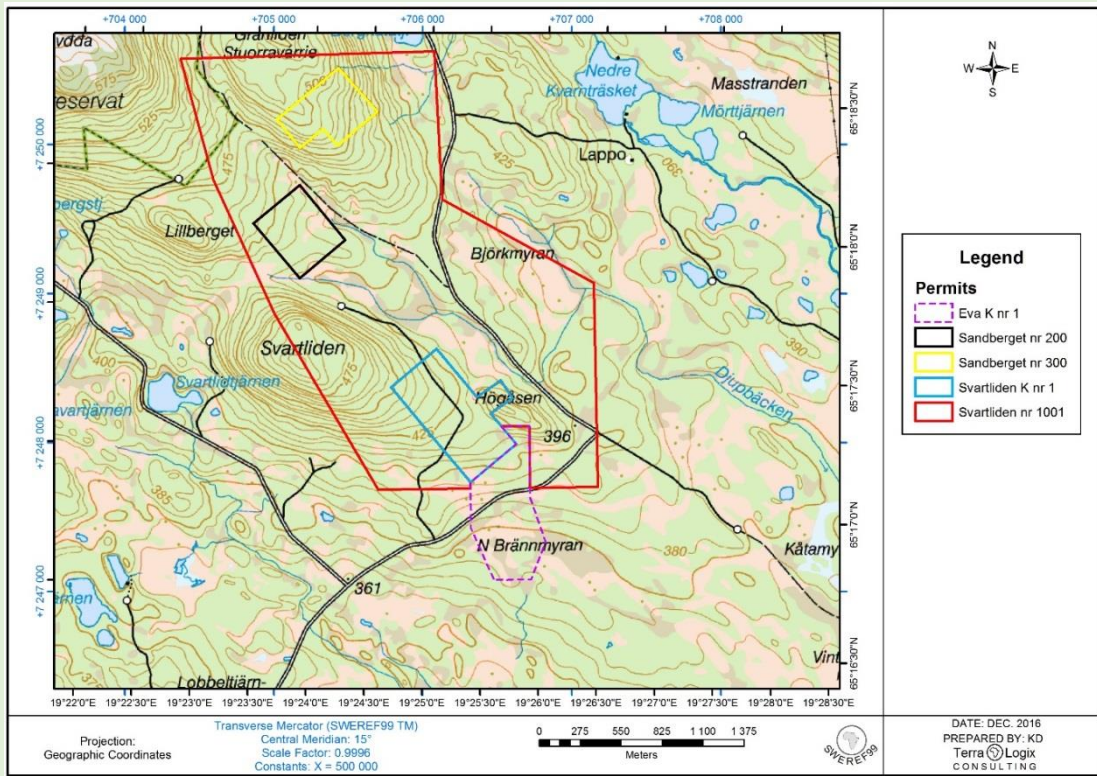


Figure 1a: Copperstone Exploitation Licenses

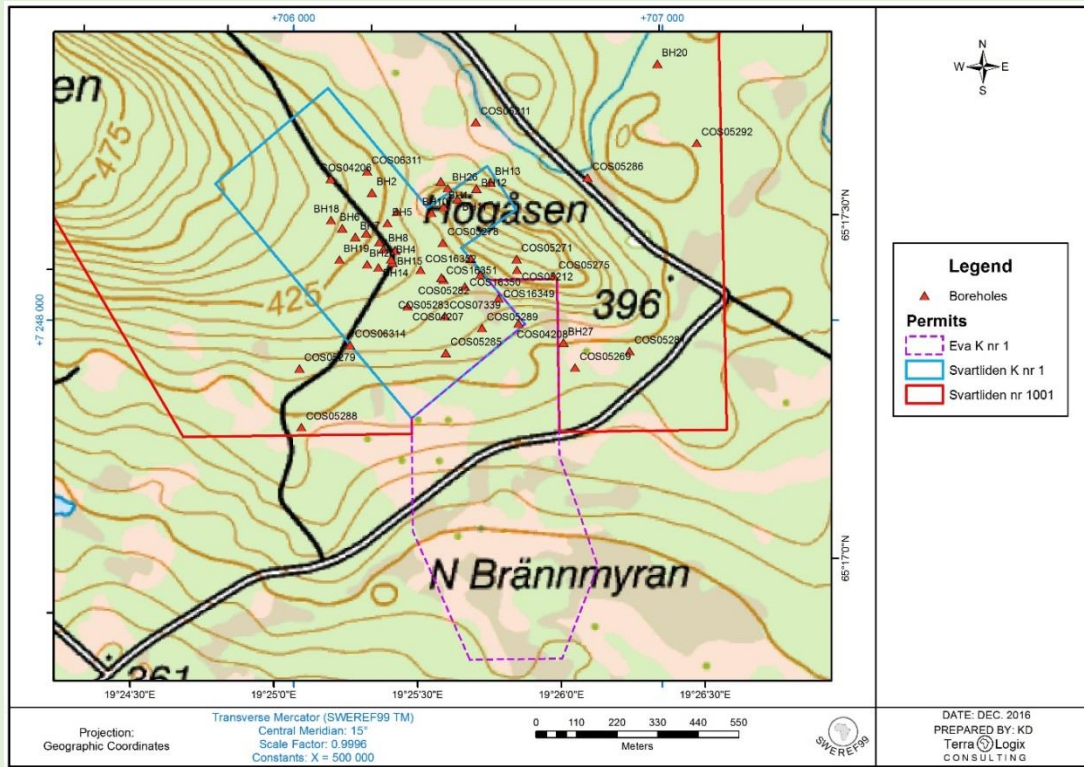


Figure 1b: Svartliden k nr 1 (in blue) with borehole collars



56 diamond drill holes (collar positions shown in Figure 1b) have been investigated in order to determine the potential of SV to host down-dip extensions of known mineralization, and to site three deep holes should this possibility exist. This report outlines the findings of this study.

## EXPLORATION HISTORY

The broader Copperstone licence area contains 260 inclined diamond drill holes (approximately 36,140m of core drilling) ranging from 70-650m in length but typically 150-250m in length. Systematic core drilling commenced on the property in the early 1970's, although the very first hole was collared in the mid 1950's. From 1971 until 1978, Boliden Mining AB drilled a total of 109 holes across the property (approximately 12,173m). Subsequently Lundin Mining AB drilled a further 138 drill holes (21,727m) from 2004 until 2007. Much of this drilling was positioned on shallow magnetic anomalies and also led to the discovery of the Eva massive sulphide occurrence (located ~300 m southeast of SV).

In the late autumn of 2015, Copperstone Resources AB drilled a total of 9 drill holes on the property (1,400m), of which two drill holes were collared within the SV concession. During this campaign core orientation techniques were introduced and planar structural data pertaining to mineralization was used to build the first resource estimates from the Granliden Hill area approximately 2-3km north of SV. In order to compliment growing ideas on the unique potential of the property, Copperstone Resources AB also carried out optical televiewer (OPTV) measurements in autumn 2016. From September 2016, the Company has drilled an additional 4 oriented holes on the SV concession (840m). Details of various drill campaigns are summarised in the table below.

Period	Company	Collars	Drill metres
1971-1978	Boliden Mining AB	109	12,173.00
2004-2007	Lundin Mining AB	138	21,727.00
2015	Copperstone Resources AB	9	1,400.00
2016	Copperstone Resources AB	4	840.00
	<b>TOTAL</b>	<b>260</b>	<b>36,140.00</b>

From the broader Copperstone licence area, a total of 56 boreholes are under investigation in this report and form the SV project. In conjunction with the Eva massive sulphide occurrence, SV has historically been interpreted as being part of a volcanogenic massive sulphide (VMS) deposit hosted within/adjacent to rhyolitic intrusives, as is typical of the Central Skellefte District.

More recent investigations at SV and Eva by Chris McKnight from 2013 to 2016 have resulted in the identification of a large scale hydrothermal alteration system and related hydrothermal breccia bodies. Within this context, the high silica content of the host rocks adjacent to polymetallic sulphide vein-like occurrences are ascribed to alteration products as opposed to being part of an original felsic protolith. This observation, together with the recognition of hydrothermal breccia, (which were previously logged as agglomerate within a



stratigraphic sequence), has major implications on the understanding of ore genesis and hence on the mineralization potential of the SV area, and beyond.

SV is characterised by Cu-Au-Zn mineralization which is hosted in chalcopyrite, sphalerite, pyrrhotite and arsenopyrite irregular-edged, anastomosing veins/veinlets (and to a lesser extent in disseminated sulphides). These have been intercepted in boreholes that have typically been drilled as steeply inclined holes of 100 to 300 m length with the sulphides occurring sporadically in 3D space, making it difficult to identify areas of contiguous mineralization. Where sulphides do occur there is typically insufficient grade and tonnage (based on historic drilling) to suggest the occurrence of an economic deposit suitable for underground mining. The mineralization does, however, remain open-ended at depth. The drill tested mineralization has values that typically range between 0.1 to 1 g/t Au; 0.2 to 1.5% Cu and 0.5 to 10% Zn. The Eva occurrence south of SV is dominated by Zn and Au (with subordinate Cu) and is situated about 200 m S of SV but does not form part of this current investigation.

At SV the texture and mineralogy of certain parts of the core shows the rock mass to be highly altered. Typically there is a distinctive pale yellow colouration as compared to the darker greenish grey colour of the country rock that has not undergone significant hydrothermal alteration. Altered rock has significantly higher silica content with spotty, banded and fragmental textures. In places there are distinctive patterns of crackle and jigsaw brecciation that is commonly outlined by pyrite. Under polarised light in a petrographic microscope, thin sections demonstrate that a relatively coarser-grained quartz filling has also invaded fractures and brecciated fragments. The reasonable abundance of sericite (and locally muscovite) supports the geochemical dataset that shows potassic enrichment. In general terms the quartz-sericite-pyrite alteration style can be described as phyllic. Within the phyllic alteration zone, patches of older chlorite are overprinted. Beyond the limits of the phyllic alteration zone, chlorite is common, and less so epidote. This is the outer propylitic alteration halo and fades into unaltered country rock. The propylitic alteration style is still to be verified. These rocks are characterised by relatively high chlorite content and a decrease in K relative to the phyllic alteration. The presence of albite and epidote needs to be verified though by further petrographic work (for ease of reference this alteration style will be referred to as propylitic in this report).

The vertical extent of the phyllic alteration type does thicken significantly to the south and east of SV, where all holes in that vicinity (inclined holes drilled to approximately 200m total length) failed to intersect the base of the phyllic alteration zone. Northwards away from the core of the system, phyllic alteration interfingers with propylitic alteration to form gently inclined, less vertical and strata bound configurations. The approximate boundary between propylitic and phyllic alteration styles trends NE-SW. In general terms the full footprint of phyllic alteration is currently limited to the distribution of drill holes, and a few outcrops south-east of SV. The inferred extent of the phyllic alteration zone is >3km NE-SW and 1km NW-SE.

In addition, previously identified agglomerates are now interpreted as cross-cutting phreato-magmatic breccia bodies. Evidence for this includes the disconformable contact between the breccia and the surrounding country rock, the angular nature of the fragments,



petrographic evidence for fragments within the matrix to be of an igneous origin, the diffuse nature of some of the outer edges of the fragments (possibly indicating a reaction with the matrix) as well as the spatial proximity of the breccia pipes, mineralization and phyllic alteration (implying a genetic link between the three).

The combination of mineralization, alteration and breccia pipes, as well as the geochemical signature of the host rocks means that the presence of Cu-Au-Zn sulphides may well be attributed to magmatic-hydrothermal activity. As such there is potential to discover Cu-Au porphyry-style mineralization underlying the SV exploration permit which could have higher grades and significantly higher tonnage potential. This mineralization is effectively blind although what is drill tested in the upper 10 to 300 m does attest to the potential for deeper seated mineralization.

Within the broader Copperstone property there are several mineralized areas of which SV is considered to have, from current knowledge, the best mineralization and has been the most extensively drill tested. The datasets from the shallower drilling are valuable as they allow for a degree of vectoring into the interpreted deeper mineralization.

Given the above re-interpretation it was decided to put together a technical team to more fully evaluate the potential for economic, hydrothermal base and precious metal sulphide mineralization of significantly larger size and value than what has been inferred to date.

The objectives of the team were to:

- Re-evaluate the local geology, styles and patterns of alteration to test and verify the new interpretation as hydrothermally induced features linked to sulphide mineralization.
- Define mappable rock units to enable a clearer correlation and definition of lithologies. These units would need to be representative of the alteration;
  - allowing the shape of the breccia to be determined as best as possible,
  - incorporating the distribution of the sulphides,
  - taking cognisance of any measurable features such as the orientations of sulphide veins,

so that together these units can provide vectors to the proposed underlying mineralization.

- Ultimately the objective is to test the exploration model. The combined alteration and mineralization vectors should point towards areas of increased grade and tonnage potential and enable the siting of deep drill holes to test that potential.

## TEAM

A technical team has been put together by Copperstone Resources AB/Chris McKnight in order to implement this programme. This team consists of three additional geologists, two





from Pretoria, South Africa (Karsten Drescher (KD) and David Dodd (DD)), and Maurice Zongo from Burkina Faso (MZ). This team first came together in 2004, and has since collaborated on a number of projects.

KD has extensive experience with GIS and general geological software, and oversees the capture and management of the database and generation of digital images. DD and MZ have worked together to identify the geological units that needed to be captured as well as the interpretation of these in 3D space, including the generation of four cross-sections through the property. MZ captured and modelled all data in Micromine.

