EMPRESA MINERA CUMBARATZA S.A.

MINING DISTRICT CUMBARATZA

EXECUTIVE SUMMARY

ZAMORA CHINCHIPE PROVINCE

ECUADOR

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CONTENT

I. GENERALITY

Historical data Pio Jaramillo Alvarado indicates that the gold bonanza Nambija territories occurred in the following periods: **1556 - 1556**; and to the Government of Salinas was generally 1577 to 1590. Logroño believes this continued until **1599** because of its big richness.

Pío Jaramillo establishes that Yaguarzongo governorate (13 years) production was 7,540 kg of gold or **242.487.71** troy ounces of gold.

CUMBARATZA mines were rediscovered by the investigator ***Juan Moricz*** between **1970** and **197**1 according ancient sailing directions found in research conducted in the **Archives of Seville**, Moricz rediscovered the lost and historical mines "Limbija" or "Nambixa" exploited in a rudimentary form in the time colonial, by the Spaniards and later abandoned as a result of Shuara uprising led by the legendary **Kiruba**, who expelled the Spaniards.

Sure of the important discovery, Juan Moricz formed the **"EMPRESA MINERA CUMBARATZA S.A**." in order to legally request the mining concession contract and start **prospecting phase of 50,000 hectares** in the region.

The Prospecting was conducted by the German company **"KLOCKNER ANLAGEN**" and demonstrated the existence of ***copper, lead, zinc***, leaving marked for posterity the ancient Spanish gold mine in the so called **Nambija** sector, which is near the confluence of iron creek and gold creek. The center of this old mine was the Arch Tunnel, which is carved in stone and with hundreds years of antiquity, inside which they took in 1973 the **first samples** of mineral with amazing results from ***more than 200 grams of gold per ton.***

After filing of the prospective studies, the Cumbaratza Company requested the **contract Mining Exploration 30,000 hectares**. The exploration intensified in the sector Nambija, near **Arch Tunnel**, and was estimated **TWO MILLION OUNCES OF GOLD**, which served as a basis to request the next **contract minimal extraction** which had **acquired right**.

In **June of 1983** there was an gold fever that caused the migration of many people to Nambija sector in order to perform work of **artisanal** mineral extraction, with **rudimentary** and chaotic **organization** standards, **safety and sanitation** methods, in addition to complicated and **high logistics costs**, resulting in a high cost of operation, so that only materials took advantage **high grade ore**.

This action of invasion caused that the government of the time does **not fulfill** the Exploitation contract give us to which we had **acquired right**, to the strict compliance of the Exploration contract.

In the period of 1985 -1986 rich and easy operation **in El Arco** and **El Playon** areas were detected; after were discovered sites bonanza known as **Mapasingue and The Tierrero;** in this period the sector had vehicular road and better technology used. In 1994 and because of the intense and disordered mining occurred a great landslide that caused the death of over 1300 people and the collapse of many mining tasks. Since then artisanal mining activity declined in great magnitude. The **Tierrero** was exploited for three years and later observations indicate the presence of a great mineralized structure with a minimum amount of extracted resource.

The Cumbaratza mining area covers **30,000 hectares**, divided into **10 titles** of 3,000 hectares each, numbered I to X; The Nambija mine with sectors The Arco, The Tierrero, Mapasingue and Playon are in **Cumbaratza VIII** area and a small part in the **Cumbaratza VII** area.

II. GEOGRAPHICAL LOCATION.

The Nambija (Cumbaratza) mining district is located in the province of Zamora Chinchipe found occupying southeastern Ecuador; it is within the territorial jurisdiction of the canton Zamora. It occupies the area of the condominiums north and south Nambija mines and on the western flank of the Cordillera Nanguipa.

Provincia de Zamora Chinchipe

The UTM coordinates of the Mining Area Cumbaratza are:

PP:	737000E	9569000N	1:	749000E	9569000N
2:	749000E	9544000N	3:	737000E	9544000N

III. RELIEF AND ROADS.

The region is characterized by a rugged mountain relief with slopes of 45 ° to 50 ° formed by the rocky substrate. The main feature is formed by the Cordillera Nanguipa having an elongation South to North, parallel to the Cordillera del Condor located to the east. Within the limits of the Concession the elevations range from 1200 meters above sea level in the northern and 2600 m in the southern sector. The main drainage is formed by the Nambija River, with South – North route, with a dense network subparallel secondary integrated mainly by Iron Creeks, Fierro, El Diamante, White, Cambanas, Cumay, Chamico, and in the east, the creeks Zumbi, Nanguipa, Guaysimi, and The Guinza. The topography and drainage system has formed deep V valleys.

