# Vendaval: A new porphyry Cu-Au discovery in Salta, NW Argentina

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## Abstract

Vendaval is a Maricunga-style Cu-Au porphyry deposit located in the high Andes at 3500 - 4000 m above sea level in the west of Salta Province, Argentina, close to the border with Chile. Although indications of a mineral system in the area were recognized by at least two previous explorers from the 1990s onward, the discovery of economically significant mineralisation was not made until systematic mapping and geophysical surveys were used to target initial diamond drilling by First Quantum in 2019.

In 1996-1999 Rio Tinto noted an area of alteration outcropping in gaps in the pumice cover to the east of the impressive Socompa volcanic cone (6051m). They subsequently completed basic reconnaissance and sited 12 widely spaced vertical RC holes over a wide area. The RC chips showed limited alteration and apparently sub-economic grades. In 2010-2013 a junior explorer Terreno Resources completed geochemical sampling and trenching in the area but failed to follow up with any drilling.

First Quantum entered Argentina in 2014 following the acquisition of the Taca Taca Cu-Au-Mo porphyry from Lumina Copper Corporation. The regional exploration team based out of Santiago had begun to develop a targeting and prioritization model based on a large-scale tectonic framework. A series of structural corridors and areas of interest (AOIs) in the central Andes were highlighted for reconnaissance and data gathering. One of the corridors of interest – the Socompa structural corridor, extends NW from Taca Taca over the border into Chile (Farrar et al., 2023).

First Quantum geologists initially visited the Socompa area in late November 2017 following the signing of a *Confidential Agreement* with the local owner and as part of a generative reconnaissance traverse, validating its potential as a Cu-Au porphyry and locating some encouraging outcrops of banded quartz veins reminiscent of those observed in porphyry deposits of the Maricunga belt, and accompanying porphyry-related alteration in-between the wide areas of post-mineralization pumice cover. It took nearly a year to conclude a farm-in option with the tenure holder but after this was signed in September 2018 a nine-day field campaign was conducted to geologically map the area and collect samples to aid in further targeting. The mapping was based out of a remote tented camp located close to the license. Later in the same season, a more detailed program was conducted including geologic mapping (Anaconda method) capturing vein and alteration paragenesis, detailed geochemical sampling, ground magnetics, and IP surveys as well as multi-spectral data. Results were quickly interpreted and suggested that the area hosted a significant porphyry system at a suitable level of erosion for preserved mineralisation. A number of porphyry intrusion phases were mapped including some apparently late post-mineral dykes (which turned out to be important). With only a short field season remaining it was decided to try and mount a rapid drill program as the weather in this remote area was known to become treacherous by late April/May. A camp was established and an initial program of four planned diamond holes commenced in late March 2019. Holes were designed to be a thorough test of the system, being inclined, up to 500 metres deep, and targeted using a variety of surface outcrop mapping observations like quartz vein density, rock geochemistry, and airborne magnetic interpretations.

The first hole SOCDD19-001 encountered extensive alteration and visible mineralisation almost from the surface. Assays returned 501 m (from 8 m to 509 m) at 0.3% Cu & 0.27 ppm Au (0.5% CuEq). This first hole was sited very close to one of the historical vertical RC holes and demonstrated that whilst sitting well within the mineralized envelope the RC hole had unfortunately (or fortunately for FQM) penetrated directly down a sub-vertical post-mineral dyke thereby failing to intercept the primary mineralization to any degree. The third hole, SOCDD19-003 sited on a separate porphyry centre approximately 2 km to the north of the first hole returned 124 m (from 180 to 304 m) at 0.59% Cu & 0.46 ppm Au (0.92% CuEq) and a further 311.9 m (from 336 m to 647.9 m) at 0.27% Cu & 0.26 ppm Au (0.47% CuEq).

Towards the end of this initial drill programme the true challenges of operating in the high Andes were realized; initially with heavy snowfall and then the first of two devastating windstorms which destroyed the camp, rolled over shipping containers, broke the weather station, and spread geophysical equipment down the hill. It was these events that led to the naming of the project as Vendaval (Spanish for 'gale').

By the end of the first drill campaign in May 2019 a total of 2,088.9 m (in four diamond drill holes) had been drilled at the project, which tested three targets: a northern stockwork, a central stockwork, and the Filo de Oro prospect. 'Vendaval Central' as it became known appeared to have some size whilst Vendaval Norte (north) returned some impressive intercepts but in an apparently narrow porphyry dyke. Preparations were made for more systematic Induced Polarization (IP) surveys and follow-up drilling in the 2019-20 field season. Despite the obvious excitement at this time, little did anyone know that as drilling started in early 2020 the world was about to be gripped by a pandemic that would shut down borders, isolate staff, and reign chaos on drill contractors and laboratories alike. The team that had been operating the project was largely based in Chile and no longer had access to the project. A whole new team of young Argentinian geologists and technicians had to be employed and inducted by the only remaining First Quantum geologist in Salta. Permits were required just to drive into the field, and multiple layers of hygiene, sanitation, and isolation were imposed, all severely slowing operations for the next two seasons. Regardless of all the precautions still some COVID-19 cases crept in causing evacuations and abandonment for periods. Despite the COVID 19 induced chaos the initially inexperienced young team battled on regardless through the 2020-22 summer drill seasons completing 45,983.7 m in 92 holes. To date, this drilling has now delineated a significant body of mineralisation at Vendaval Central, approximately 1,000 m by 600 m at the surface and extending over 700 m vertically. Long and consistent intercepts include VENDD21-029: 651 m @ 0.34% Cu & 0.52 ppm Au (0.70% CuEq) and VENDD23-089: 1,013.3 m @ 0.31% Cu & 0.34 ppm Au (0.54% CuEq). Within this envelope is a higher-grade core of mineralisation > 0.7% CuEq.

The Vendaval Central Cu-Au porphyry has been dated as mid-Miocene in age. The banded quartz veining, widespread hypogene intermediate argillic alteration overprinting a K-silicate altered core, and the shallow level of emplacement are known features of the Au-rich porphyry deposits in the Maricunga belt (e.g Vila and Sillitoe, 1991; Muntean and Einaudi, 2000). However, Vendaval is at least 200 km further north than any other known Maricunga porphyry (Cernuschi et al., 2023a) representing a significant northerly extension of the belt with obvious implications for future exploration. Results from the Vendaval programmes are currently being modelled with a view to generating an initial resource and a preliminary economic assessment.