KD has captured all relevant historical data into the database and MZ, CM and DD worked on site for a cumulative time of approximately five weeks each and together in Uppsala for an additional week of data compilation. The team continued to work together from their various base localities on this report and the finalization of the 3D modelling, and will re-assemble towards the end of January 2017 to start the drill programme.

## PROGRAMME OF STUDY

The process followed to achieve these objectives was as follows:

- Produce a project dataset that includes all data (including assay data, borehole logs, collar data, geophysical data etc.). This has been done in an Access formatted database which allows the information to be brought into any geological software package chosen.
- Identify the geological units that should be captured and then mapping/logging these across the 56 boreholes selected from SV. This entailed laying out the core, assigning each metre of core to one of the units of interest (besides later intrusions) and capturing this on paper.
- Capture the units for the 56 boreholes in Excel, in the Access database and in Micromine.
- Collect 36 samples for thin-section preparation and description in order to assist in the identification of the protoliths, verify the existence of minerals characteristic of alteration and to help confirm the genesis of the breccia.
- Implement a new ground magnetic geophysical survey to verify the location, depth and source of the two positive magnetic anomalies previously identified.
- Model the lithological units identified in the 56 boreholes in Micromine
- Identify the locality of three (3) boreholes to drill test this opportunity.
- Draft up in this report the processes followed and the conclusions made leading to the definition of the next stage of the exploration programme.

## LOCAL GEOLOGY

The country rock hosting the mineralization at SV consists mostly of thermally-altered tuffaceous fine-grained sediments (silty pelites and quartz-wackes) interbedded with localised mafic lava flows. The sediments are fine-grained green to grey lithologies that are generally without distinctive primary features, and mostly devoid of any laminations, bedding or other sedimentary features. Typically, these units contain numerous fine quartz



clasts, often angular in shape. There are some horizons that are slightly coarser with repeated fining-upward beds. Correlation of units suggests that the primary stratigraphy dips moderately to the southeast.

The sediments have undergone low grade thermal metamorphism/weak hydrothermal alteration causing them to be chloritized, recrystallized and to have undergone various degrees of silicification. The breccia bodies and alteration form an integral part of this investigation and are addressed in more detail in the following pages.

## GEOCHEMISTRY AND ALTERATION

Hydrothermal alteration of volcanogenic host rock involves the replacement of primary minerals such as plagioclase, pyroxene and amphibole with minerals stable at the conditions of alteration, generally in the temperature range of 150–400 °C. Examples of these alteration minerals include quartz and other forms of silica (chalcedony, opal, amorphous silica), illite, sericite, smectite, chlorite, serpentine (lizardite, chrysotile), albite, epidote, pyrite, carbonates, talc, kaolinite, pyrophyllite, sulfates (anhydrite, barite, alunite, jarosite), and oxides (magnetite, haematite, goethite) (Shanks, 2012).

Within SV an area of phyllic alteration has been identified and modelled. This has been verified by petrographic analysis which identified quartz, sericite and pyrite from units mapped as phyllic. The area of phyllic alteration can be identified and mapped out as distinct from the surrounding grey-green rocks that are tentatively described as having undergone propylitic alteration.

The aerial extent of the phyllic alteration around SV cannot be fully evaluated as it is limited by borehole distribution, but a loosely defined contact is described below. What is evident is that the area of phyllic alteration has a relatively longer NE-SW axes (which is about 3 km long) and a shorter E-W axes in the order of 1 km wide.

### PHYLIC ALTERATION

Phyllic alteration is characterised by the mineral assemblage quartz-sericite-pyrite. Either alteration of primary potassic feldspars has occurred to form quartz-sericite, or potassium metasomatism has occurred, or a combination of both. Usually pyrite is the only sulphide phase present. The assemblage is characteristic of high temperature, moderately acidic hydrothermal alteration and typically forms a halo around a more intense potassic alteration zone within calc-alkaline porphyry copper deposits. Phyllic alteration at SV is identified by its characteristic yellowing and brecciation of the host rock and is associated with a high silica content and disseminated “spotty” pyrite (see Figures 2 and 3).





Figure 2: Photo of the phyllic alteration showing the typical yellow colour and “spotty” pyrite

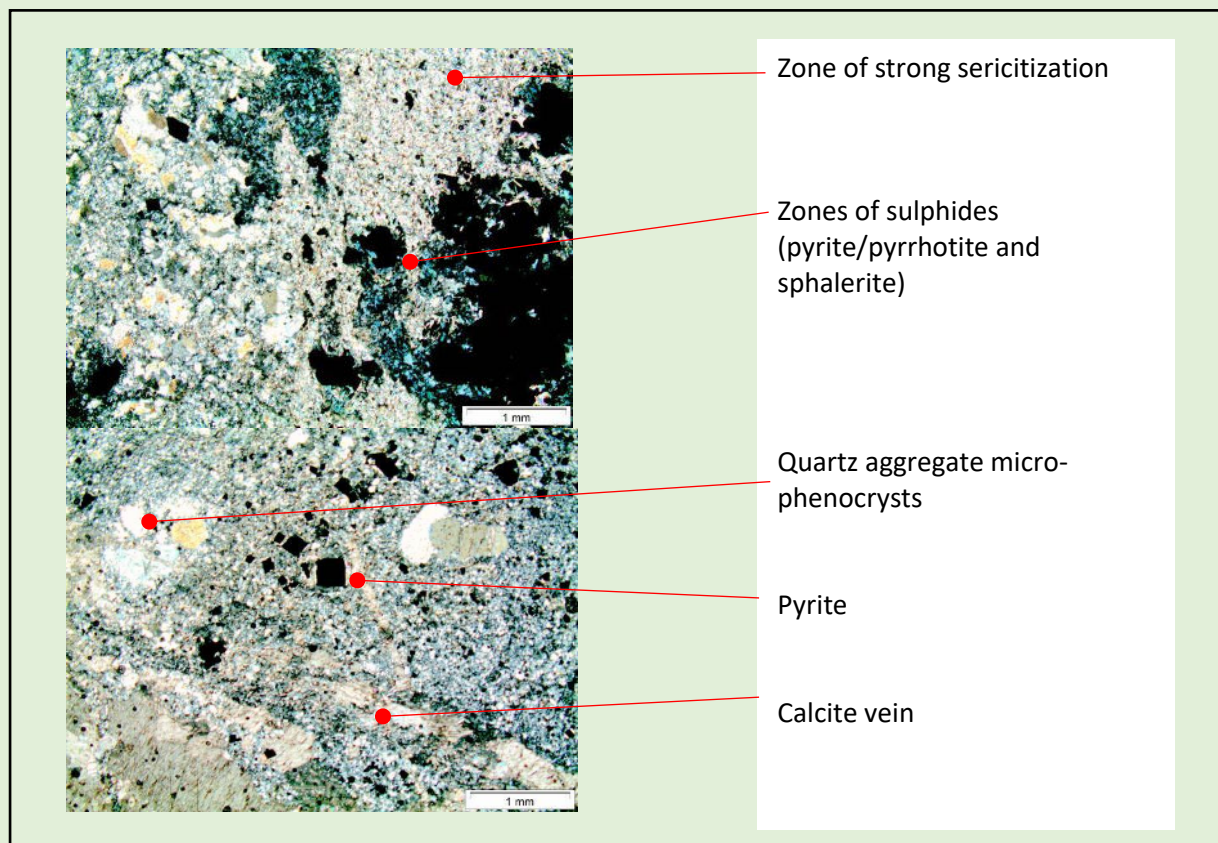


Figure 3: Photomicrograph of the minerals characteristic of the phyllic alteration



Besides the mineralogy the core has distinctive features showing increasing levels of leaching such as the development of crackle breccia as shown in Figure 4.

Esmaeily et. al. (2012) studied the mass changes resulting from alteration (and associated mineralization) of the Astaneh granitoid rocks in western Iran. They noted that  $\text{Al}_2\text{O}_3$ ,  $\text{TiO}_2$ , and  $\text{P}_2\text{O}_5$  were relatively immobile during alteration whilst  $\text{SiO}_2$  and  $\text{K}_2\text{O}$  were enriched. They further noted a depletion of  $\text{Na}_2\text{O}$  and  $\text{Fe}_2\text{O}_3$  and enrichment of  $\text{K}_2\text{O}$ . This was attributed to the sericitization of alkali feldspar and the destruction of ferromagnesian minerals whilst enrichment of Si in phyllic zones is consistent with silicification.

The mass changes described by Esmaeily et. al. are typical of most hydrothermal alteration which causes the removal of sodium, calcium, and magnesium from calc-alkalic rocks resulting in pervasive replacement of silicates which in turn destroys the original rock texture. The table below shows the variation in some of these elements within SV. It can be seen when comparing propylitic to phyllic alteration that K and Ba are enriched, that Ca, Mg, Ti and Mn are depleted and that in this instance Na is fairly immobile, but very low. These characteristics are broadly in line with those expected of phyllic alteration as observed in other projects with hydrothermal alteration such as in the Astaneh granitoid referred to above.

Table showing the variation in various elements between the phyllic alteration and the country rocks								
Alteration Type	K %	Na %	Ca %	Al %	Ti %	Ba ppm	Mg %	Mn ppm
Phyllic	1.53	0.22	0.49	4.86	0.09	360.46	0.94	334.07
Thermally Altered & Silicified	0.85	0.23	1.00	5.63	0.16	226.19	3.00	897.16
Thermally Altered	1.11	0.22	0.75	5.87	0.13	315.67	2.47	612.38

There are a number of elements at SV that show a close correlation with either Au or Cu mineralization. These include As, Sb, Bi, Cd, Co, Se, Te, In, Sn. This suite of elements also provides further indications of hydrothermal activity relating to magmatic fluids.

Besides the mineralogy and chemistry, phyllically altered rock has distinctive textural features such as the development of crackle breccia shown below (Figure 4).

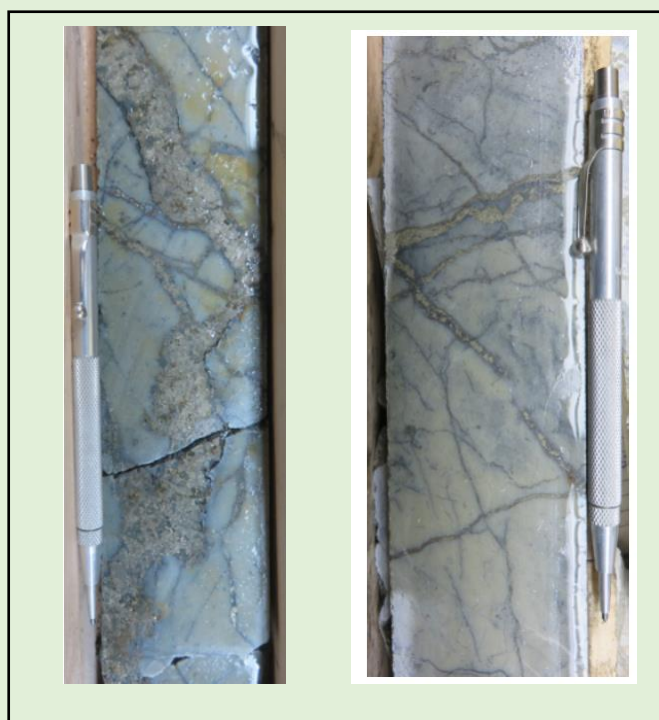


Figure 4: Crackle breccia – ruptures and cracks filled with pyrite in a highly siliceous matrix.

At SV widespread hydrothermal alteration is associated with pyrite indicating that this sulphide resulted from the primary cause of hydrothermal alteration and are thus not related to subsequent late stage alteration or supergene enrichment.

#### PROPYLITIC ALTERATION

Outside the phyllic alteration zone the bedrock is weakly chloritized, has an abundance of silica and is characterised by a dark grey to green colour (see Figure 5). This alteration style is termed propylitic in this exercise.



Figure 5: Hydrothermally altered core characterized by grey-green colour and relict sedimentary features.



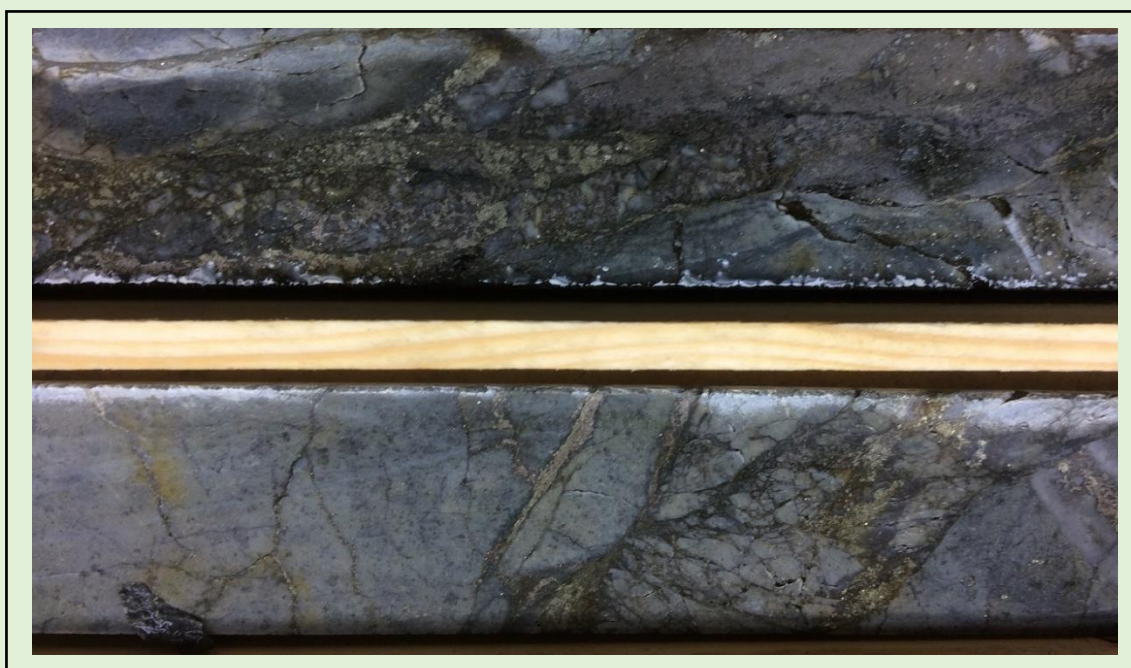


In other large hydrothermal systems it is not uncommon that propylitic alteration is characterised by chlorite, albite and epidote. Albite (sodic feldspar) was identified by both petrography and XRD at SV but is generally very fine grained. Assay results indicate very low levels of Na, as well as Ca, as epidote is also uncommon. It is likely that the outer alteration halo is vague and controlled by the general siliceous nature of the protolith stratigraphy.