From the city of Zamora is reached by a asphalted road main to Namirez, to continue on a ballast road to the village San Carlos and here enters the concession for different routes of third order and footpaths**.**

Route Summary: Quito - La Toma (air) 45 minutes; The Toma - Loja (land transport) 35 km; Loja - Zamora 60 Km; Zamora - Namirez 19 km; Namirez - San Carlos de las Minas (ballasted road) 15 Km; San Carlos - Nambija (ballasted Road) 17 Km.

IV. REGIONAL GEOLOGY.

Ecuador is divided into ***three geologic provinces*** roughly corresponding to the three physiographic regions. These three regions are, from ***west to east***. ***Costa***, ***Sierra*** divided into ***two cordilleras***, separated by the Inter-Andean Valley, and the ***Oriente*** separated into ***two regions***: the sub-Andean zone and the Eastern Basin. The basement of the coast consists of Cretaceous ***tholeiitic basaltic*** rocks, which would constitute a portion of the Oceanic crust welded to Continent. These rocks are covered with detrital sediments of the Upper Cretaceous and Tertiary. The Western Cordillera is composed of **Cretaceous basaltic volcanic** rocks (equivalent to those of the Coast), coated with ***andesitic lavas and pyroclastic Tertiary and Quaternary***. The Cordillera Real (Oriental), on the contrary consists of a large number of ***metamorphic rocks*** (shale to mica) Paleozoic. The intra-Andean trench that separates the two cordilleras in the northern half of the country is a depression whose exact origin is not known because the contacts are covered by recent volcanism. A large thrust fault separates the Sierra and Oriente, is located primarily sub-Andean zone, structurally separate but, stratigraphically part of the Eastern Basin located further east. This basin consists of sedimentary rocks deposited in three phases on the Precambrian Shield rocks Guyanese - Brazilian. First, the Paleozoic marine sedimentary and Lower Mesozoic (Pumbuiza, Macuma, Santiago and Chapiza Formations) finished the phase by volcanism (Misahuallí member of the Chapiza formation). Then the geosynclinal deposition of Upper Cretaceous marine sediments (Hollín, Tena and Napo formations also regrouped under the name Limón formation). The end of the Cretaceous marks the origin of Andean orogeny characterized by classic sedimentation from Western. The sub-Andean zone is deformed (folds and thrusts) in the Tertiary. The thrust fault that defines the western boundary of the sub-Andean zone and its contact with the Cordillera Real is marked by the presence of a series of granitoids batholiths Jurassic (?), probably displaced by the tectonism associated with the lifting of the proto-Cordillera (late

Cretaceous). The volcanic and subvolcanic rocks associated with certain batholiths, as included in the batholith Abitagua, Misahuallí member of the Chapiza Formation could represent a late stage of the same plutonism (comagmático evidence of origin). By extension, this theory could perhaps interact with long volcanic rocks observed within the limits of the Zamora batholith in the area covered by this study. Intrusives granitoids have been mapped very close to this region, sedimentary rocks of the Santiago Formations and Chapiza north and south and possibly east (Feininger, 1987), as well as younger sediments of the Limón formation (north). Feininger (1987) proposed a theory according to which Ecuador would be divided into five allotóctonosos, "land" among which is the "***Santiago Terrane***" comprising the southern half of both the Real Cordillera and the sub-Andean region (including the Batholith Zamora), an area characterized by the exclusive presence of the *Santiago Formation* would be absent in the other areas. Santamaria et al. (1983) and Pillajo (1983) have done work in the region of Nambija (photogeological maps and check-up visits). Both identify an area of sedimentary and volcanic rocks of the batholith to the lower area that would have been part with activity skarn. The ***Nambija*** gold deposit is located within this area.

V. LOCAL GEOLOGY.

Nambija, contains a ***potent sedimentary*** of the Santiago formation of ***300 meters***, consisting of micritic limestones, sandstones, skarns and quartzite; lesser extent are shales, calcareous sandstones, siltstones, marble and hornfels, which is the roof pendant on the Zamora Batholith. Dioritic bodies, cuarzodioríticos, monzonitic and andesitic dikes ***intrude*** the sedimentary sequence; also available green chloritized tuff.