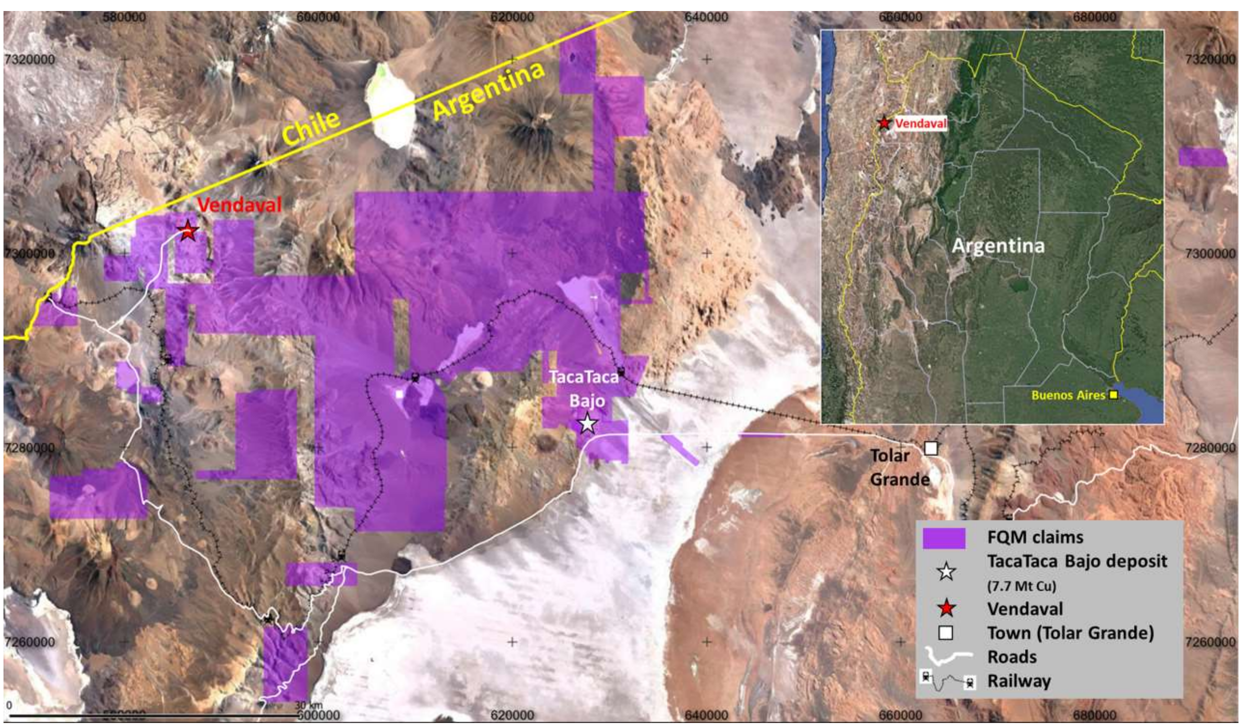


*Figure 1 - Location map of First Quantum Minerals projects in Salta, with landholdings. Coordinates in UTM WGS 84 Zone 19S projection.*

## VENDAVAL

# Introduction

The Vendaval project is located at 24° 23' 24" S latitude and 68° 08' 26" W longitude, approximately 1,500 km northwest of Buenos Aires and 80 km west of Tolar Grande (the nearest populated town) in Salta province, Argentina (Figure 1). The Vendaval concession covers 1,800 Ha and it is 100% controlled by Argentinian private owners, currently in active joint-venture with First Quantum Minerals. First Quantum Minerals also owns a landholding that includes the Cu-Au-Mo Taca Taca Bajo deposit (2.2 Bt @ 0.43% Cu, 120 ppm Mo, 0.09 g/t Au), located 45 km to the SE of Vendaval.

Vendaval is situated at an average elevation of 4,200 m above sea level, in an environment with sparse flora and fauna to the east of the Socompa volcano (6,051 m). The dry puna vegetation is characterised by grasses, alpine herbs and dwarf shrubs. The climate at Vendaval is arid and cold, with the winter (snow) season extending from approximately May to September. During winter, no field activities are possible at the project. It also has a rainy/storm season, locally known as the "*Altiplano Winter*" the effects of which are somewhat ironically felt mainly during the summer months of January and February. Very strong winds are characteristic of the area, which often exceed 100 km/h and can be accompanied by sudden blizzards.

Although Porphyry style alteration was first recognized in the area by Rio Tinto in the late 1990's, after three years of exploration and limited RC drilling it appears only low-grade gold porphyry mineralisation had been located and they decided to exit the project. Terreno Resources held the project for two years starting in 2011 and conducted several surface programmes but no drilling. In September 2018, First Quantum Minerals entered into a commercial agreement with the local tenure owners and commenced exploration activities that lead to the discovery of a considerably larger and higher grade Cu-Au porphyry system than previously realized. In this paper, we describe how and why this area was selected and the tools used to advance its exploration, as well as to describe the geology, mineralisation and alteration as currently understood.


*Figure 2 - Photographs from the Vendaval project showing: (a) Panoramic view toward the east (January 2019); (b) Drill site during summer season on "Altiplano winter" (2019); (c) Same drill pad in 2019, few weeks after photo b; (d) View to Vendaval toward the west, Socompa Volcano. (e) Geophysicist tent destroyed by strong wind; (f) Camp module tipped over during the storm; (g) Core logging area, completely destroyed by gale.  .*

## Geologic setting

Vendaval is located at a northern projection of the Maricunga porphyry belt, as newly defined by First Quantum. Vendaval shares many characteristics with previously known Maricunga porphyries from the main area of this belt, with projects like Cerro Casale (391 km to the south, 13.89 Ma, 2 Bt @ 0.33% Cu, 0.5 g/t Au) and Lobo-Marte (14 - 13 Ma by K-Ar, (Vila and Sillitoe 1991)). These similarities include style of veining, mineralization, hydrothermal alteration, ages of porphyry intrusions, and wall-rock types.

The Vendaval porphyry bodies intrude a sequence of volcanic agglomerates, andesites, and dacites of the Quebrada del Agua volcanic-sedimentary complex (Koukharsky, 1969), of upper Oligocene – lower Miocene age, as reported by the Argentinian geological survey (Segemar, 2001). These ages were obtained using K/Ar analysis on different stratigraphic levels and range from 23 ±1 Ma at the base, to 15 ± 1 Ma at the top (west of Chuculaqui station).

At Vendaval, the Quebrada Del Agua andesite-dacite volcanic wall-rocks have been intruded by a swarm of mid-Miocene (14.54 - 14.24 Ma U/Pb in Zircon; Filipov, 2019) diorite porphyry dykes. The Vendaval deposit is overlain to the West by mid to late Miocene andesite volcanic rocks and Pliocene-Pleistocene ignimbrites. The central valley at the project is filled, by Pleistocene-Holocene pumice fields to an estimated depth of up to 100m.

