CONTENTS

ILLUSTRATIONS

TABLES

2 PROJECT DESCRIPTION.

2.1 GEOGRAPHICAL LOCALIZATION OF THE PROJECT

The area of interest (mining title 5969) is located in the Segovia - Remedios - Zaragoza mining district, which is located on the eastern margin of the Cordillera Central in the municipality of Segovia, sub region of Bajo Cauca in the Department of Antioquia (Illustration 2.1-1).

The municipality of Segovia is located at 7 ° 04 '28" north latitude and at 74 ° 41' 56" west longitude of Greenwich. The height of the urban head above sea level is 650 meters. It is located at a distance in the road to Medellin about 227 Kilometers, the road in a large percentage is paved, the rest is unpaved, and it is in regular conditions. The territorial extension of the Municipality is of 1,231 Km2. Segovia is located on plates 106 and 117 of the Geographical Institute Agustín Codazzi (I.G.A.C). Their lands range from five hundred meters (500 m) to one thousand (1000 m) meters above sea level. It borders on the north with the municipalities of Zaragoza, El Bagre and Bajo Cauca, on the east with the department of Bolívar, on the south with the municipality of Remedios, and on the west with the municipalities of Amalfi, Anorí and the Valley of Aburra. The sub-region extends over the eastern slopes of the central mountain, between the Saint Lucas mountain and the Porce, Nechí, Nus, Matá and Alicante rivers.

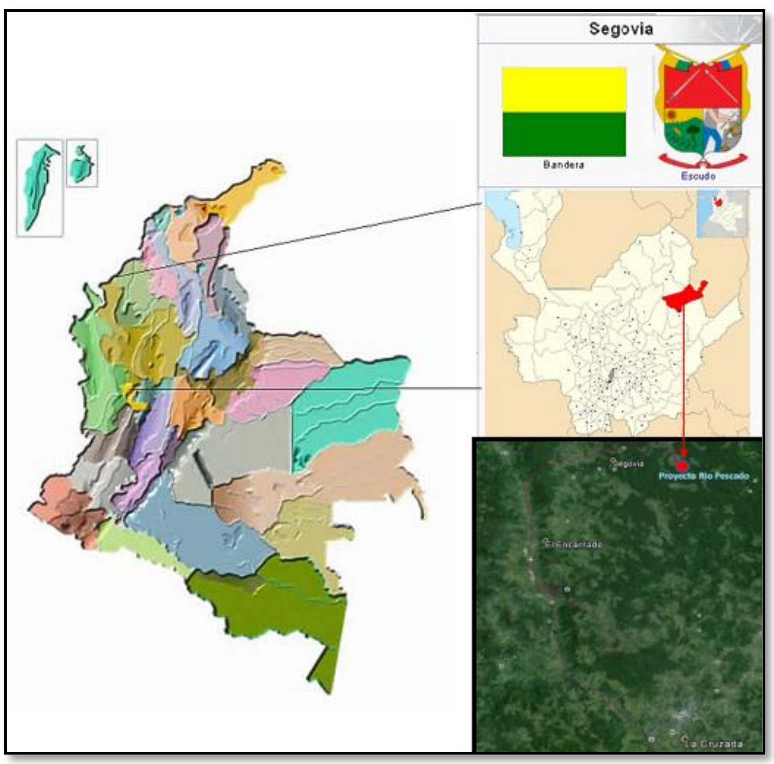


Illustration 2.1-1. Geographical location of the project.
Source: Modified from mayoralty of Segovia.

2.1.1 PROJECT LOCATION

The project area, denominated as "El Pescado Project" is located 20 kilometers in the north of Segovia municipality, at 11 kilometers of Los Laureles village of Machuca town. It is located at 150 kilometers of Medellin city, capital of Antioquia department. (Table 2-1, illustration 2.1-2 and illustration 2.1-3).

Table 2-1. Coordinates of the vertices that delimit the area of the mining title (Magna Sirgas Bogotá)

East	North
930.003	1.293.006
931.003	1.293.006
931.003	1.294.006
930.003	1.294.006

The concession contract 5969 is located on plate 106 of the I.G.A.C, presenting an area with the following characteristics (Table 2-2, Illustration 2.1-2 and Illustration 2.1-3):