In general, the amount of silicification surrounding the phyllic alteration zone does suggest an outer chlorite-dominated propylitic zone which is visibly different.

### *ALTERATION BRECCIA*

Crackle breccia provides further evidence of hydrothermal activity as they form due to hydraulic rupturing when local hydrostatic pressures exceed the ambient lithostatic pressure. In addition, there can be significant volume loss through intense acid leaching. Crackle breccia causes discrete clasts that are still in-situ but separated from each other by ruptures/cracks. With more rotation during prolonged fluid flow, jigsaw breccia can then develop. In many instances the matrix between the clasts is filled with sulphides. These breccia styles have been identified at SV (see Figure 6).



*Figure 6: Pyrite filled crackle-jigsaw breccia*

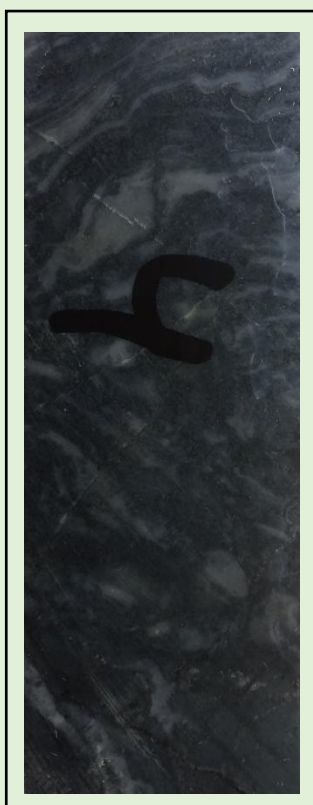
### *INFERRED PHREATO-MAGMATIC BRECCIA*

At SV there are also thick zones of polymictic breccia consisting of unaltered sediments and lava, phyllic-altered fragments, and quartz porphyry/felsic igneous rock. Some of the crystals making up the fine-grained groundmass are also brecciated (see Figures 7 and 8).





*Figure 7: The polymictic clasts which have themselves undergone a degree of brecciation subsequent to being emplaced.*



*Figure 8: An example of the dark milled component to the breccia which either forms a matrix to the clasts or in some instances has a more massive texture, sometimes with quartz lamellae possibly indicative of the fluid movement at the time of emplacement. These are often situated more centrally within the breccia (medial) whilst the more clast laden material is situated on the edges of the pipes (proximal).*

Petrographic analyses indicate that the breccia has significant patches of igneous texture suggesting that there is a possibility of a phreato-magmatic system dismantling the upper zone of a magma body at depth. The breccia margins are typically shattered, and probably formed due to interaction of magma with meteoric fluids. The matrix consists of fine quartz, chlorite, muscovite, sericite and minor rutile.



In places the broken fragments have been partly or completely invaded by relatively coarse-grained quartz, which is also present in the matrix. This shows that silica has been added subsequent to the brecciation of the country rock and either forms part of the fluids/vapour making up the breccia or was introduced after emplacement of the breccia. The igneous texture making up the matrix of the breccia implies that the breccia may be close to its magmatic source or that the invading magma is moving through unconsolidated sediments. This magma has been described petrographically as quartz porphyry.

Such styles of large scale breccia development are typical of porphyry copper systems, where they may act as conduits for ore fluids. At SV there are both early stage un-mineralized pebble-dominant breccia and a later stage copper-mineralized body. The latter can be considered as an explosive diatreme and post-dates the formation of the phyllic alteration.

### *PETROGRAPHIC ANALYSES*

Thirty six samples were taken from selected boreholes for petrographic analyses and six for XRD analyses. This study confirmed the following:

- Sericite, pyrite and quartz were identified confirming the presence of phyllic alteration.
- Chlorite was identified in the propylitic alteration samples. Albite was identified through XRD and both albite and epidote were tentatively identified in a few samples but because they are so fine-grained their identification even under the microscope is difficult.
- Igneous texture and feldspar crystals confirm the likely igneous origin of the breccia bodies.

The mineral assemblage within the various lithological categories, as identified through petrographic analyses is as follows:

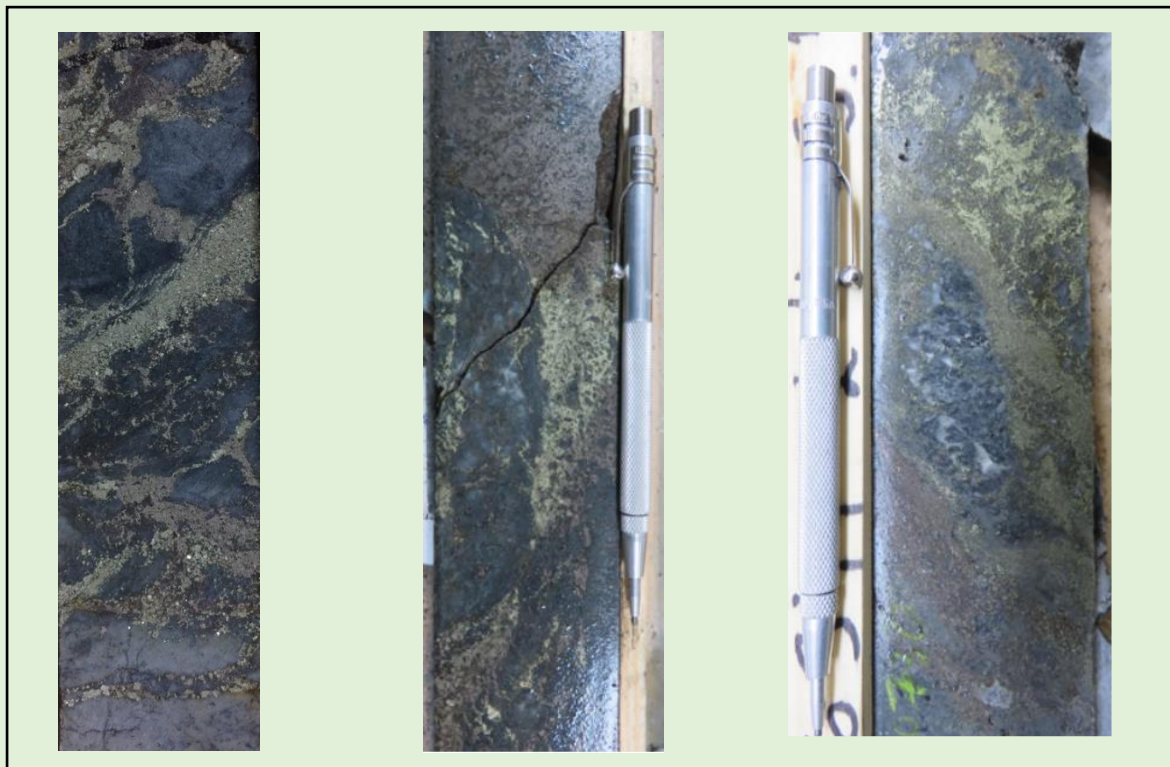
Lithological Code	Quartz %	Sericite %	Chlorite %	Minor Mineral %
Phyllic Alteration	~55-60	~20-30	~0	Fine-grained felsic minerals
Propylitic Alteration	~18-40	Up to 18	~ 3.5-40	Fine-grained felsic minerals (possibly including epidote and albite)
Breccia Bodies	Groundmass of fine-grained felsic minerals with clasts that contain up to 49% chlorite and 70% quartz			

### *MINERALIZATION*

Mineralization occurs predominantly as sulphide veins but in places has a more disseminated appearance. The sulphides consist of chalcopyrite, sphalerite, pyrrhotite and arsenopyrite. The chalcopyrite and sphalerite occur as discrete veins or together with



pyrrhotite. Mineralized sulphides also often occur in conjunction with pyrite although pyrite is pervasive and not necessarily related to mineralization. The photos below (Figure 9) show the typical stringers of sulphide, consisting predominantly in this case of pyrite and/or pyrrhotite with lesser chalcopyrite. The high quartz content can also be seen in the photo on the left.



*Figure 9: SV mineralization showing pyrite, pyrrhotite and chalcopyrite occurring largely as veins but also disseminations. Chalcopyrite is frequently associated with pyrrhotite. Sulphide assemblages also frequently cross-cut illustrating pulses of mineralization.*

The grade distribution of metals contents from individual samples taken from sulphide veins occurring with the various host units is tabulated below:

Grade Distribution of Veins within the various Lithological Units							
Host Lithotype	Au (g/t) Max	Au (g/t) Ave	Cu (%) Max	Cu (%) Ave	Zn (%) Max	Zn (%) Ave	% of Total Mineralisation
Phyllic	4.40	0.85	7.90	2	13	3	23
Propylitic	2.40	0.41	9.93	2	15	3	48
More siliceous Propylitic	0.74	0.38	0.78	0	2	1	5
Breccia Pipe	2.20	0.45	4.10	1	22	4	24



The following Figure 10 shows the general pattern of grade distribution as found in narrow veins across the study area.

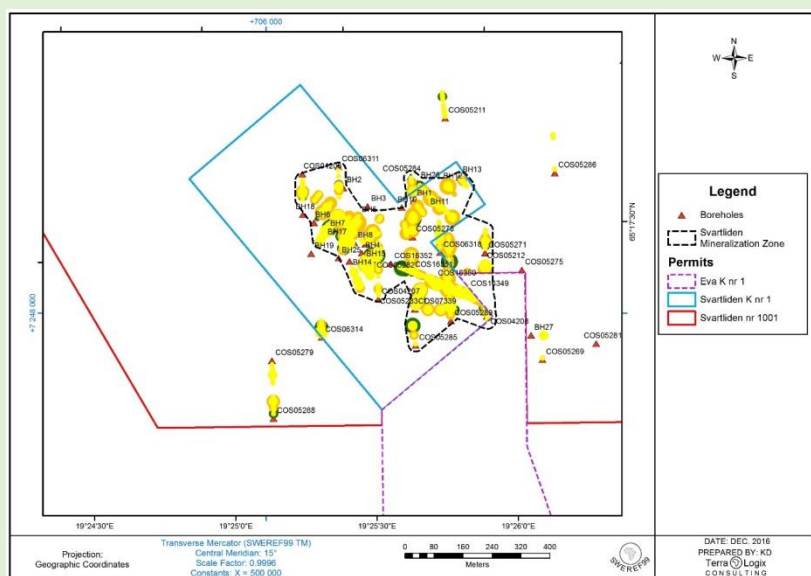


Figure 10: Spatial distribution of significant mineralization in plan view defined as > 0.1 g/t Au; 0.2% Cu and 0.5% Zn.

The following table indicates some of the best composite assay results from the SV area. Individual metal values were calculated as a weighted average over sections of drill core where sampling was continuous. Estimation of copper-equivalence has been applied to show the typical range of mineralization potential. For this estimate, gold is 1210USD/troy oz, silver is 17USD/troy oz, copper is 5800USD/metric tonne and zinc is 2800USD/metric tonne. No recovery factors are applied.

Drillhole Name	From (m)	To (m)	Intercept (m)	Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Cueq (%)
COS05282	186.15	188.68	2.53	0.50	46.87	2.19	0.24	3.08
COS16352	239.60	241.30	1.70	0.47	44.12	1.86	0.50	2.83
COS05283	207.90	213.80	5.90	0.51	39.42	1.28	0.44	2.21
COS05283	99.30	116.33	17.03	0.39	23.80	0.24	2.85	2.10
BH11	13.57	29.60	16.03	0.04	24.00	1.11	1.26	1.97
COS05278	194.27	208.50	14.23	0.12	24.10	1.33	0.28	1.77
COS16351	77.95	82.00	4.05	0.33	12.90	0.42	0.53	1.02
COS04208	27.05	66.55	39.50	0.11	13.00	0.44	0.65	0.95
COS05289	191.30	222.70	31.40	0.09	11.25	0.74	0.11	0.96
COS16349	27.20	87.00	59.80	0.11	6.53	0.50	0.40	0.83
COS06316	110.60	151.90	41.30	0.05	9.82	0.50	0.37	0.80
COS04209	42.10	79.25	37.15	0.08	8.00	0.58	0.15	0.78
COS05212	9.10	39.85	30.75	0.09	7.07	0.58	0.11	0.76
COS16352	168.00	213.00	45.00	0.15	11.23	0.15	0.67	0.68

The following Figures 11a, 11b and 11c show the general trends of mineralization grade with intercept width and depth.