### Vendaval Central

Multiple phases of porphyry dykes of intermediate composition have been identified by dyke and vein cross-cutting relationships and supported by petrographic and compositional observations (Figure 3). The magmatic sequence of events can be summarized as follows:

- Andesite wall-rock (VAN,15.82 ± 0.45 Ma): Fine grain porphyritic to aphanitic, with many textural variations and associated breccias.
- Pre-Mineral sub-volcanic-dykes (VAN-PM): Porphyritic texture with oriented amphibole and pyroxene phenocrysts.
- Early Mineral Porphyry (EMP, U/Pb in Zr, 14.54 ± 0.15 Ma): Hornblende-biotite crowded diorite porphyry stock with medium coarse-grained texture. The bulk of the Cu-Au mineralization is hosted in this unit and immediate volcanic wall-rock and commonly host the highest density of quartz veins (>30 veins/m).
- Early-inter-mineral – breccia/porphyry (BXI-EIMP): Crowded diorite porphyry that commonly hosts quartz vein clasts/fragments. Mineralization is associated with quartz veining but with less density and lower Cu-Au grade than in the previous (15-30 vein/m).
- Inter-mineral Porphyry (IMP): Hornblende-rich diorite porphyry with a crowded porphyritic texture of fine to medium size, that commonly hosts fragments of quartz veins, and it in turn cross-cut by a lower density of quartz veins than observed in the older dykes (<15 vein/m).
- Inter-late-mineral porphyry (LIMP): Fine to medium grain size crowded diorite porphyry. Poorly mineralized. Usually does not host quartz veins.
- Late-mineral porphyry (LMP): Hornblende and pyroxene rich diorite porphyry, with coarse texture. Very rarely hosts quartz veins. Whereas K-silicate alteration is common in the previous volcanic and intrusion units, this late unit is only propylitically altered.

As shown above, U/Pb isotopic ages *in zircons* indicate a Miocene Age of 14.54 to 14.7 Ma for the intrusions and potentially a 1 Ma lifespan for the hydrothermal system according to one Ar/Ar age of 13.6 Ma in Alunite (Figure 4, Hemming, 2020).

## VENDAVAL

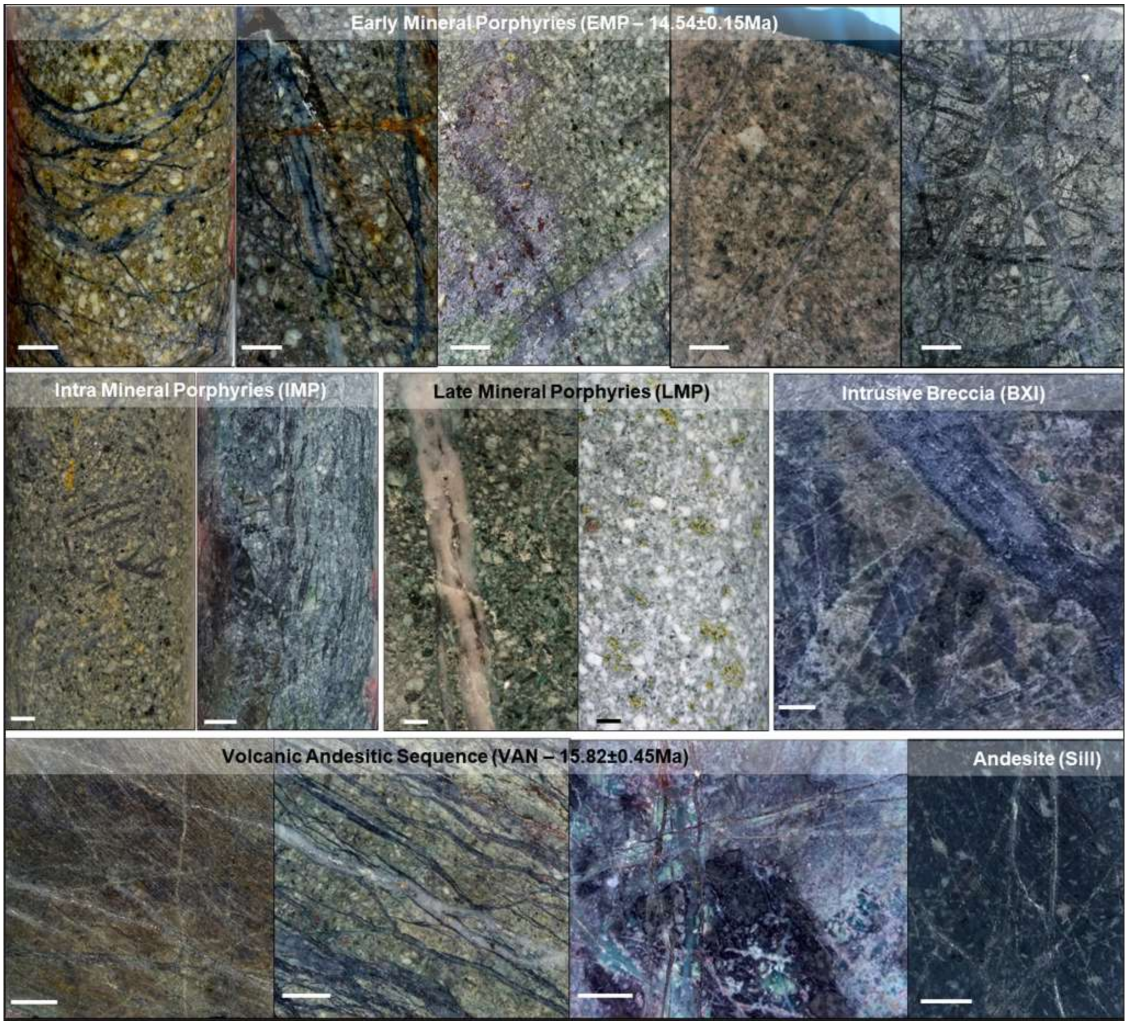


*Figure 3 - Collage photos from core samples of Vendaval with different rock types, white line represents 1 cm.*