The Nambija skarn within the Zamora batholith has a north-south elongation of **50 km,** and **15 km** wide in the east - West. The sedimentary sequence corresponds to the ***Piuntza Unit*** Middle Triassic to upper, the stockworks of ***porphyry copper*** and ***skarn copper*** are within the skarn, ***gold mineralization*** is hosted in ***skarn confined to the graven north - south*** defining belt Nambija located between the Zamora and Chumbiriatza rivers.

Two types of skarns presents Nambija belt: corneas or metamorphic skarn calc-silicate are homogeneous and banded wide lateral extent and skarn ore which are heterogeneous and complex and related faults, fractures and lithologic contacts, ***faults confluent with azimuth of 340 ° and steeply dipping 10 ° west.***

VI. MINERAL GENESIS.

Nambija, in southeastern Ecuador is an oxidized gold skarn; their mineralogy is dominated by Granadita as garnet. Nambija comprises a series of gold deposits in the southern part of the Cordillera Real, north and northeast tendencies in the belt of rocks of the Cenozoic, Mesozoic, and Paleozoic. The central part of this belt is composed of Tertiary volcanic rocks recently, several active volcanoes. West of this volcanic belt is a sequence of ***Cretaceous island arc*** and oceanic sedimentary, volcaniclastic and volcanic rocks that have been invaded by numerous ***Tertiary plutons*** type 1, relatively mafic.

Regionally, the district is bisected by Nambija western edge, N10 ° E to N20 ° E ***trust faults*** spaced by approximately 10-30 km drive. Nambija The skarn occurs within Piuntza metamorphic deposits, volcano-sedimentary rocks that occur as ***roof pendants*** in the Zamora batholith (Litherland et al. 1994 170 Ma). The Piuntza Unit is approximately 500 m thick and consists of sandstone, shale, limestone, tuff, and andesite flows (Paladines & Rosero 1996). The Zamora batholith is an equigranular tantalite to granodiorite (Salazar 1988). Most of these intrusions have been altered to K feldspar, sericite, chlorite, and clay. Therefore the original compositions and ages of these intrusions are not well known.

Within the Nambija district, a number of ***gold skarns***, which have been worked by farmers, including from north to south, Fortuna, Cambana, Campanilla, Nambija, Guaysimi, and Sultana del Condor. Most of the skarn and mineralized zones occur in the northern and northeastern corridor with structural breccias, veins and shears with large parallel faults. This mineralized zone is 1.5 km long, 125 meters wide, and slopes of 34 ° E (Aguirre and others 1985; McKelvey 1991). The highest grade mineralization occurs at the intersection of these structures north and northeast. The fact that the majority of the mineralization and some skarn are structurally controlled and spatially associated with porphyry rocks suggests that skarn mineralization is not related to the main phase of the Zamora granodiorite. Instead, the formation of skarn appears to be ***associated*** with some of the ***younger porphyritic intrusions*** and is associated with mineralization independent quartz has a strong structural control.

In Nambija in Tierrero green garnet skarn mine with K feldspar with abundant brecciation zone to the southwest. The skarn ***is not rich*** in sulfur, but most samples contain ***little*** pyrite, chalcopyrite, sphalerite and / or galena-bismuthinite-argentite. Hand specimen, both garnet and pyroxene are pale green. In addition, some of the Garnets are also pale brown and yellow. This pale green, yellow garnet is typical ***skarn distal*** regions and is similar in many skarns ***garnet Zn***. In thin section, garnet is strongly zoned as is typical of hydrothermal skarn garnet. There are moderate nuclei golden, coarse grained multiple pulses indicating hydrothermal fluids, and in general, are more andraditicas that the nuclei. Almost all of these garnets analyzed indicate Ad 21-72 except some fairly andradite distal samples. Although not very anomalous, ***most garnets contain 0.5-1.5% MnO***. This is slightly more spessartine ***component that normally*** occur in the ***garnet skarn Au***. Otherwise, these compositions are typical intermediate Granadita skarns Au and would be very unusual for most systems skarn metal, including Fe, Cu, Zn and Pb (Meinert 1992). In contrast, all pyroxenes are diopside and such poor pyroxene in Fe skarns is atypical in Au. Pyroxenes are also relatively rich in manganese, more than any other type of skarn Au, but much less typical Zn skarns.