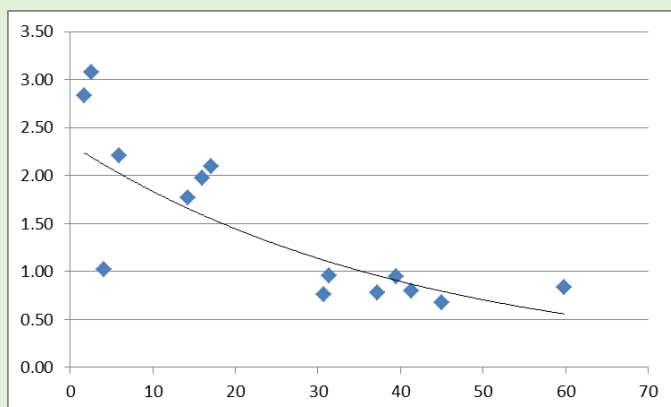


Figure 11a: Cueq vs intercept width. This graph shows the general decrease in grade with width of drill hole intercept.

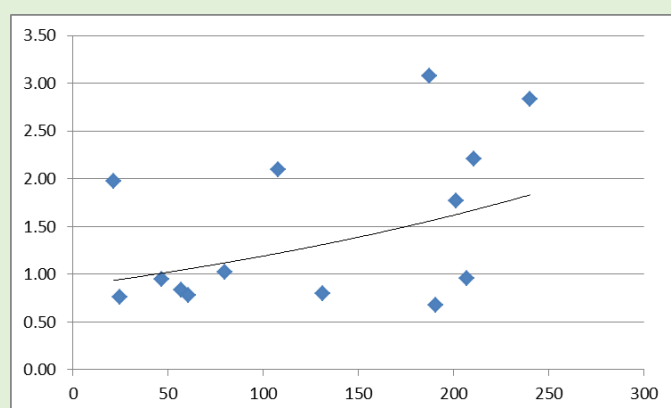


Figure 11b: Cueq vs average intercept depth. This graph shows the general increase in grade of drill intercepts vs depth.

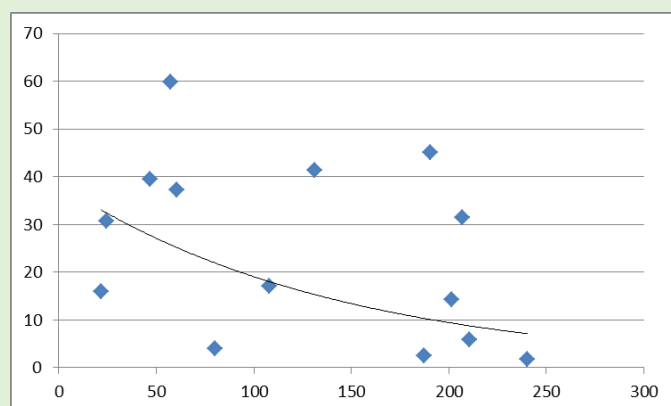


Figure 11c: Intercept width vs depth

The above results show that in areas where veins are concentrated, significant grades can be found. Overall patterns show an increased grade with depth, and a narrowing of the mineralized intercept width. Typically the greater intercept widths occur within the phreato-magmatic breccia. It is reasoned that these explosive vents broke away through the phyllic cap seeking lower pressures outwards, and formed natural conduits to tap away and disperse some of the metal rich ore fluids trapped below in the rising stock.

This dynamic 4D model also explains the fundamental difference with the earlier pyrite-dominated sulphide bodies found at Eva which are more gold rich. The hydrothermal maxima introduces more reduced (pyrrhotite bearing) fluids of higher temperature, pressure and copper concentration at higher levels within the system. It is expected that reworking of the older massive pyrite bodies may have resulted in the zinc grades found at SV.



## GEOLOGICAL SECTIONS

The following table indicates the collar details of the 6 drill holes that were positioned on the SV property by Copperstone Resources AB in 2015 and 2016.

Month /yr	Drill Hole	SWEREF99TM EASTING	SWEREF99TM NORTHING	Elevation (RH2000)	Azimuth	Dip	Top of rock	EOH (m)
Dec-15	COS15347	706274.633	7248190.635	424.78	311.77	-50.00	10.90	160.00
Dec-15	COS15348	706276.082	7248189.701	424.79	28.91	-50.00	12.10	135.50
Aug-16	COS16349	706555.651	7248059.569	413.95	118.00	-45.00	27.20	150.00
Sep-16	COS16350	706464.696	7248091.867	420.02	112.00	-45.00	37.40	211.30
Sep-16	COS16351	706401.375	7248116.301	421.45	112.00	-45.00	29.80	180.70
Oct-16	COS16352	706344.500	7248136.300	422.00	112.00	-45.00	36.10	299.50
<b>Total</b>								<b>1137</b>

The following table indicates the extent of sampling that was carried out, and was added to the extensive database of historic drill holes.

Samples	QAQC	Total	Core length	Sampled length	Coverage
104	15	119	149.10	103.90	70%
58	9	67	123.40	57.25	46%
60	9	69	122.80	60.55	49%
89	12	101	173.90	90.10	52%
103	15	118	150.90	113.10	75%
202	27	229	263.40	213.05	81%
<b>616</b>	<b>87</b>	<b>703</b>			

From geological logging and combined with a review of all historic drill holes, a series of geological cross-sections were constructed (see Figure 12). These sections illustrate the distribution of Cu mineralization summarised above as composite values. Absolute copper values are not shown and the detail of the geology, locality of section lines and legend are shown in the Synopsis chapter. These sections were then used to build a 3D model in Micromine.

A key to the overall understanding has been the combination of various units of interest (breccia, mineralization and phyllic alteration) in modelling work in Micromine. Breccia pipes (shown in red) are spatially related to mineralization. The bulk of the narrow vein mineralization is hosted in the propylitic altered sediments (48% of assay results) where it often occurs on the flanks of the hydrothermal breccia. It is reasoned that this unit is more permeable than the phyllic alteration zone.

It is also evident that the mineralization is more abundant in breccia in the eastern side of section 19 (bottom right) and in section line 22 (top right).

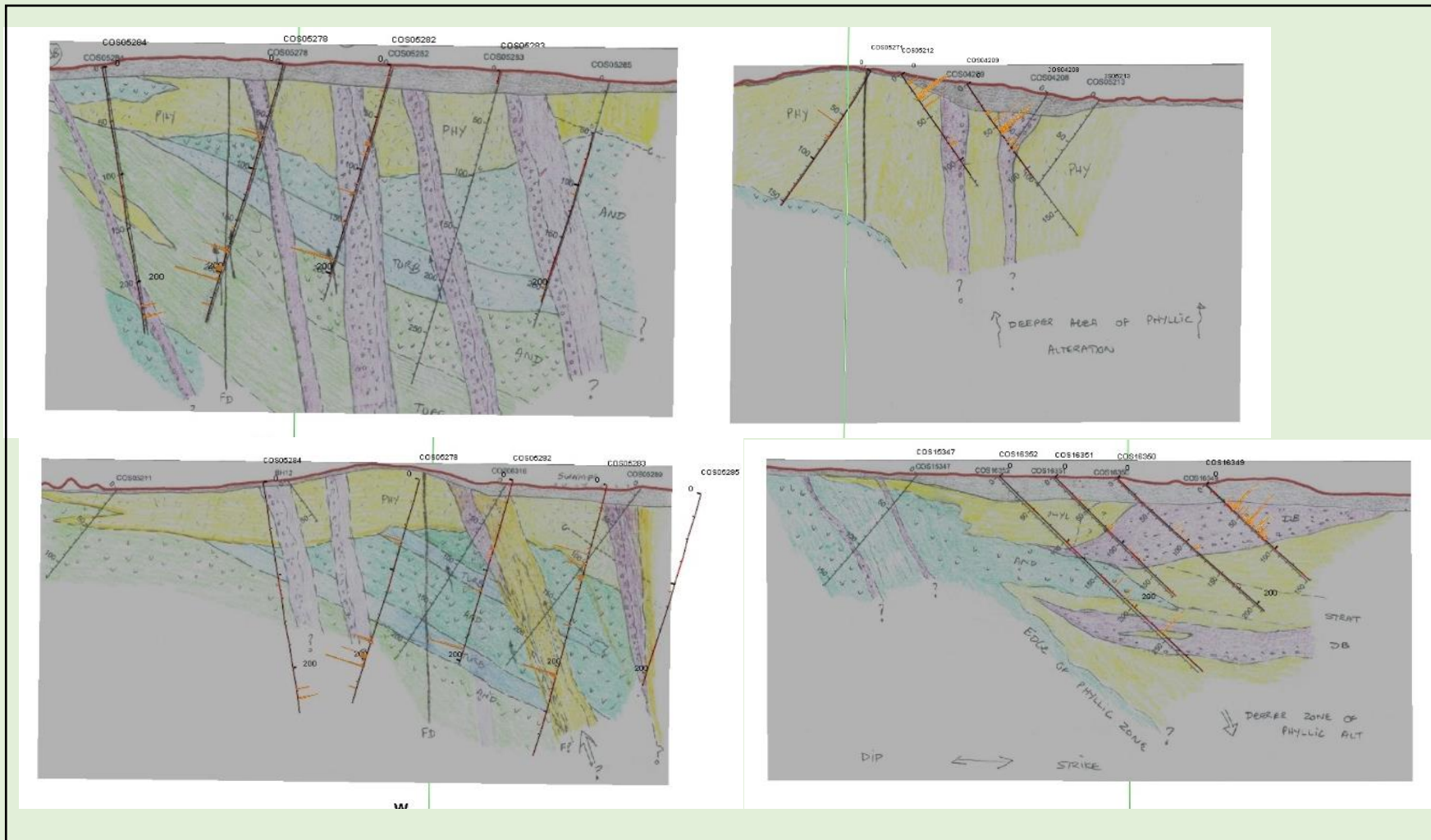
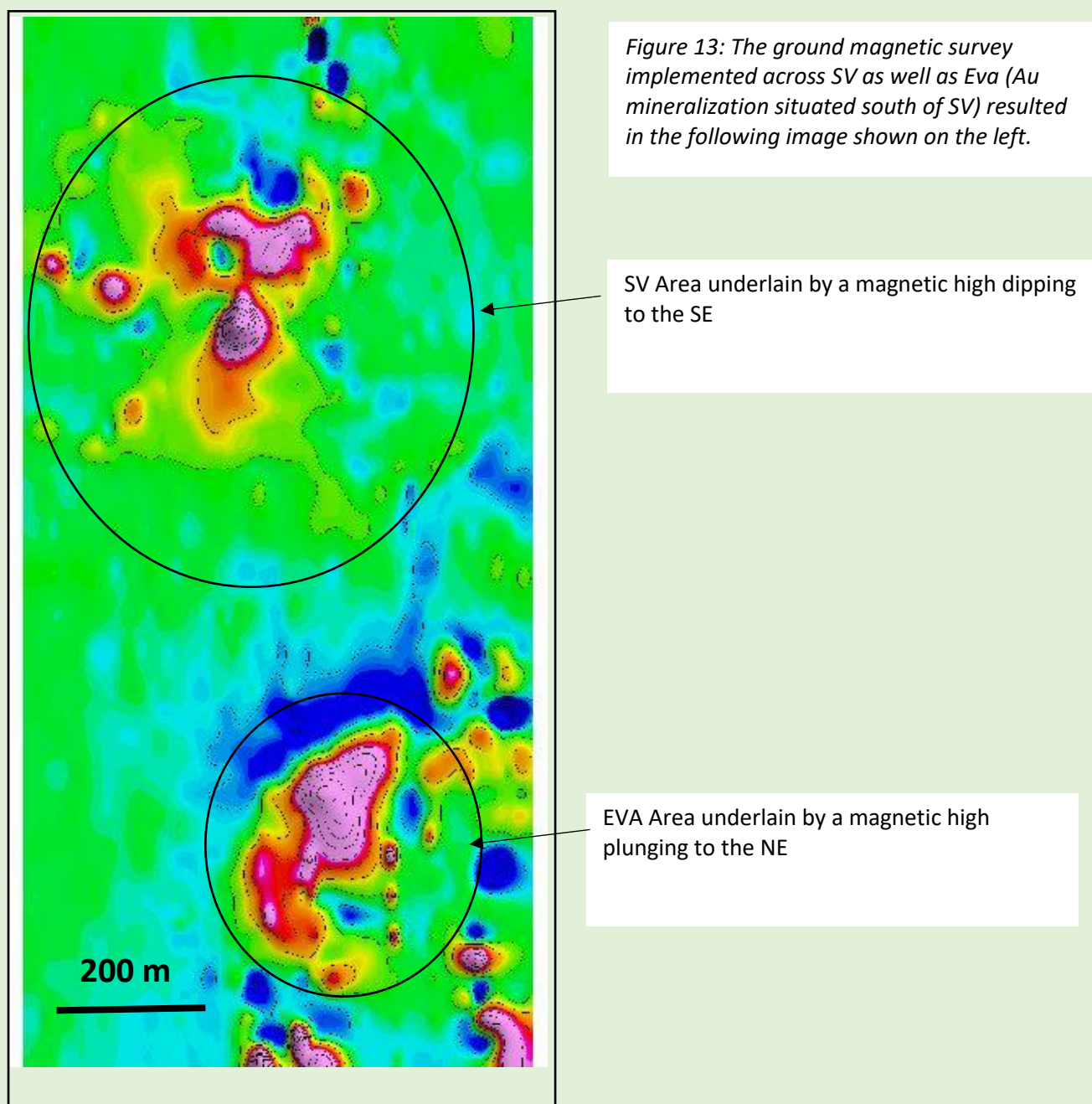


Figure 12: Geological cross-sections showing the breccia bodies in red and their association with mineralization (which is depicted by the orange bar charts on the borehole traces). Top left: Sec 15, Bottom Left: Sec19, Top Right: Sec22, Bottom Right: SecF1 (WNW-ESE).