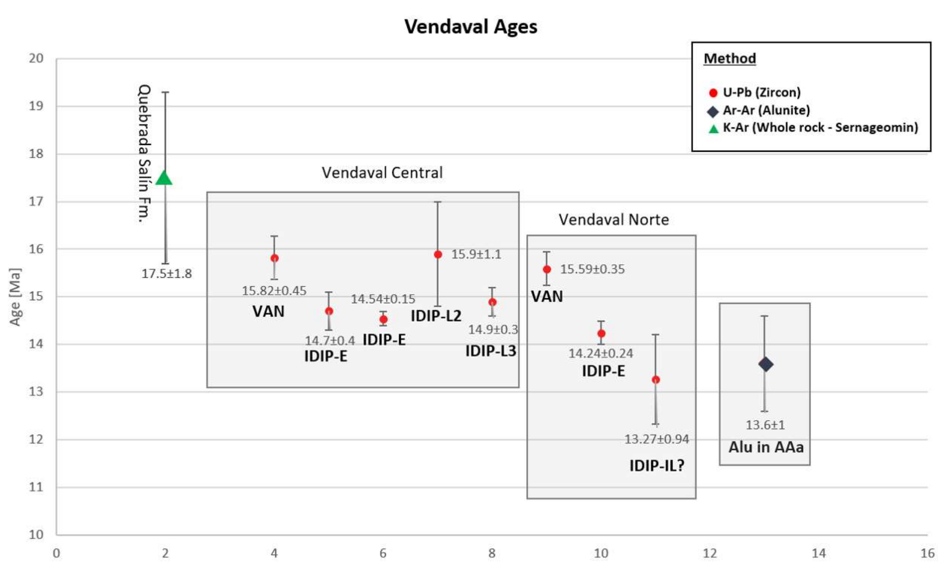


*Figure 4 - Geochronology ages at Vendaval.*

*Hydrothermal alteration, mineralisation and veins*

Hydrothermal alteration at Vendaval is similar to alteration described for porphyry Cu-Au deposits in the Maricunga belt (e.g. Muntean and Einaudi, 2001; Vila and Sillitoe, 1996). In the core area of Vendaval Central and near the contacts with the early Cu-Au-rich porphyry dykes, the volcanic wall-rock experienced a precursor calcic alteration that resulted in garnet and pyroxene patches, and thin hair-like pyroxene veins (see Cernuschi et al. 2023a for more details, and Figures 5, 6 and 7). This alteration is exclusively developed in the volcanic wall rock where local hornfels are also observed (silica-magnetite-biotite-chlorite). This alteration is recognized both in deep and shallow zones of the deposit and pre-dates K-silicate alteration and mineralization.

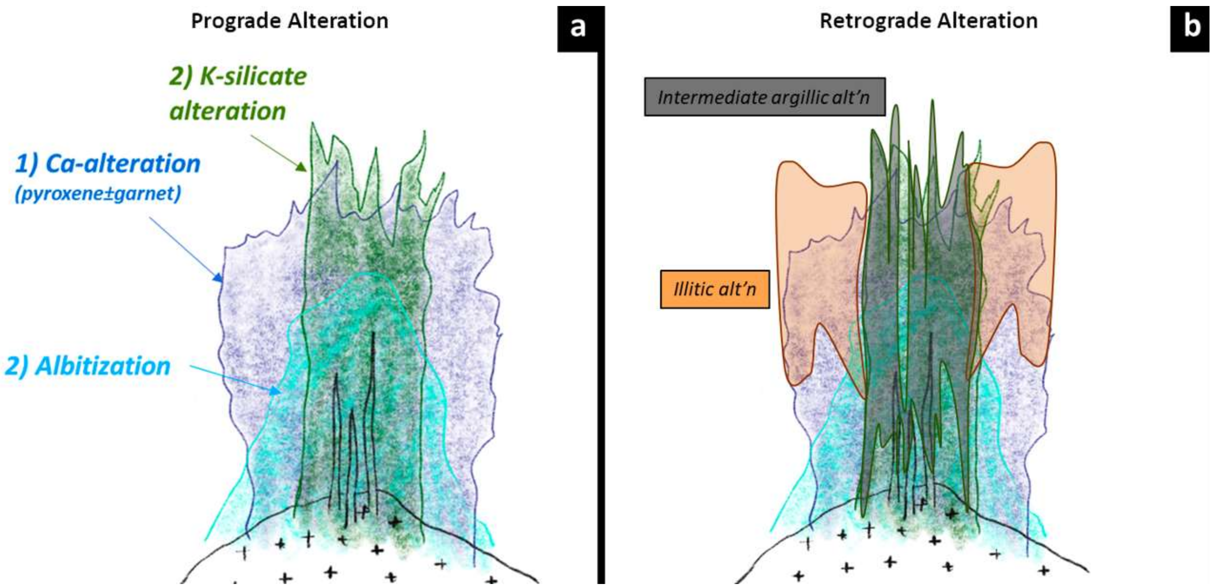


*Figure 5 - Alteration Model – evolution of Vendaval deposit (a) Prograde alteration and (b) retrograde alteration from Cernuschi et al., 2023a*

A central and vertically elongated K-silicate potassic zone with hydrothermal K-feldspar, biotite, magnetite, chalcopyrite, pyrite, quartz and traces of albite affects the early- and inter-mineral porphyry dykes and their adjacent volcanic wall-rock (Figure 5). The K-silicate alteration hosts the bulk of the Cu-Au mineralization that is associated with 'A type' quartz veins with sugary texture at depth, and banded maricunga-style quartz veins at shallower levels (see Sillitoe, 2010 and Cernuschi et al., 2023b for vein nomenclature). Both vein types are apparently textural variations of the same family of veins as A veins grade into banded Maricunga-veins with shallowing depth. The difference in texture is a function of depth of emplacement. Nonetheless, where cross-cutting relationships can be observed, banded Maricunga veins cross-cut A veins, indicating that the banded veins continued to form until later stages (Gigola, 2020; Cernuschi et al., 2023a and Figure 6). The vein abundance is variable and increases from the edges of the system towards the centre, reaching up to 30 veins per meter. Vein abundance is positively correlated with Cu-Au grades. The main vein orientation trends are ENE to WSW and WNW to ESE; with a subordinate set trending from N to S. These orientations commonly result in sheeted veins swarms along the most abundant orientation.

Early mineral porphyry dykes have higher Cu and Au grades owing to the abundant A quartz and banded Maricunga quartz veins. The early mineral porphyry dikes also have the highest Au/Cu ratios, suggesting that Au mineralization occurred early in the system.