The Nambija Gold occurs in quartz veins spatially associated with ***skarn with garne***t. Some of the quartz veins are deformed garnet indicating contemporaneity with skarn formation. Fluid inclusions in quartz are simple two-phase inclusions. No mineral recrystallized, so that the total salinity is <26%, weight of NaCl. Homogenization temperatures were not determined, but the lack of garnet retrograde reaction such as the formation of epidote, suggests that the temperature of quartz veining is relatively high and beyond the range of epithermal mineralization.

In the Cambana mine, brown garnet skarn is cut by quartz veins parallel with a laminate - grainy texture. This rock clearly recorded two events: ***The first activity*** is the ***formation of relatively coarse-grained garnet skarn*** with optical zonation similar other samples of Nambija (composition cores Ad40, AD60). Pyroxene in samples having a content similar to the other samples Nambija iron, but the manganese content is even greater than the remaining samples. . Pyroxene in samples having a content similar to the other samples Nambija iron, but the manganese content is even greater than the remaining samples. ***The second event*** is a ***brittle deformation***, in which the rock has been invaded by ***hundreds of parallel quartz vein.*** The walls of the quartz veins match perfectly to brittle fracture occurred without significant shear stresses. As long quartz veins have no apparent reaction of hydrothermal fluids with the host rock (garnet). Fluid inclusions in the quartz are mostly rich vapor indicating that boiling / exsolution liquid has occurred, probably due to a sudden reduction of the pressure (caused by movement?). No new mineral, so that the total salinity is <26 % weight of NaCl. This texture is similar to that observed in ***mesothermal orogenic gold deposits*** containing quartz veins tens to hundreds of bands (streaks) cutting of the rock wall, separated by quartz.

The skarns Nambija region have the characteristics of the calcium copper skarns. These features include: **1)** mineralization of pyrite, pyrrhotite, chalcopyrite and sphalerite in a gangue calc-siliceous garnet (andradite-grossularite), diopside, wollastonite, magnetite, etc. **2)** Retrograde primary for late mesothermal skarn processes. **3)** Association to the calc-alkaline intrusions (diorite, granodiorite, quartz monzonite). **4)** Derivation of metasomatic congenital calcareous beds in the volcanic sequences (andesites, dacites). **5)** Tectonic orogenic Environment of continental arc (Einaudi et al, 1981; Einaudi and Burt, 1982).

VII. IMPORTANT MINERALIZED BODIES.

- **Tumi Breccia**: Located southeast of the Concession and occupies 50% of the block **Cumbaratza X**. It is composed of granodiorite, diorite and tonalities of the Zamora batholith with elongation N - S, extending east and west; about this a group of stratified skarn rocks by granitización is located, with gold mineralization with a structural preference NNE, are ***mineralized lenses***, similar to ***Cambana, Fortuna, Cambana, Guaysimi, Nambija.*** Gold mineralization is hosted in thin volcanoes -sedimentary strata.

Within this block (**Cumbaratza X**) are defined anomalies with high grade gold and copper in porphyry copper Philonian structures.

In Guanta – Ortiga anomaly are defined anomalies identified as: ***Loma Verde, Guaysimi, Stockwork, and further south Cerro Colorado, South West Anomaly and South East Anomaly.*** An estimated 200 meters deep under these anomalies there is mineralized over twelve million ounces of gold.

70% of this breccia is the Cumbaratza Concession, so we can say that in this sector can get **eight million four hundred thousand ounces of gold**.

- **David Breccia**: To the northeast of Nambija and within **Cumbaratza VI** and Cumbaratza VIII is similar to Breccia Tumi but smaller size and high concentration

of gold skarn; in this area has identified several ore bodies which are described below:

Campanillas. Located to 1.5 km north of the Nambija deposit (745812E - 9551342N), has an abrupt slope relief. The deposit is hosted in a sequence well stratified tuff and controlled structures northeast.

The gold mineralization is controlled by veins in faulted areas northeast direction, the quartz veins is translucent and milky with visible gold, and limited in the vicinity of faulted structures. The gold deposit is within a sequence of 30 to 40 meters thick andesitic tuffs and tuffaceous sediments. The tuffaceous rocks maintain their thickness towards the north with a change of facies characterized by alternating layers of decimeter scale.