## GROUND MAGNETICS

A ground magnetic survey was implemented across SV (and Eva) to understand the causative source and possible depth of the magnetic highs shown from historical magnetic data (see Figure 13). Readings across the borehole core with a magnetic susceptibility meter showed that the only rock unit that returned any significant magnetic readings was pyrrhotite. The magnetic high at SV is therefore ascribed to pyrrhotite mineralization close to surface. The magnetic high at Eva is likely to have the same causative source but this still needs to be investigated.







## STRUCTURE

A total of 880 structural readings were taken down the historic SV boreholes using an Optical Televiwer system which enabled the strike and dip of the sulphide veins to be measured using WellCad software. Figure 14 shows the contoured polar plot of the results. Highlighted poles are the small population of massive sulphide contacts derived in 2013 for the Eva area.

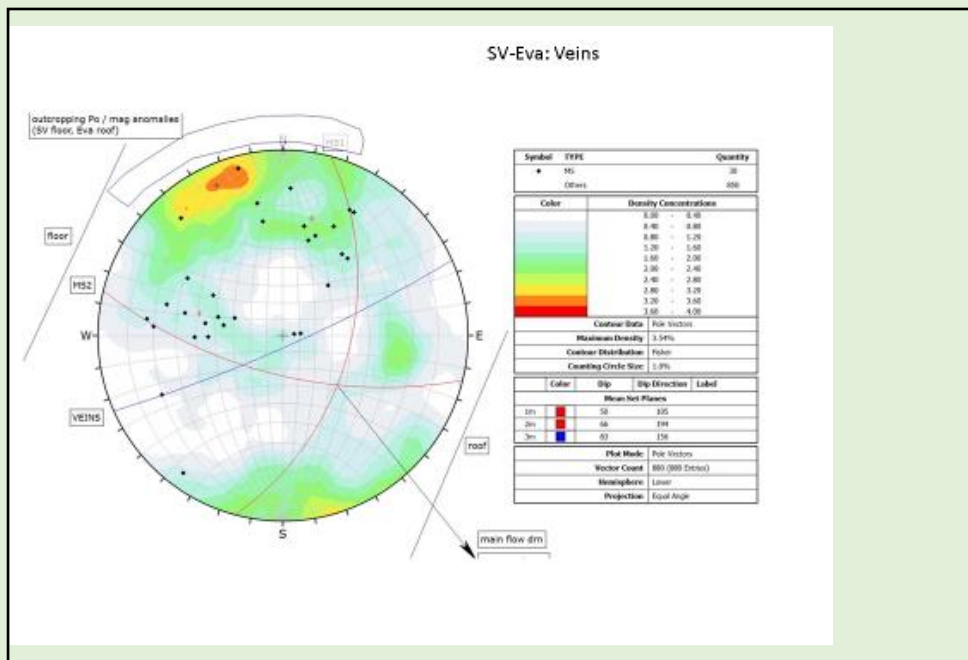
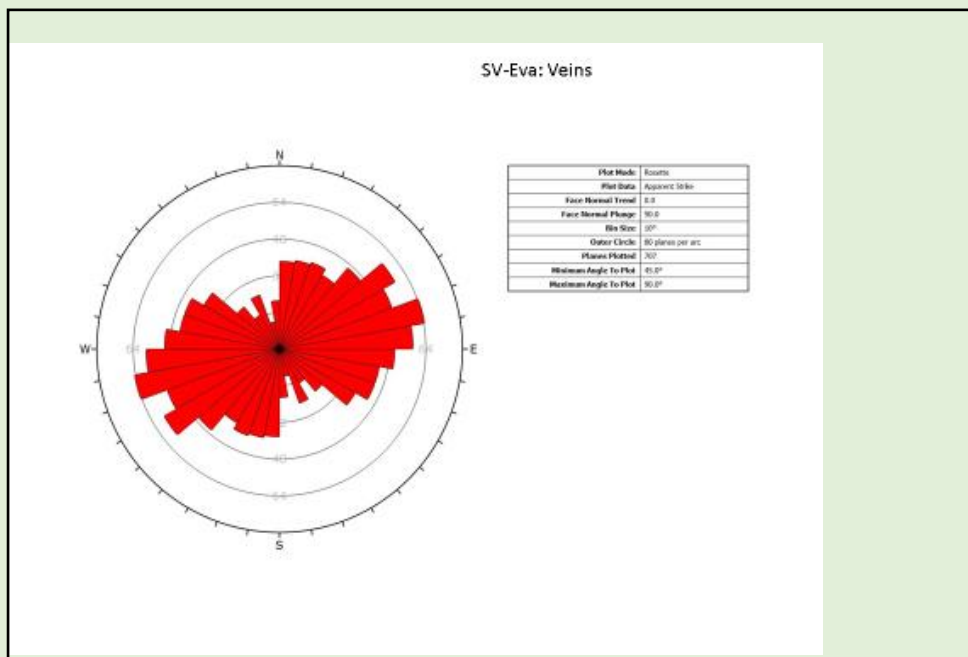


Figure 14: Measurement of veins from SV showing strong NE-SW strike and steep dip to the SE. This general strike is also shown in the rose plot below.



The image below (Figure 15) shows these veins plotted per borehole and once again the NE-SW trend is evident.

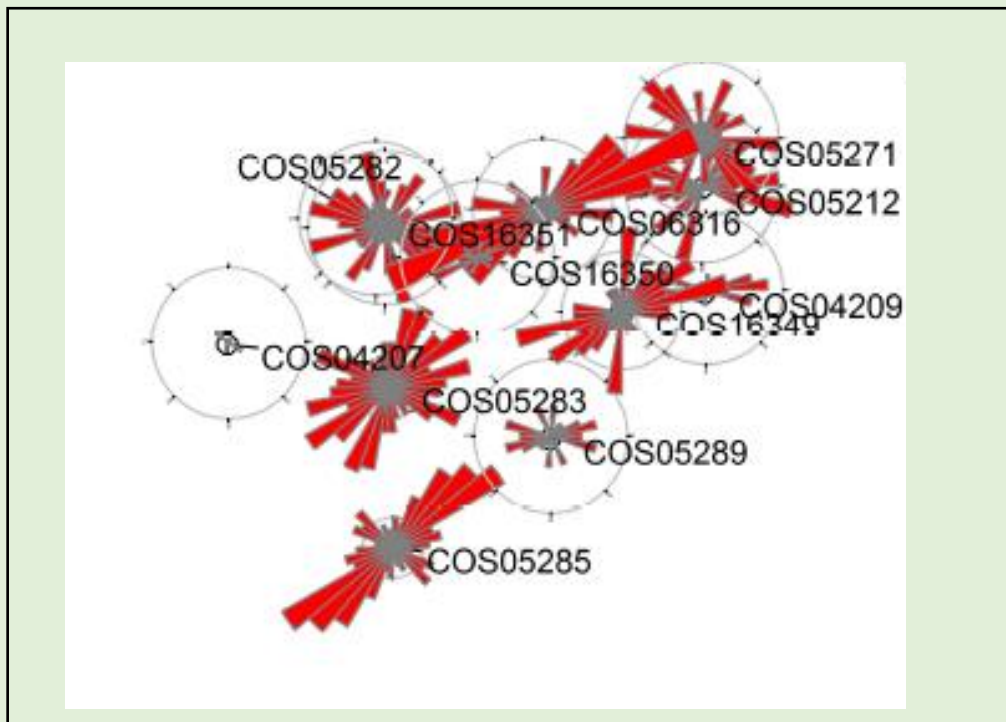


Figure 15: Rose plots showing the NE-SE orientation of the sulphide veins at SV

## SYNOPSIS

The FIRST OBJECTIVE of this exercise was to objectively evaluate the degree of alteration as well as the identification of the agglomerate as a true volcanic breccia in order to confirm the potential of the area to have been affected by an ore forming hydrothermal system.

***The outcome of this study is that the SV area has indeed undergone significant hydrothermal alteration and the associated breccia is of igneous origin (inferred phreato-magmatic style).***

Areas subject to hydrothermal alteration are characterised by zones such as propylitic, phyllic, potassic and argillic, which in turn are characterised by a suite of minerals including sericite, quartz, pyrite and the clay minerals such as kaolinite, smectite and illite. In addition these alteration types are characterised by a variation in mineralogy such as removal of sodium, calcium, and magnesium from calc-alkalic rocks.

***The borehole core at SV contains the mineral assemblages indicative of phyllic alteration including quartz, pyrite and sericite.***

***The phyllic zone also displays a relative enrichment in K as well as depletion in Ca, Mg, Ti and Mn.***

***This mineralogical/geochemical evidence for alteration is corroborated by the textural features displayed in the core such as crackle breccia.***



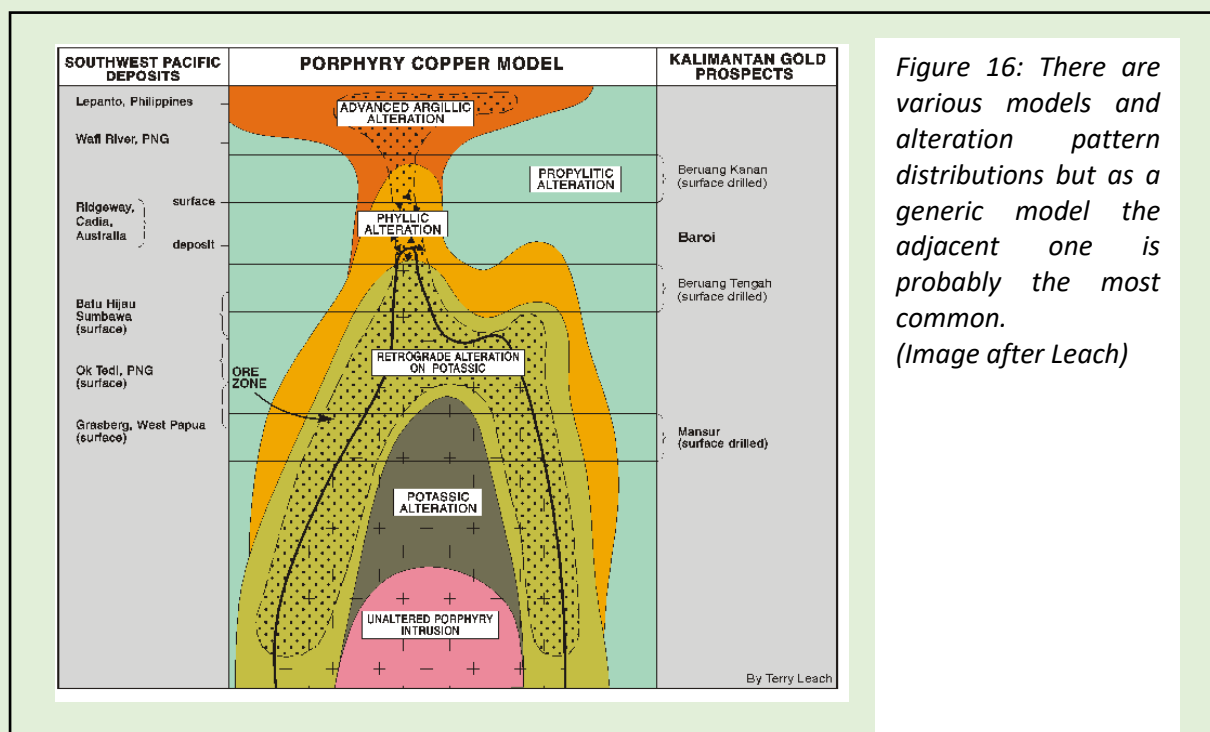
***In addition the alteration occurs in conjunction with Cu-Au-Zn-Ag mineralisation and occurs over a reasonable scale (as shown in the cross-sections and plan image) which is of the same order of magnitude as other porphyry systems (which typically have alteration halos in the order of 0.5 to 5 km by 5 to 10 km (Berger et. al. 2008) although the extent of erosion is unknown.***

Cu-Au Porphyry systems are characterised by three main criteria (Pirajno, 2009) namely:

- Large volumes of rock that are affected by hydrothermal mineralising fluids.
- The mineralization is spatially and genetically related to one or more intrusive bodies of which at least one has a porphyry texture.
- There is a presence of veins that form a stockwork of sulphides containing Cu, Fe, Zn, Pb, Mo as well as W, Sn and Bi.

***Based on the alteration, mineralization and presence of breccia pipes it is evident that all available evidence points to the fact that the SV licence may well overlie a hydrothermal mineralizing system and possibly a Cu-Au porphyry.***

The image below (Figure 16) is a schematic of the mineralizing system that is proposed as a possibility.



Part of the process of identifying the possible origins of the SV mineralization is to determine what style of hydrothermal system is possible at SV. The most obvious feature at SV is the abundance of pyrrhotite associated with copper, silver and gold mineralization.