Most of the Cu is hosted in chalcopyrite (up to 3%), and bornite is rare. These Cu-sulfides are hosted within the quartz veins and along their margins, commonly in contact with hydrothermal K-feldspar. The Cu-ore intercepts commonly average 0.3% Cu and includes shorter intercepts with higher grades. Mineralization can be subdivided into an upper, relatively thin oxide-mixed zone) and a deeper hypogene zone with chalcopyrite and lesser bornite

Based on TIMA phase maps and SEM imaging, gold appears to be mostly hosted as inclusions in chalcopyrite and to a lesser degree in silicate phases (Cernuschi, 2022). Gold usually ranges from 0.2 g/t to more than 1 g/t. Two well-defined high gold zones are recognized: 1) a shallow to medium depth zone (~300 to 600 m) related to a high density of banded Maricunga and A quartz veins, K-silicate alteration, and intermediate argillic overprint and, 2) a deep zone (~800 to 1013.3 m at the end of the deepest hole), with K-silicate alteration, increased disseminated magnetite, incipient intermediate argillic overprint and low quartz vein density.

## VENDAVAL


*Figure 6 - Mosaic from core with relevant alteration types (a) Garnet-pyroxene-chlorite alteration (calcic assemblage). (b) Diorite porphyry (EMP) with strong potassic feldspar - biotite (potassic-silicate alteration). (c,d) Smectite – chlorite – illite alteration (Intermediate argillic assemblage with variations). (e)Pervasive strong steam heated silica – kaolinite alteration with relicts pyrophyllite – dickite. (f) Hornfelized volcanics (silica-magnetite –biotite –chlorite). (g) Propylitic alteration (chlorite – epidote – calcite).*

Cryptic and mild albitization overprints outboard the two older alteration types (calcic and K-silicate) and the high-grade Cu-Au mineralization. Albitization is mostly identified at the periphery of the system where it affects wall-rock that was not previously altered and reaches a relatively shallow depth (Figure 5).

One of the most distinct hydrothermal features at Vendaval Central is that the Cu-Au mineralized K-silicate centre is overprinted by locally intense hypogene intermediate argillic alteration, composed of smectite, hydrobiotite (biotite-vermiculite), carbonates and less chlorite. This overprint is most intense at shallow to medium depths and absent in the deeper zones where K-silicate alteration is not overprinted, and therefore magnetite is better preserved. This late hypogene intermediate argillic overprint is a common feature of other Maricunga porphyry deposits.

On the upper part of the system towards the NE and S edges of the system, relict advanced argillic alteration composed of alunite, pyrophyllite, and dickite is preserved. Advanced argillic alteration is also observed at depth along narrow cross-cutting sub-vertical structures.

The shallow periphery of the system has illite alteration (Figure 5), composed of a pervasive replacement of wall-rock by illite (K-deficient muscovite) and thin-hair-like pyrite veins. There is minor and local propylitic alteration composed of chlorite and epidote, but it is almost exclusively hosted in late mineral intrusions (Figure 6).

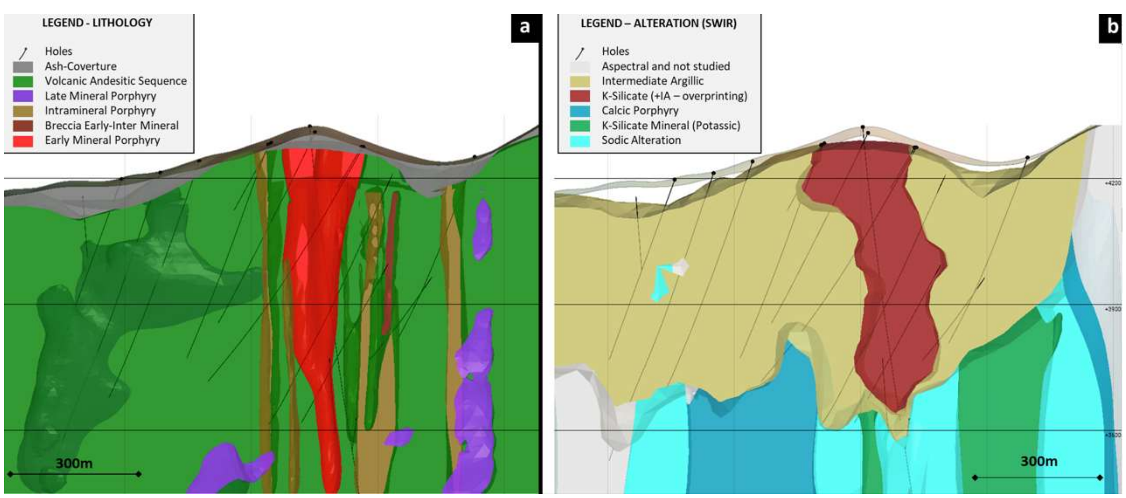


*Figure 7 - Long section along Vendaval Central deposit (a) 3D lithological model showing the different pulses intruding the volcanic andesitic hosting sequence. (b) 3D Model Alteration – SWIR, modelled from the integration of geochemistry + SWIR data from TerraSpec to define the alteration domains (Cernuschi, 2023).*

# Exploration History

## Early exploration

The Argentinian Geological Survey (SEGEMAR) mapped the area as part of a regional geology cadastre in 1969, however, there was no mention of any potential for Cu and/or Au exploration. The first exploration efforts were carried out by Rio Tinto who drilled twelve reverse circulation drill holes in the project through 1997 and 1998 totalling 2824 m. RC chips near the holes suggest evidence of a weak supergene enrichment blanket some as well as some hypogene Cu sulphides. From 2011 to 2013 the property was controlled by Terreno Resources, which conducted geologic mapping, and surface geochemical sampling, but no drilling.

## Exploration by First Quantum

First Quantum Minerals followed its in-house methodology to evaluate the prospectivity of different areas in the Andes based on predictive elements that included the continental-scale structural architecture of the region (Farrar, 2018; Farrar et al., 2023). As part of this generative exploration process, Vendaval was identified as an area of interest due to it occupying a favourable structural location where the projection of the NW striking Socompa structural corridor, intersected the north-striking, orogen parallel Miocene and Eocene – Oligocene metallogenic belts (Farrar et al., 2023).

Following the signing of a *Confidential Agreement* with the local owner and fieldwork that confirmed the area as having high exploration potential for a Cu-Au rich Maricunga style porphyry deposit, First Quantum initiated negotiations with the private owners of the property. Since September 2018, First Quantum and the private owners have been subject to a commercial farm-in agreement which covers the 1,800 Ha exploration permit. First Quantum has recently taken up 51% ownership of the project.

During 2018 a detailed mapping campaign was completed building on the understanding of previous explorers. Litho-structural mapping was carried out at 1:10,000 scale employing the Anaconda mapping method, together with selective surface rock sampling for geochemical analysis. The historical geophysical surveys were reprocessed, which proved crucial to guiding the targeting activities by highlighting the location of quartz-veined corridors and coincident high magnetic anomalies inferred as concealed intrusions. As a result of the field mapping and geophysical interpretations, five distinctive porphyry centres were identified, which exhibited sheeted arrays of Maricunga-style banded quartz veins, secondary biotite overprinted by clays and chlorite. Geochemical sampling reported anomalous samples up to 1125 ppb Au and 0.83% Cu in outcrop. Non-banded, sugary textured A quartz were locally identified (see Sillitoe, 2010 and Cernuschi et al., 2023b for vein type definitions).