Cambana. The mineralization occurs in skarn units of 1.5 to 2 meters thick which are alternating thin silicified tuffs and propilitizados skarn beds.

Ancient Spanish works were rediscovered in 1983 in what is now Mine Cambana; this was producing in those years about 4 kilos of gold per week, with a tenor of gold from 25 to 30 g / ton. Currently mining is paralyzed due to the apparent loss of gold ore, so it requires high exploration investments.

Fortuna. It is located 3 km north of Nambija, in the western foothills of the **Nanguipa and Tunantza** cordillera.

Intrusive rocks of the Zamora batholith granite and granodiorite composition found in the low parts, with intrusions of dykes, stock and scattered sills inside the area within the diorite there porphyry dacites quartz northern elongation - south, overlying this, andesites, hornfels and tuffs. The skarn occurs as a result of metamorphism contact, in which the sedimentary volcano had metasomatism at various hydrothermal activities, the skarn is a band northerly direction - south with a width of 80 to 120 meters along the area. The mineralization is oriented in the central part of this skarn band with several mineral sectors of higher interest.

These three sectors within the David Breccia have a potential **five million ounces of gold.**

- **Guaysimi Alto and Cerro de Las Banderas**: Between Tumi breccia to the south and Davis breccia to the north, there is a formation southeast of Nambija. A company is **illegally** exploiting 200 tons per day, with a tenor of 4 grams per tonne, open pit.

Felsic intrusive rocks formed by dikes crop out in the beginning of the creek El Rey; garnet skarn with andradite containing gold ***always related to post skarnificatión mineralizing structures*** also contain grossularite, almandine and tremolite; the skarn calc - silicate is the most extensive and contains actinolite, tremolite, diopside, epidote, plagioclase, garnet, calcite, iron hydroxides and manganese sulfides; volcanic rocks are sedimentary volcano type, very metheorized, are andesites, dacites, silicified tuffs, flows and breccias; sedimentary rocks formed by chert, locally calcareous siltstones and shales. Rocks

are identified as Piuntza unit, intruded by porphyry andesite composition - diorite rhyodacite.

The mineralization is localized in skarn, breccia and veins with gold, is gold skarn deposit type, similar to Nambija and has a lithologic and tectonic control; the preference direction is northwest with steeply dipping (37 ° southwestern). Skarn thickness is between 100 and 200 meters.

The Cerro de Las Banderas is a deposit of 2 km long, 400 meters wide and 80 meters deep and is formed by skarn, with high gold content. Estimated reserves in this area are **ten million ounces of gold**.

VIII. PROBABLE RESERVES ESTIMATED.

Adding all sectors with high gold potential, mainly within Cumbaratza X, Cumbaratza VIII and Cumbaratza VI, we can summarize:

TUMI BRECCIA	**8, 400,000 Oz.**
DAVID BRECCIA	**5, 000,000 Oz.**
ALTO GUAYSIMI AND	
CERRO DE LAS BANDERAS	**10, 000,000 Oz.**
TOTAL	**23 400,000 Oz.**

Note: to this amount should be added five million ounces of gold, found in Nambija sector that is currently reserved for small-scale miners, with whom, you can get to negotiate so that it produces an output of all of this place and proceed to the exploration and exploitation of the deposit.