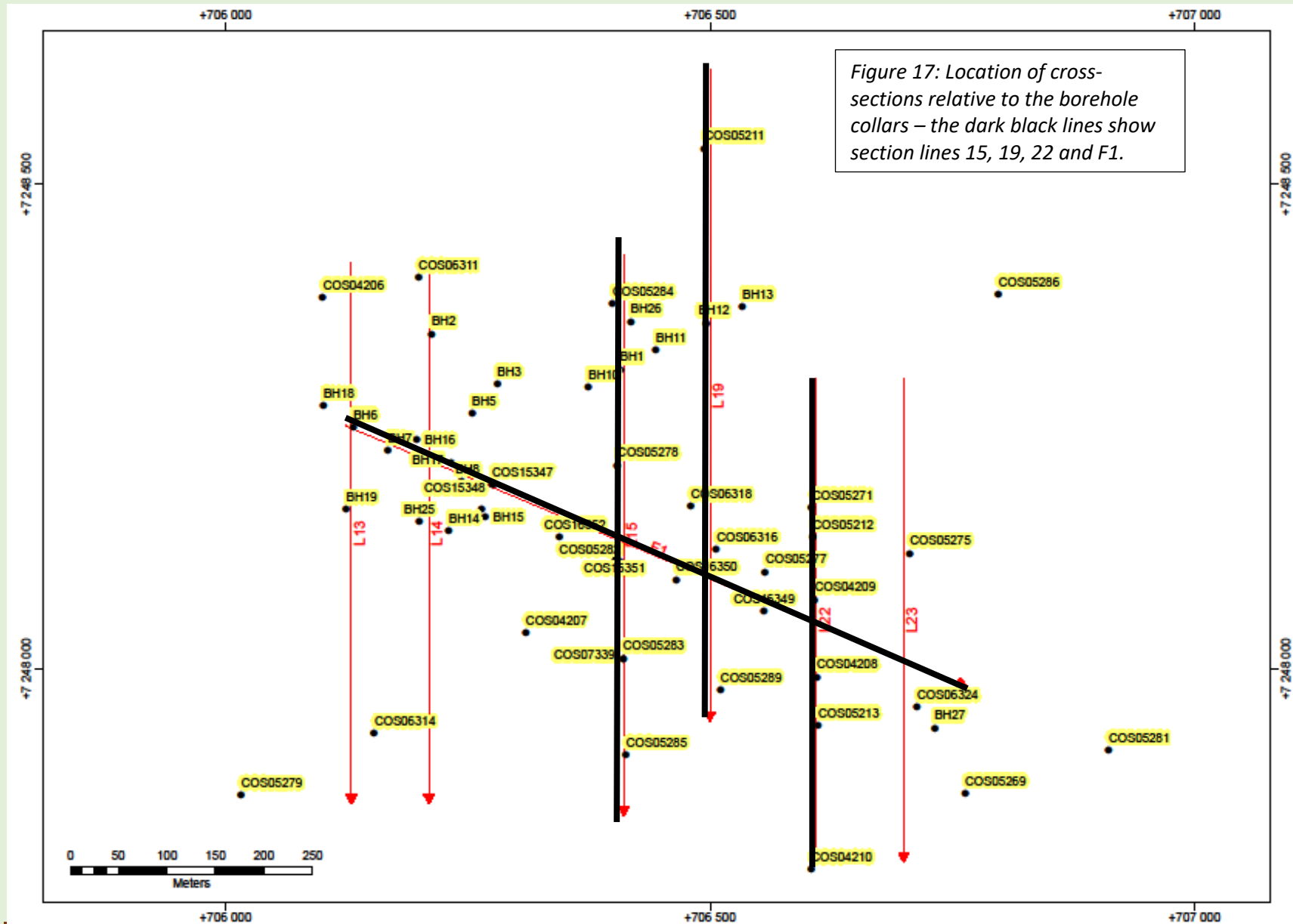
Such pyrrhotite rich porphyries have more recently become known around the world, and have formed in a reduced (oxygen-poor) environment associated with emplacement of ilmenite-bearing (titaniferous) I-type granitoids. Without detailed fluid inclusion studies it is not clear yet at SV if the blind porphyry itself was reduced, or if the ascending hydrothermal ore fluids were reduced at the site of mineralization. Ore fluids can become reduced as a result of assimilation with host rock graphitic material. Graphite has not been intercepted in any boreholes meaning that it is more likely that at SV the porphyry itself is reduced.

Within the context of the SV-Eva system, the copper-rich reduced fluids conduited NW through explosive phreato-magmatic breccia bodies and dispersed into surround unaltered rock are considered later stage, more evolved and at the maxima of the hydrothermal event.

The relevance of discriminating between reduced and oxidised porphyries is that the morphology of their sulphides and their grade distribution differs. This level of interpretation is still at a very early stage and additional drilling is required to gain a fuller understanding of the mineralizing system and whether in fact a Cu-Au porphyry system does underlie SV.

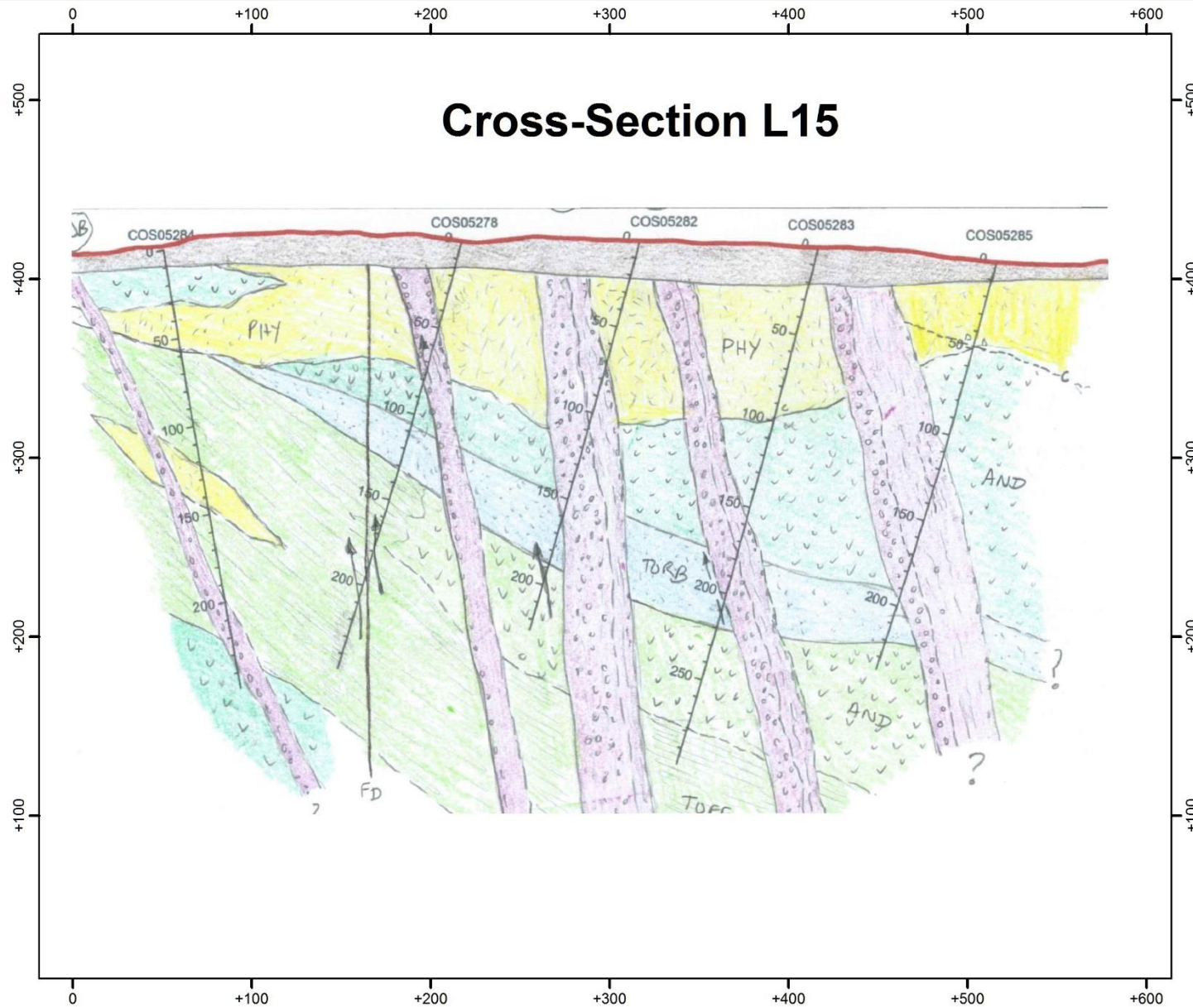
The SECOND OBJECTIVE was to package the rock types in such a manner that they can be mapped and modelled as distinct meaningful units that can provide vectors to the proposed underlying mineralization. The units within the boreholes that define the various alteration styles, and the intervals that intercepted breccia pipe were identified and captured in the database and Micromine. This information was then used to create four cross sections (Figures 18, 19, 20 and 21) which are named L15, L19, L22 and F1 (their localities relative to each other and the borehole collars are shown by the black lines in Figure 17). Figure 22 shows the plan view of the alteration based on modelling of the borehole lithologies.







# Cross-Section L15



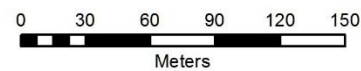
## Legend

### Geology

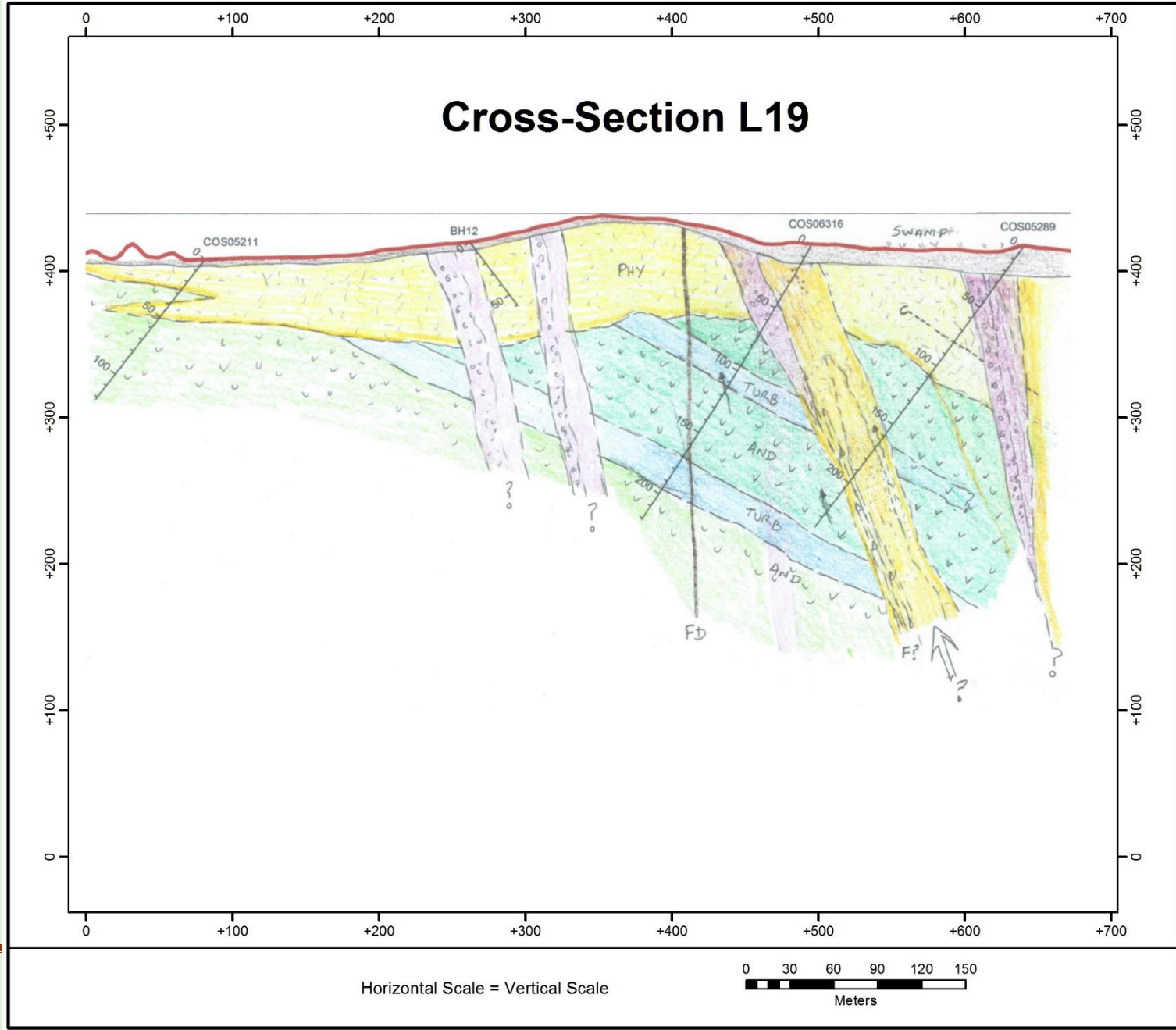
- AND: Andesite
- DB: Diatreme Breccia
- FD: Felsic Dyke
- PHYL: Phyllic Alteration
- TUFF: Tuff
- TURB: Turbidite