At this stage the project was conceptualized as a porphyry cluster, with discrete centres associated with geochemical and geophysical anomalies. The centres were observed to occur along a N-S trending structure, over a 2 km strike length.

Initial drilling commenced in in March 2019 with four drill holes for 2,088 m completed. Two independent porphyry centres were defined approximately two kilometres apart (Figure 8).The magnetic anomalies at these centres were explained by K-silicate alteration with magnetite, related to quartz veining and Cu-sulphides. Encouraging Cu-Au grades were intercepted on the north target (Vendaval Norte) [SOCDD19-003: 439.9 m @ 0.35% Cu, 0.31 g/t Au, 0.56% CuEq from 283 m including 12 m @ 2.8%Cu, 2.51 g/t Au, 4.5% CuEq from 250 m depth] and encouraging grades on the central target (Vendaval Central) [SOCDD19-001: 501.1 m @ 0.30% Cu, 0.26 g/t Au, 0.47% CuEq from 8 m depth, Figure 8 and Table 1). In May 2019, during the drilling of the fourth hole, a storm partially destroyed the camp and marked the end of the drill season.

## VENDAVAL

| Phase | Hole | East | North | Elevation | AZ | DIP | Depth | From | To | Interval | Cu_pct | Au_ppm | CuEq_100 | AuEq_100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | SOCDD19-001 | 586893 | 7301603 | 4218 | 325 | 60 | 560.3 | 8.1 | 509.2 | 501.1 | 0.296 | 0.260 | **0.500** | **0.695** |
| II | VENDD20-006 | 587013 | 7301432 | 4221 | 325 | 60 | 695.6 | 83.9 | 695.5 | 611.6 | 0.328 | 0.246 | **0.500** | **0.728** |
| II | VENDD20-008 | 587179 | 7301535 | 4222 | 325 | 60 | 699 | 114.0 | 699.0 | 585.0 | 0.330 | 0.410 | **0.610** | **0.895** |
| IV | VENDD21-029 | 587121 | 7301620 | 4241 | 325 | 65 | 701 | 50.0 | 701.0 | 651.0 | 0.340 | 0.520 | **0.700** | **1.020** |
| IV | VENDD22-060 | 587574 | 7301659 | 4268 | 325 | 70 | 703.1 | 38.0 | 703.1 | 665.1 | 0.270 | 0.360 | **0.510** | **0.757** |
| IV | VENDD22-067 | 586952 | 7301516 | 4210 | 30 | 70 | 697.8 | 44.0 | 697.0 | 653.0 | 0.330 | 0.380 | **0.590** | **0.865** |
| V | VENDD23-086 | 587603 | 7301561 | 4327 | 325 | 70 | 983.9 | 162.0 | 983.9 | 821.9 | 0.304 | 0.421 | **0.590** | **0.867** |
| V | VENDD23-089 | 587048 | 7301834 | 4327 | 145 | 85 | 1013.3 | 0.0 | 870.0 | 870.0 | 0.323 | 0.314 | **0.537** | **0.788** |

Coordinarates in WGS84_Zone 19S
***CutOff: 0.15% Cu-Eq (considering 100% Rec, 2 max dilution samples & 15m min reporting range)***

*Table 1 - Vendaval's best intercepts (all drill phases).*

The second drilling program during the 2019/20 summer season was focused on delineating the continuity and size of both porphyry centres. Economic intervals were replicated and improved at Vendaval Central (VENDD20-008: 573 m @ 0.34% Cu, 0.42 g/t Au, 0.62% CuEq from 126 m depth, Figure 8). Hole VENDD20-010 appeared to delimit the mineralization towards the east. However, mineralization remained open in other directions and at depth. At Vendaval Norte, the mineralization was intercepted in hole VENDD20-009 (39m @ 0.75% Cu, 0.45 g/t Au, 1.06% CuEq from 380 m depth) associated to thick quartz veins with patches of chalcopyrite and bornite. A total of 4,074.6 m were drilled during this program, which ended sooner than planned due to the onset of the COVID-19 pandemic.

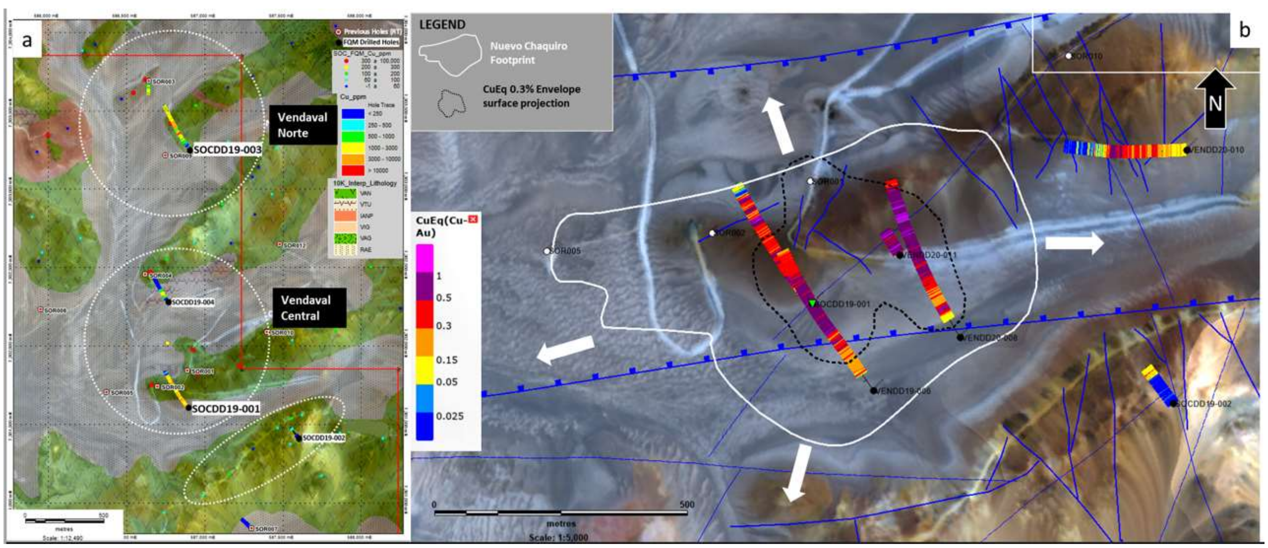


*Figure 8 - (a) results after Phase I showing the main two porphyritic centres identify on Vendaval; (b) Vendaval Central in comparison with other porphyries copper-gold (Nuevo Chaquiro, Colombia), showing the potential open areas, after drilling Phase II.*

The third program took place amidst the challenges posed by the COVID-19 pandemic from 2020 to 2021, including adhering to strict protocols, navigating quarantines, and managing isolation measures. Most of the original exploration team was unable to visit Argentina due to the stringent quarantine and COVID-19 regulations enforced there. A new team of young Argentinian geologists were hired and mostly trained remotely and by the one FQM geologist that had remained in the country after the pandemic started. Despite the pandemic challenges, the new team successfully drilled 17 holes for a total of 8,930.8 m.