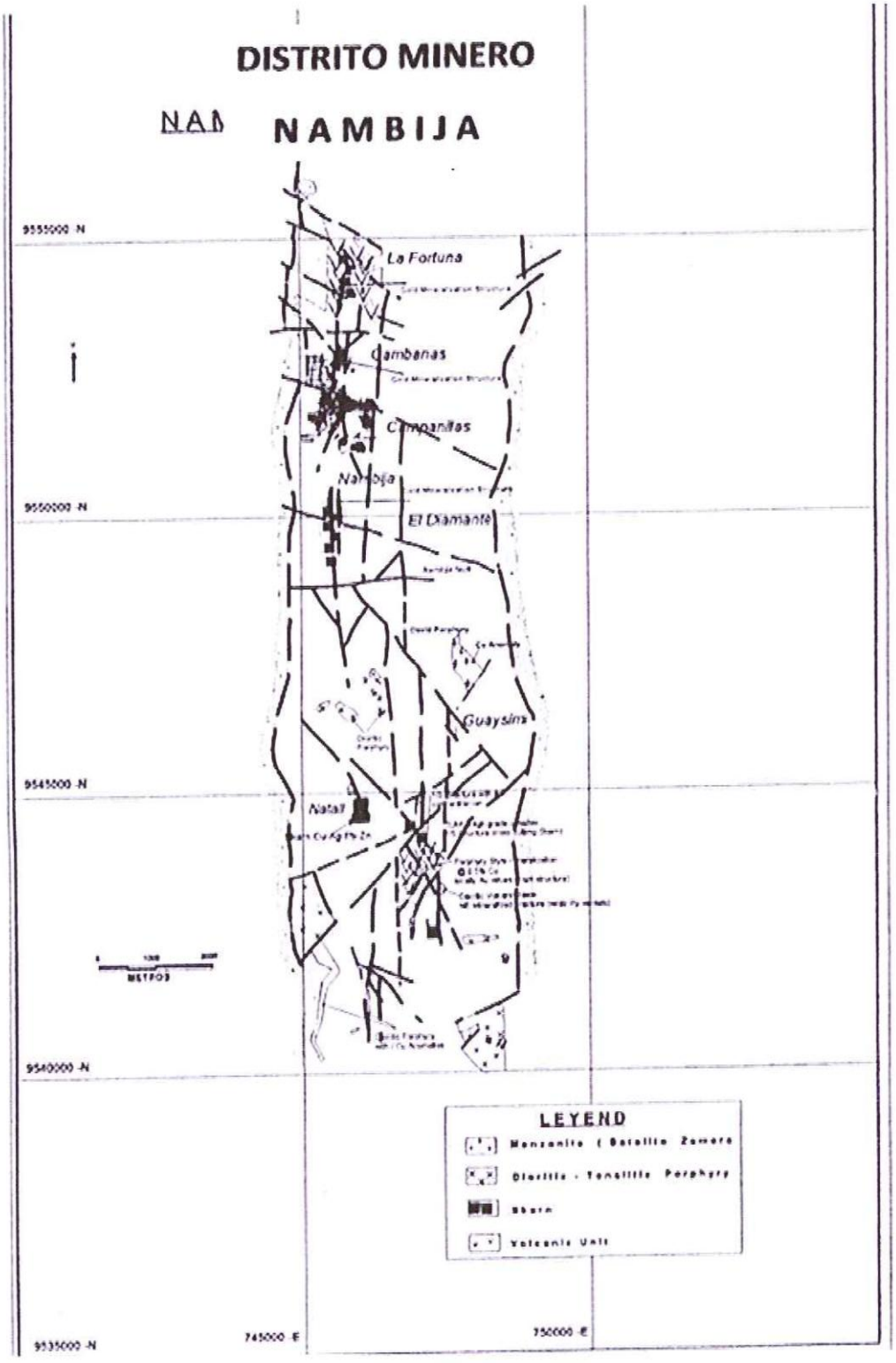
We must emphasize that the only Nambija gold can be extracted by technical methods, which are not available to small miners.

Conclusions

From the geological environment area has many factors and events that favored the formation of deposits of metallic minerals especially gold, these deposits, together make up the Mining District Nambija great extent and depth. Carbonate rocks, intrusive acids hydrothermalism are the main factors that are affected by tectonic events of great magnitude, making Nambija the main gold mining sector in the province of Zamora Chinchipe.

Despite the intense exploration activity conducted out by various groups and various technical and empirical methods cannot compile all the information these originated, but each of these studies conclude on the existence of a mining district with great potential and reserves gold.