Figure 18: N-S Cross-Section L15

Horizontal Scale = Vertical Scale



DATE: DEC. 2016  
PREPARED BY: KD  
Terra Logix  
CONSULTING



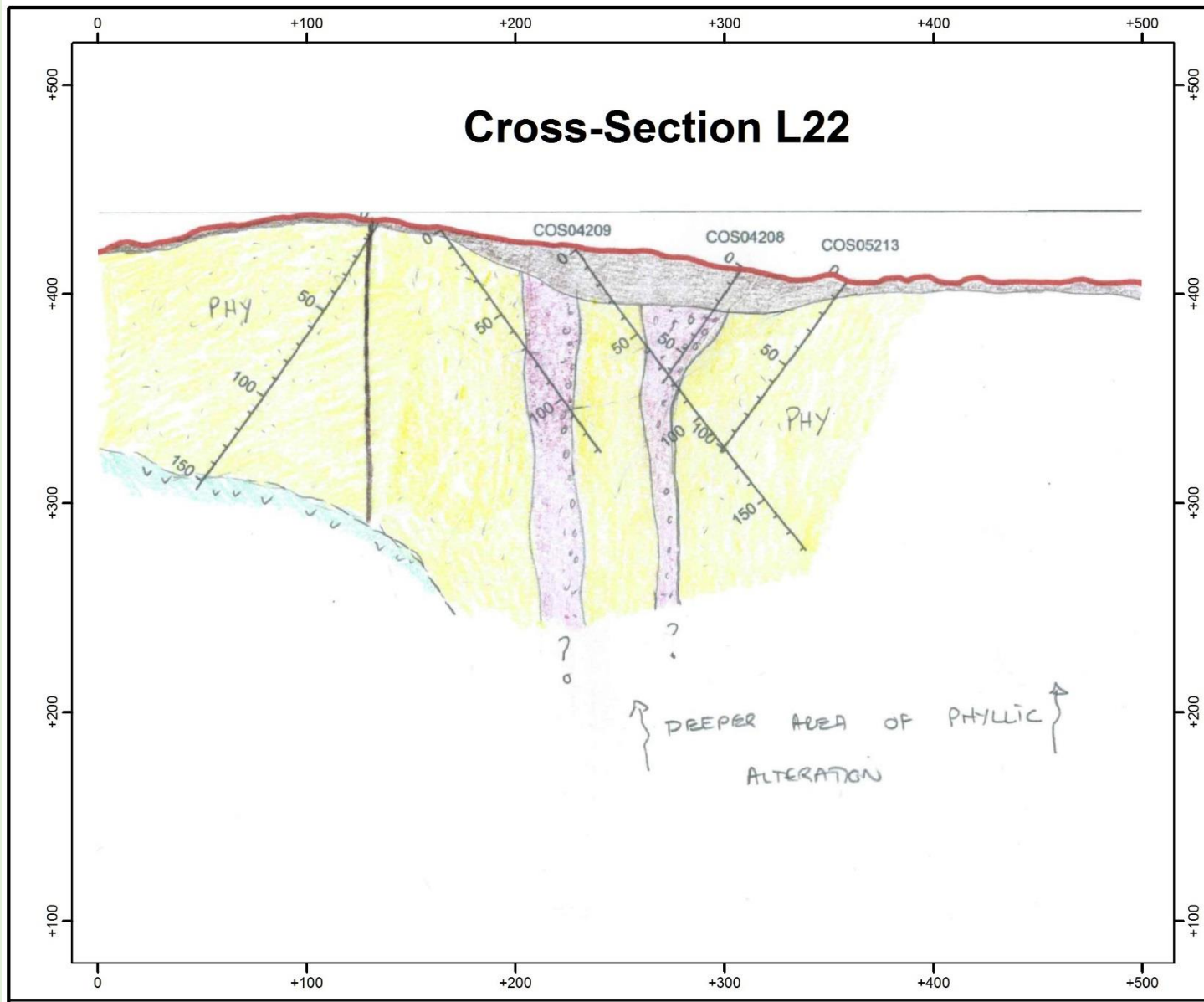
#### Legend

**Geology**

- AND: Andesite
- DB: Diatreme Breccia
- FD: Felsic Dyke
- PHYL: Phyllic Alteration
- TUFF: Tuff
- TURB: Turbidite

*Figure 19: N-S Cross-Section L19*

DATE: DEC. 2016  
PREPARED BY: KD  
Terra Logix  
CONSULTING



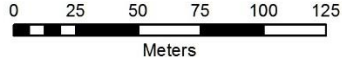
#### Legend

**Geology**

- AND: Andesite
- DB: Diatreme Breccia
- FD: Felsic Dyke
- PHYL: Phyllic Alteration
- TUFF: Tuff
- TURB: Turbidite

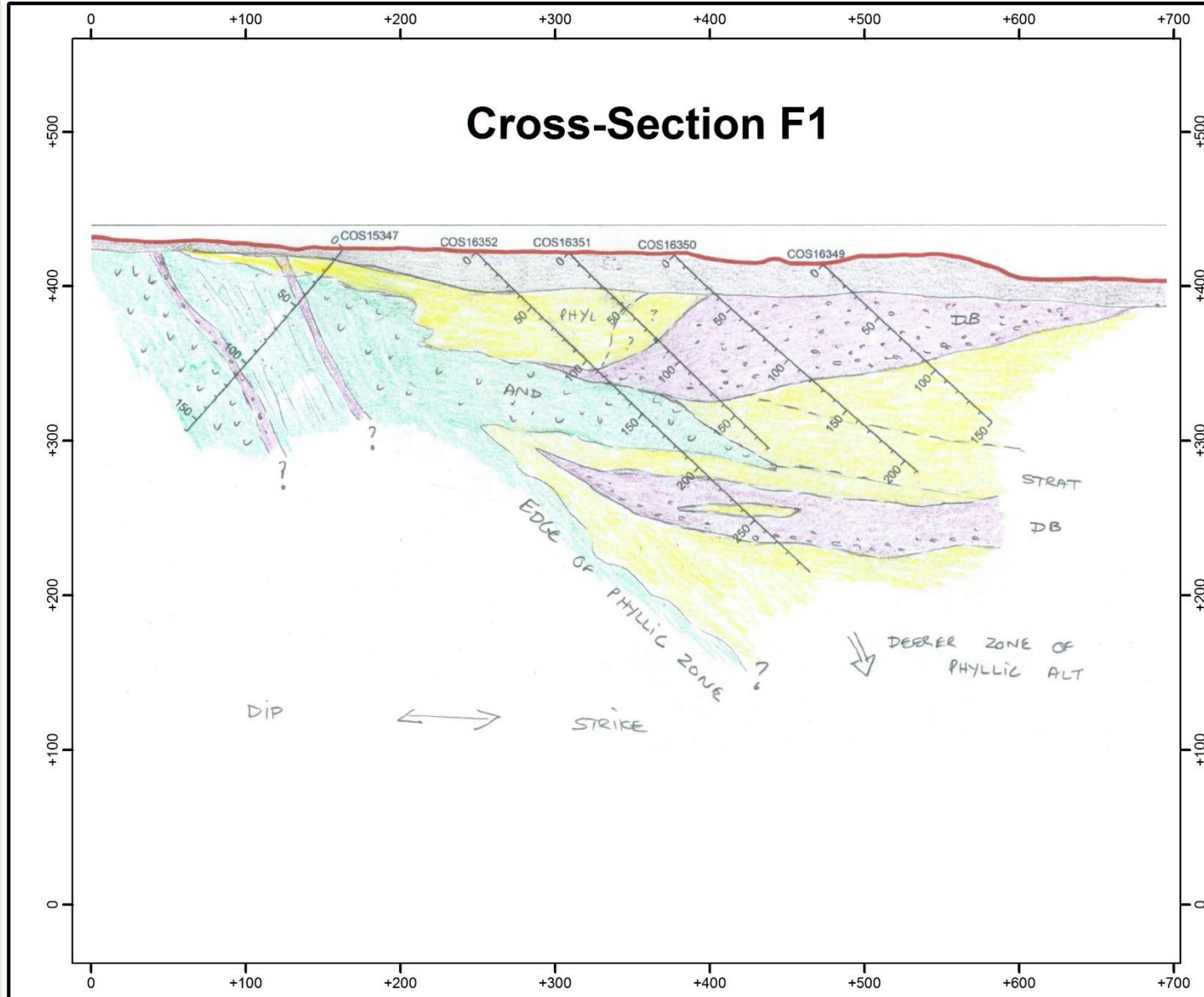
*Figure 20: N-S Cross-Section L22*

Horizontal Scale = Vertical Scale



DATE: DEC. 2016  
PREPARED BY: KD  
Terra Logix  
CONSULTING



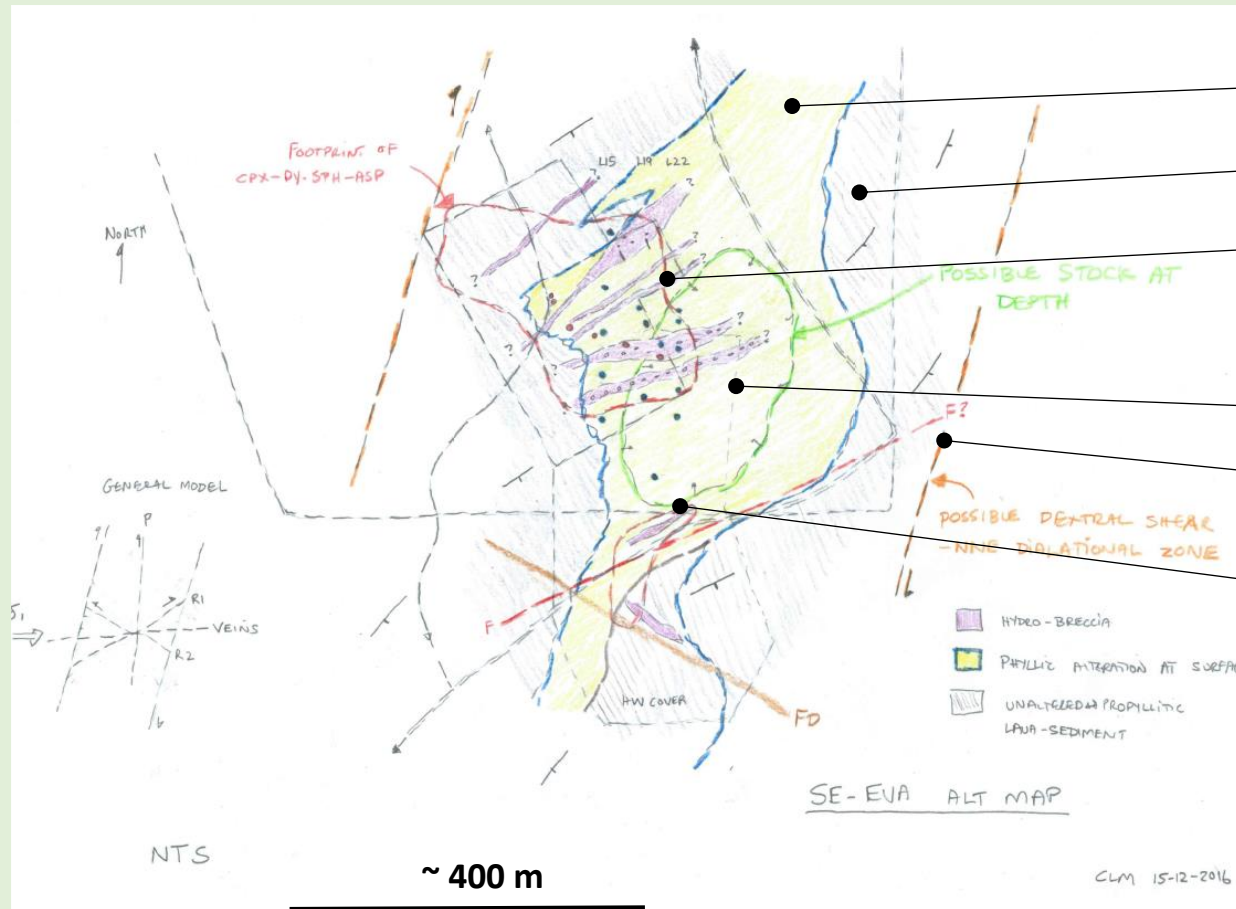


### Legend

**Geology**

- AND: Andesite
- DB: Diatreme Breccia
- FD: Felsic Dyke
- PHYL: Phyllic Alteration
- TUFF: Tuff
- TURB: Turbidite

Figure 21: NW-SE Cross-Section F1



- Phyllic Alteration
- Host rocks (not hydrothermally altered)
- Breccia with ENE-WSW strike dipping to the SE and associated with Cu-Au-Zn mineralisation at SV.
- Possible Stock at depth
- Proposed dextral shear
- Au Mineralisation at Eva

Figure 22: Plan view of the alteration based on 3D modelling of the borehole lithologies.



## CROSS SECTION OBSERVATIONS AND INTERPRETATIONS

The following can be deduced from these sections and the plan view:

- The phyllic alteration has a “mushroom” shape, extending horizontally from L22 in the east (where it extends with depth) to a flatter orientation towards lines L15 and L19 in the west.
- The host rock lithologies (sediments, lavas, and pyroclastics) have a gentle dip (or apparent dip) to the S/SE.
- The volcanic breccia/diatreme breccia dips very steeply to the SE, have a strike of ENE-WSW and cross-cuts the country rock.
- The breccia is largely hosted within a zone of phyllic alteration which has NE-SW orientation.
- By looking at these sections in conjunction with Figure 12 it can be seen that the bulk of the mineralization is in the SE portion of the boreholes on the eastern side of section F1 and within section L22. (Not shown in the sections is the fact that this is also an area of relative Mo enrichment).

The orientation of the features in the plan view indicates the possibility that a dextral shear zone could have caused ENE dilation which has been exploited by the breccia pipes and possibly also by an underlying blind stock. The mineralization is hosted mostly within the un-silicified and more permeable country rock where it is in contact with the breccia bodies. This veining is considered to be leakage away from the deeper potential ore zone.

It is also known that in the Eva deposit (situated south of SV) the southern limit of the phyllic alteration has been identified and that alteration is continuous/semi continuous between SV and Eva. The veins and breccia pipe within SV are considered to have originated from a source underlying the phyllic alteration. Phyllic alteration has acted as a cap to the system. Given the steep dip of the sulphide veins towards the SE (at SV) it is postulated that a possible ore zone could be located to the S/SE of SV but not far (in plan) from the drilled mineralization given the steepness of dip angles.