Significant mineralization was observed in several near-surface intercepts, including VENDD21-012, with 256 meters @ 0.38% Cu, 0.53 g/t Au, and 0.73% CuEq; and VENDD21-028 with 324 meters @ 0.39% Cu, 0.52 g/t Au, and 0.74% CuEq. During this program, it became evident that the mineralization extended beneath the pumice cover and that Vendaval Central and Vendaval Norte had different geologic characteristics. Vendaval Central has a wide and elongated mineralization zone along a NE-SW strike that is associated with high quartz veining abundance (Figure 9). Mineralization at Vendaval Norte is restricted in volume and attempts to expand its size by drilling its periphery have proven unsuccessful so far.

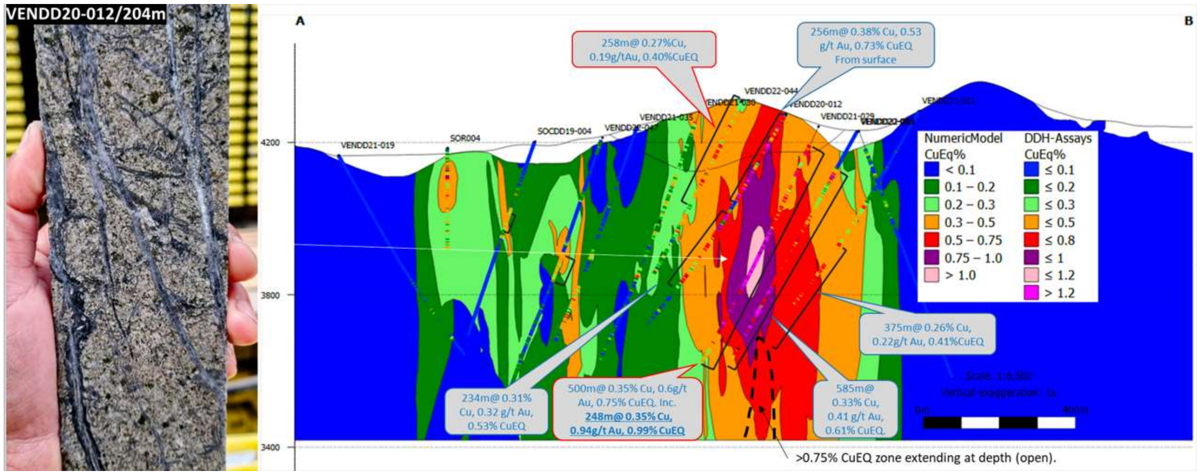


*Figure 9 - Long Section view to NW of Vendaval Central with CuEq grades after phase IV, Lefthand image shows typical 'EMP' core.*

During 2021 a high resolution MIMDAS-IP survey was conducted to define the existence of other satellite bodies below the post-mineralization pumice cover. This survey totalled 17.2 line kilometres, distributed along five separate lines at the southern portion of the claim. Taking into account magnetic data collected from the drill holes and from the ground magnetic survey, a constrained geophysical model was produced.

The fourth drilling program (2021-2022) was focused on delimiting the extent of high-grade mineralization at Vendaval Central and improving the understanding of the geometry of post-mineral, grade-diluting intrusions. The aim was to attain an adequate drill hole density to produce a mineral resource estimate. This programme was set as an infill program with an average of 100 m spacing between contiguous drill holes. Six drill rigs were simultaneously active on site and completed a total of 21,036 m in 48 drill holes. The mineralized zone was expended towards the east. For example, VENDD22-060 intercepted 685.1 m @ 0.27% Cu, 0.36 g/t Au, 0.51% CuEq, 0.75 g/t AuEq from 44 m depth (including 114 m @ 0.31% Cu, 0.54 g/t Au, 0.68% CuEq, 1 g/t AuEq from 544 m depth). The mineralization remained open at depth and towards the south-east. (Figures 9 and 10). At Vendaval Norte, shallow holes were drilled with the aim of intercepting mineralization closer to the surface, however, the results showed marginal copper-gold grades, demonstrating the restricted size and narrow vertical geometry.

During the 2022/23 season, a fifth drilling program was focused on exploring potential satellite centres to Vendaval Central and Norte by targeting blind geophysical signatures (chargeability – resistivity – magnetics) with little success. However this program also aimed to better define the continuity Cu-Au at depth in Vendaval Central, in a yet untested deep and high magnetic zone (Figure 10). Deep mineralization was successfully confirmed by drill holes VENDD23-086 (821 m @ 0.6% CuEq) and VENDD23-089 (1013.3 m @ 0.54% CuEq) below about 800 m depth. These intercepts show a high Au/Cu ratio, which is apparently coincident with zones of high magnetite abundance (Figure 10).