Similarly mining activity started in pre-Columbian times with obsolete methods, which could only exploit sites, mining and metallurgical minor complication later with the squatter settlement that was formed in the 80s has been the common denominator disorder, lack of technical methods and waste of economic resources and mineral. But nevertheless, despite having made only a superficial mining, it has generated large volumes of metal (gold) to the present.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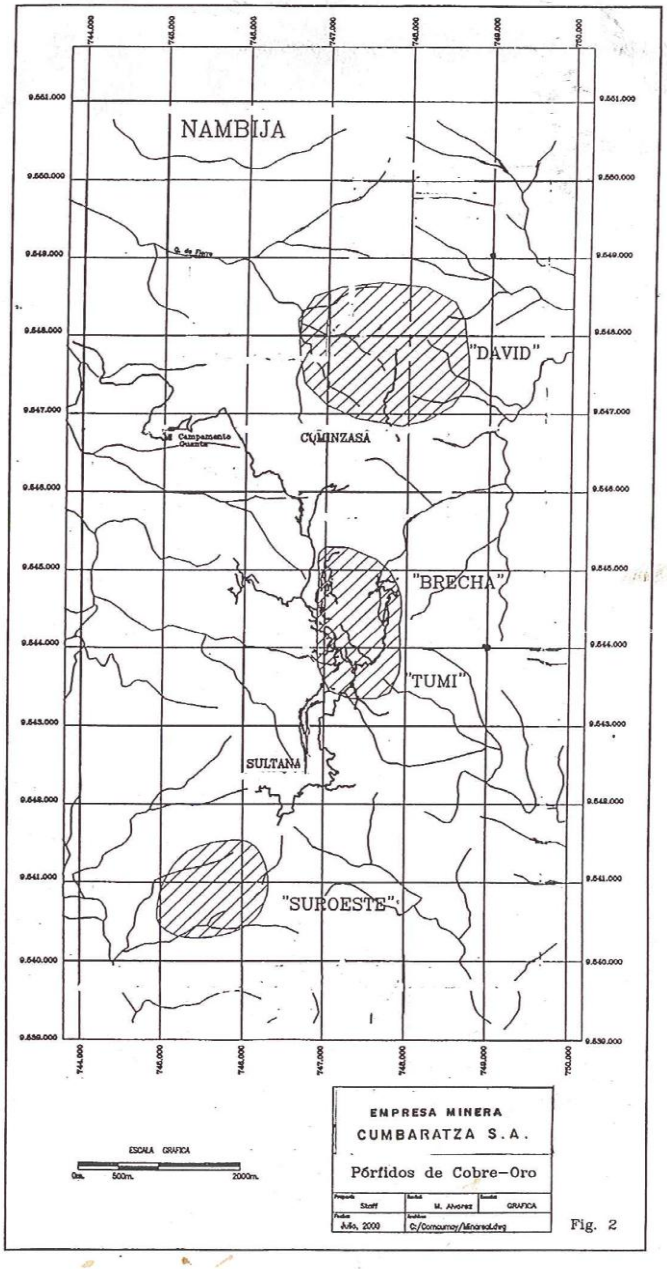
NAMBIJA
"DAVID"
CUMINZASA
"BRECHA"
"TUMI"
SULTANA
"SUROESTE"
EMPRESA MINERA
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Pórfidos de Cobre–Oro
ESCALA GRAFICA
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Staff
M. Alvarez
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Fig. 2

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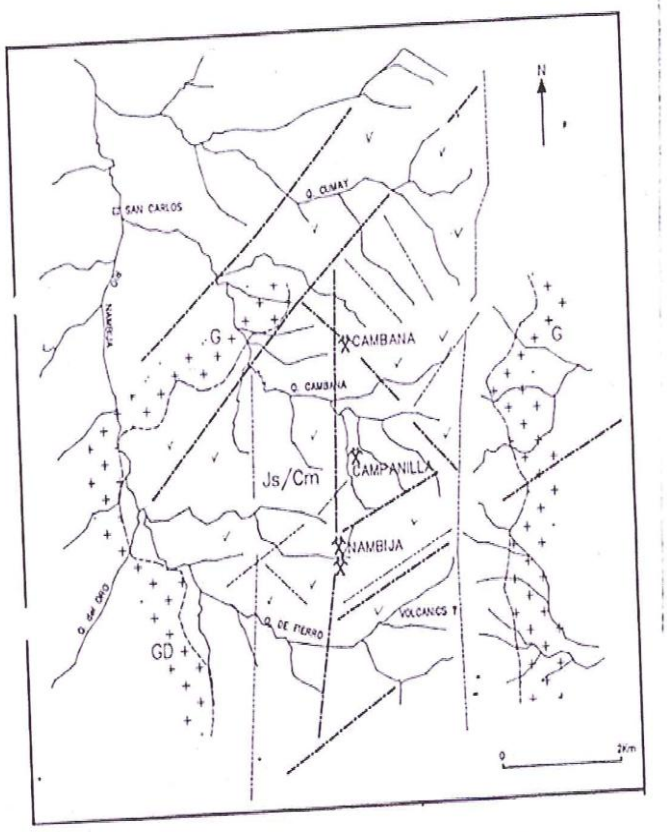

GEOLOGÍA – ESTRUCTURAL DISTRITO NAMBIJA