The depth of the ore zone is a function of the extent of erosion and depth of the underlying causative intrusive. Alteration styles are also zoned and these can give an indication of proximity to the ore zone. Given the abundance of igneous material making up the matrix of the inferred phreato-magmatic breccia this suggests that the breccia is close to its intrusive source. The depth to potential ore at SV is therefore uncertain but its locality in plan is relatively well constrained, assuming the deductions about its origin SE of SV in the direction of the steeply dipping sulphide veins are correct.

Overall it is considered that there is sufficient evidence to show that a hydrothermal mineralizing system could well have been in place at SV, possibly resulting in a blind large scale porphyry type deposit at depth. The modelling of the 56 boreholes that have possibly drilled into the upper part of the proposed mineralizing system provides vectors indicating that exploratory drilling should be conducted SE of SV into mineralization that dips steeply



towards its source. The images below are derived from Micromine and show the simplified version of the modelling at SV.

Figure 23 view southeast shows the modelled inferred phreato-magmatic bodies plunging steeply southwards, and also the general distribution of copper mineralisation at SV (green spheres).

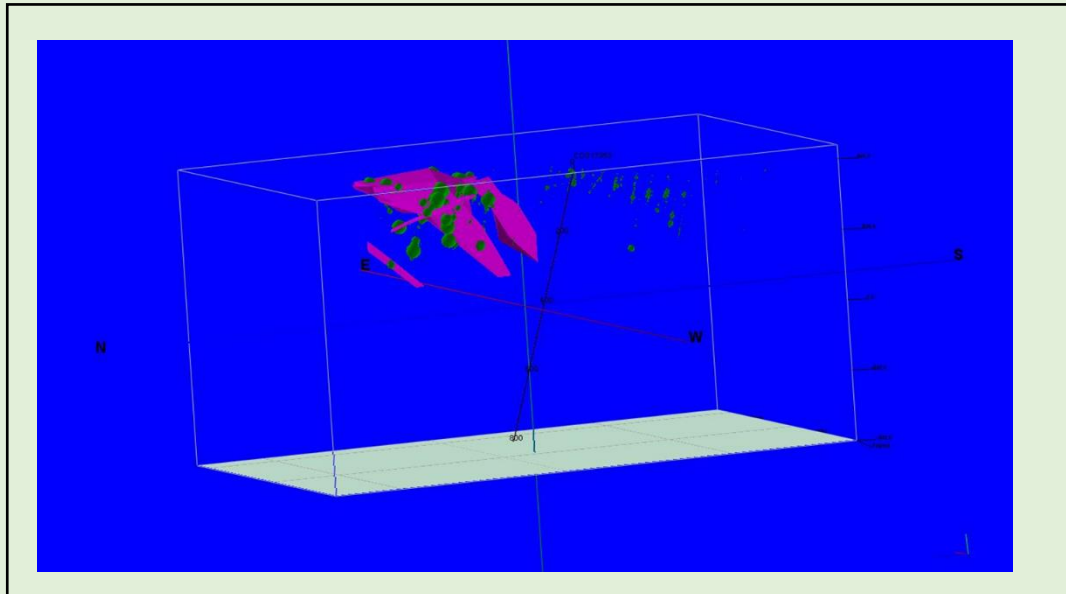


Figure 23: Modelling of the breccia bodies (in pink) showing their plunge to the SE

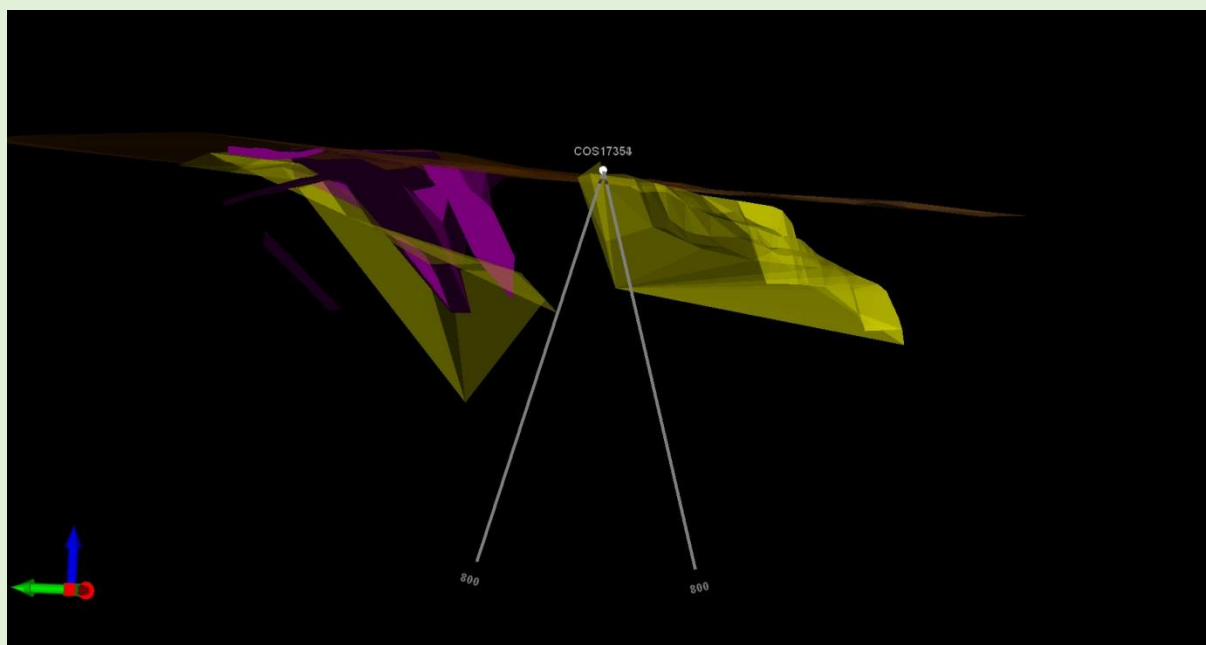


Figure 24: East view of the 3D model showing the boundaries of both SV (left yellow) and Eva (right yellow). Breccia bodies at SV shown in purple. Proposed drill holes shown.





Below is an extrapolation of what could potentially be underlying SV. The top right corner is cross-section 15 and breccia bodies intercepted in these boreholes have been extrapolated (in addition to the breccia bodies known to exist at Eva). These breccia bodies are known to have an igneous origin but what is unknown is whether this is associated with a mineralised stockwork as illustrated below. This is the potential that requires drill testing.

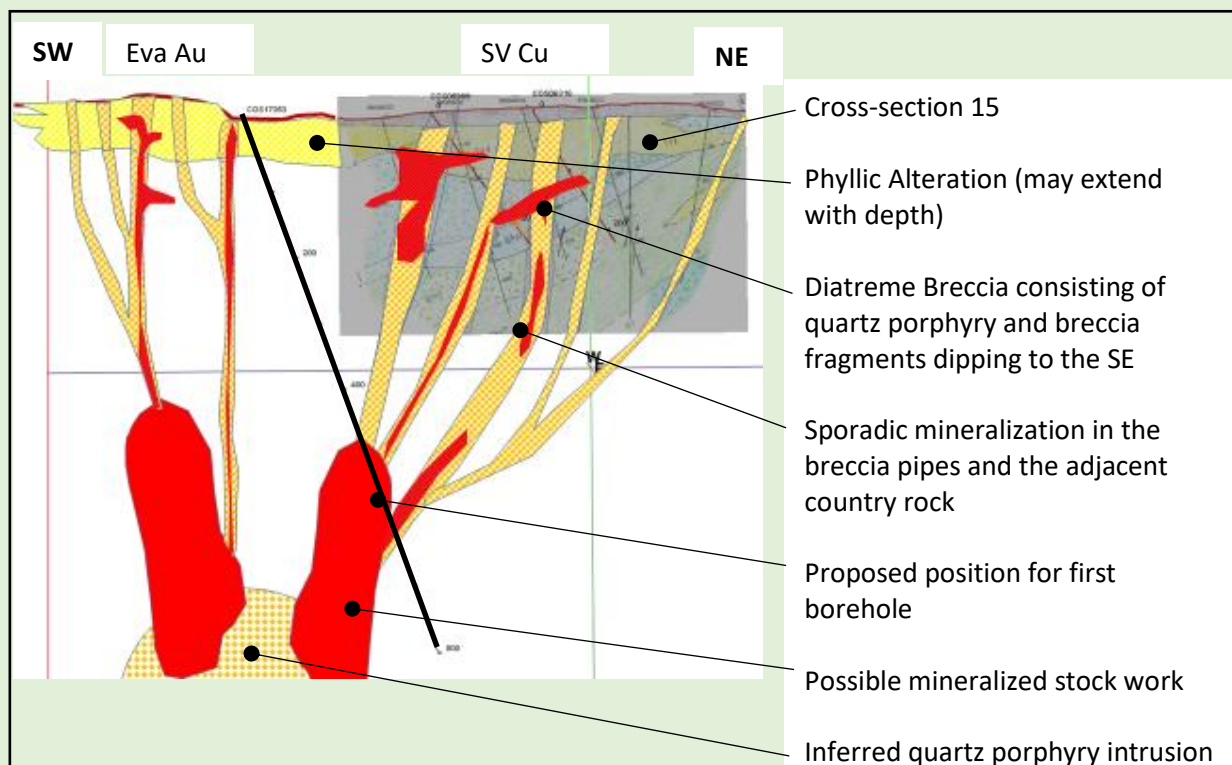


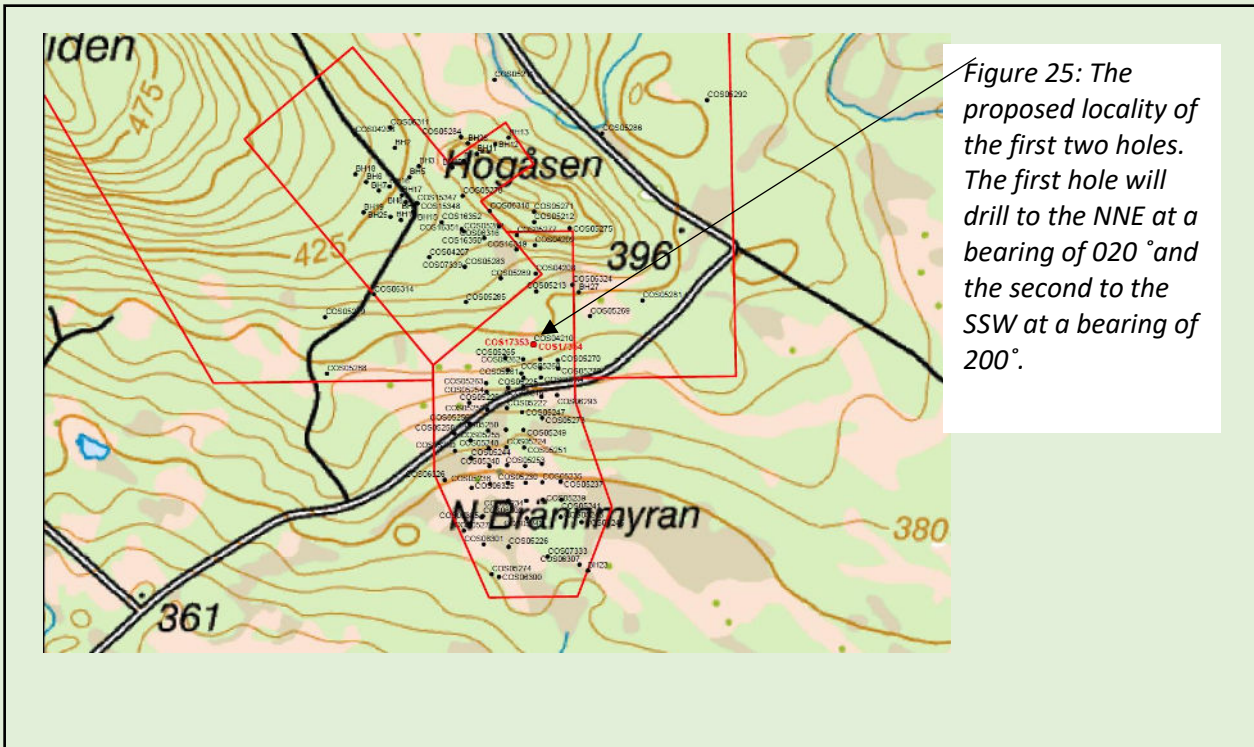
Figure 24: Schematic section showing the possibility of porphyry related mineralization at depth

## RECOMMENDATIONS

There is sufficient evidence at SV that a plunging, mineralized, brecciated zone of altered bedrock could potentially extend with depth (as depicted in Figure 24). The mineralization may increase in grade and tonnage but it is not possible from the existing data to indicate what the magnitude of the grade change might be, or if it does actually extend with depth.

Given the scale of the area under investigation it is considered that three inclined boreholes of 800 m length with a vertical extent of about 650 m are considered to be appropriate to test the possibility of mineralization at depth.

The approximate collar position of the first two planned drill holes is shown below in Figure 25. This site is considered best as it targets the area of thickening phyllic alteration; an increase in Mo and importantly an increase in mineralization as seen on the eastern side of section 19 and section 22 (see Sections and Figure 12).



It is further recommended that as Eva has been identified as possibly forming part of the same mineralizing system as SV, that the 50 boreholes from Eva are investigated and modelled in the same manner as the SV borehole core.

Should drilling at SV prove successful then it is recommended that the remaining mineralization within the Copperstone project (Granliden Hill and Granliden South) is also evaluated and drill tested in the same manner.

Ongoing drilling will require further petrographic work to refine the current dataset as well as to identify additional alteration styles that may be encountered.

If any significant mineralization is intercepted then deportment studies and an assessment of the Cu recovery should be undertaken at a relatively early stage.

The outcome of this investigation should be considered as preliminary and will be complemented by the proposed drilling and the study of Eva.