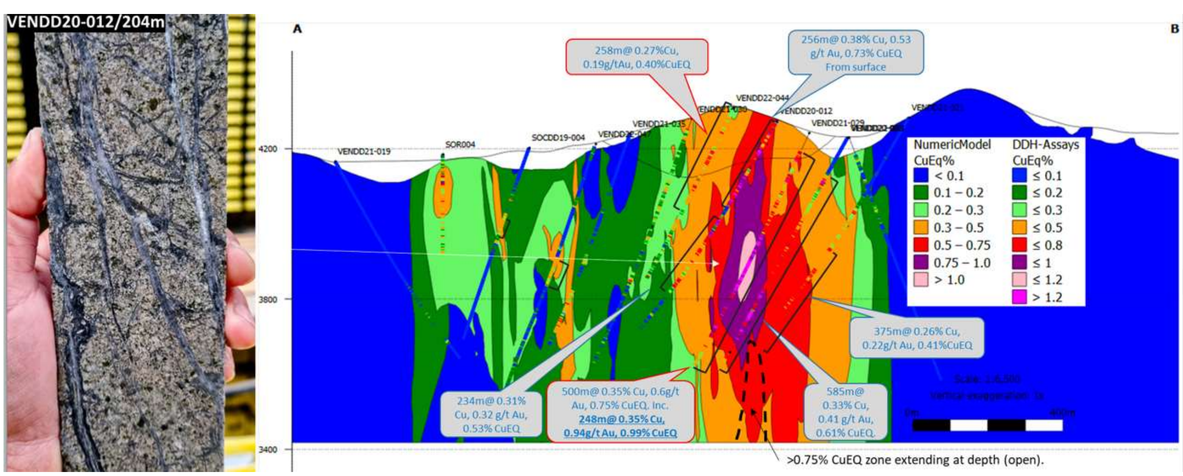


*Figure 10- Section on the core of Vendaval Central view to the E, with 3D Magnetic (constrain – Susmag) model and Ratio Cu/Au values (filtered with values > 0.15% Cu content), on grey ratio ~1 and on yellow ratio ~ 0.75 (higher gold rather than copper), is evident the continuity in depth. (b) – Oblique view of Vendaval (including Norte & Central), with geophysical response on Central body (mid-high magnetic with voiding zone of chargeability (mid-low values) and High resistivity related to sheeted quartz veining density >5 vein/m related to main ore Phase.*

## Conclusions

The discovery of Vendaval demonstrates that perseverance coupled with holistic geologic exploration concepts and applied technology can significantly change the perception of historical exploration projects. First Quantum was able to capitalize on its in-house expertise to prioritize and rank areas of prospectivity in the Andes which led the team to focus its attention on the previously dismissed Socompa target. Careful compilation and integration of all the prior exploration work by Rio Tinto and Terreno together with comprehensive desktop and detailed field mapping provided compelling evidence of a concealed and sizeable porphyry system that justified carefully targeted and deeper drilling than had been previously carried out. Initial drilling was prudently planned with a preferred orientation perpendicular to the quartz vein swarms defined using meticulous Anaconda mapping and immediately returned a significant upgrade on previous grades and widths of mineralisation. Nonetheless it is perhaps relevant to consider that the exploration campaigns during the 1990's where most likely focused on relatively shallow and supergene enriched Cu associated with a more classic porphyry copper deposits, and may not have considered the possibility of Maricunga-style deposits in this area.

**In this modern era, porphyry Cu-Au deposits that can be found near the surface are generally 'grown' and not really discovered. Someone else has nearly always been there before, but new eyes and a thorough drill test based on high-quality data and careful observations can reveal a deposit of significance where others have failed to recognize it.**

The FQM exploration toolkit included:

- Detailed surface mapping and sampling using the Anaconda method.
- Airborne hyperspectral acquisition
- Continental-scale structural targeting followed by field reconnaissance of targets
- Reprocessing of historical geophysics plus newly collected GMAG and MIMDAS
- Systematic measurement of quartz vein orientation and abundance, both in surface and drill core
- Systematic collection of pXRF data, SWIR (TerraSpec) spectral data, and magnetic susceptibility readings on drill core
- Systematic petrography, TIMA phase maps, and isotopic geochronology of key lithogechemical units, alteration, and mineralization types.
- Detailed winter relogging campaigns after each drilling phase and construction of cross-sections led by porphyry experts to systematize observations and propose new exploration ideas for the next campaign.
- Detailed study and interpretation of geochemical and spectral data during the relogging campaigns. Continuous integration of core logging observations, geochemistry interpretations, and petrography/TIMA mineralogy, led by porphyry experts.
- Consideration of genetic models as a guidance, and constant questioning of possible variations.
- The courage and support to drill exploration holes to depths of over 1,000 m

## Acknowledgements

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**Cautionary Language**

The potential quantity and grade described in this report is conceptual in nature, there has been insufficient exploration to define a mineral resource and it is uncertain if further exploration will result in the target being delineated as a mineral resource.

**Qualified Persons and Technical Notes**

The scientific and technical disclosure for the projects included in this news release have been reviewed and approved by Michael Christie, BSc (Geol), MSc (Mining Geol), MCSM, FSEG, MAIG, who is the Qualified Person as defined by NI 43-101. Mr. Christie is Director Exploration for the Company.

For the Vendaval Project drill core ranged from PQ-3, HQ-3 and NQ-3 sizes. A diamond core saw was used to cut core in half along the center-line mark and at a nominal 2 m sample length. One half was bagged for dispatch and the other retained in the core box as a permanent record. All drill holes where sampled in their totality, except in parts with no recovery.

All bagged samples were assigned a sample ticket, barcoded sample tags were included in each sample bag. Sample bags were secured, and sample numbers were written on each. The bags were placed into a secure larger mesh sack for transport to the sample preparation laboratory and dispatched once the full hole was sampled. The remaining core was placed into storage at covered, secure facilities in Salta.

Vendaval samples were submitted to both ALS Minerals (ALS) and the Alex Stewart laboratories in Mendoza for sample preparation and analysis. Both facilities are accredited commercial laboratories independent from the company.

The sample preparation method for drill core was as follows:
- upon receiving the samples in the laboratory, they are weighed
- each sample was crushed to 70% passing 2 mm using a jaw crusher
- crushed sample was split in a riffle splitter until a 1 kg sample mass was retrieved
- sample was pulverized to produce a pulp sample with 85% passing 75 µm
- Sample was split to around 200 g for use by the analytical laboratory.

Copper was assayed by 4 acid digestion with ICP-ES/MS finish and Fire Assay (AAS) for Au on a 50g aliquot.For samples with Cu values over-limit 10,000 ppm (>1%) it was considered the ore grade Cu assay with 04 acids leach and ICP-AES analysis.Samples were also analyzed for a suite of 36 elements with ICP-ES; that consisted of a Multi-Element Ultra Trace method combining a four-acid digestion with ICP-MS instrumentation. Analytical analysis was performed with a combination of ICP-AES & ICP-MS. Sequential copper leach analysis was completed on the samples of the Oxide domain and complementary on the 10% of the deposit samples, considering Sulfur leach, cyanide leach, residual, and calculated sequential copper.

The Company has employed systematic industry standard QAQC protocols for this drill program, including the insertion of duplicate, blank and certified reference material ("CRM") samples at a rate of approximately 15% (or 1 in 7 samples). Ongoing analysis of QAQC results indicate acceptable primary laboratory accuracy and suitable control of contamination for the entire drill program.

Copper Equivalent (CuEq) for drill intersections is calculated based on $3.00/lb Cu, $1,500/oz Au with 100% metallurgical recoveries assumed for all metals. The formula is: CuEq % = Cu % + (0.680554 * Au g/t), for AuEq g/t = Au g/t + (1.46939*Cu %).