Table 2-2. Generalities Mining Tittle 5969

TITULAR	Touchstone
IGAC PLATE.	106
TOWNSHIP	SEGOVIA ANTIOQUIA
TOTAL AREA	100,00 HECTARES

Source: Touchstone Colombia

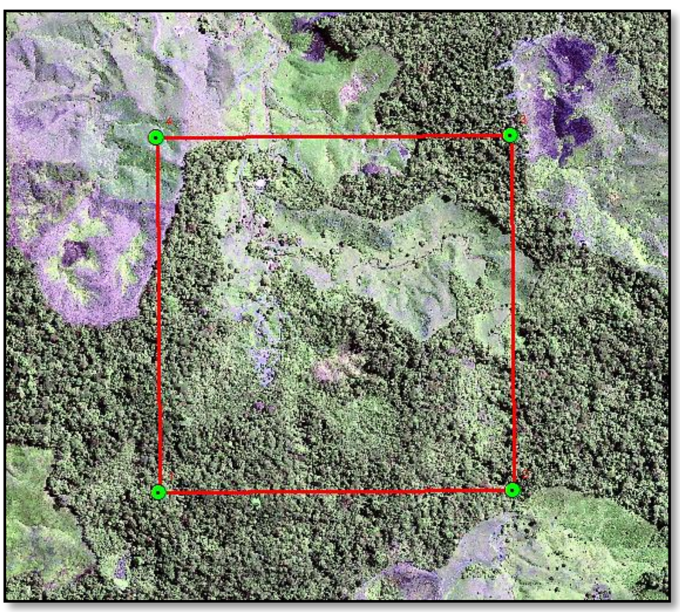


Illustration 2.1-2 Licensing polygon 5969.
Source: Ingex Mining Group S.A.S taken Arcgis.

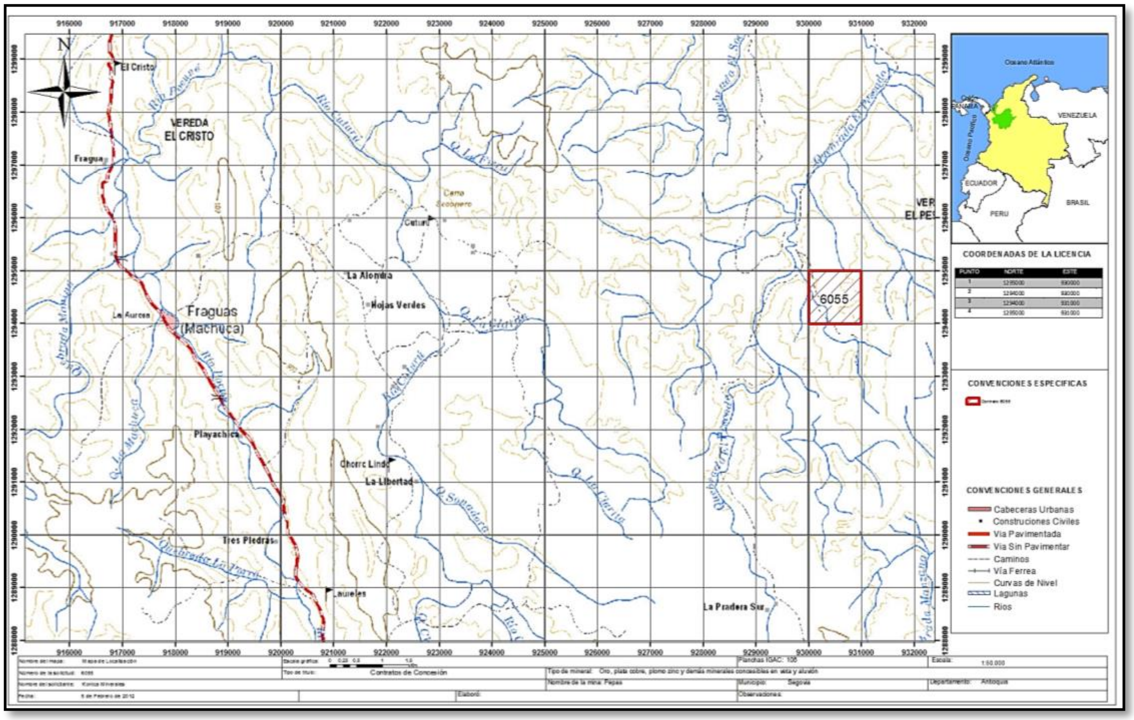


Illustration 2.1-3 Project location and tittle 5969
Source: Touchstone Colombia

2.2 EXPLORATION RESULTS

2.2.1 REGIONAL ASPECTS

Given the location of the Mining Concession 5969, the geological framework in which it is located is formed by the presence of the Diorite of Segovia (Jds); this body is located in the northern sector of the Cordillera Central on its eastern flank towards the Magdalena valley. It is an elongated body in the direction of the mountain range, with a length of 270 km, a maximum width in its central part of 50 km and a total extension of more than 5,600 km2, and some vertex and related bodies are considered (Illustration 2.2 1). It extends from the south of the town of San Martín de Loba, in the Department of Bolívar, at its northern end, to the Alicante River, in the Department of Antioquia, in the extreme south (González & Londoño 2002). This unit is the box rock of the most important vein-type mineralized structures in this area of the country and has been widely recognized for the richness in number and quality of these vein-shaped structures for the exploitation of gold.

2.2.1.1 METAMORPHIC ROCKS

The metamorphic rocks outcropping in the area of influence of the Mining Concession 5969 are grouped in the lithodemic unit called the Cajamaca Complex (Maya & González, 1995).

2.2.1.1.1 Gneiss feldspathic quartz

It is the most abundant metamorphic unit on the eastern flank of the Cordillera Central. To the west of the Otú Fault (Feininger et al., 1972). It is constituted by feldspathic and aluminum whose structure varies between schistose and sometimes migmatite, the present wide mineralogical and textural variations, due to both, the metamorphism conditions as to the heterogeneity of the original sediments, the predominant rock is gneissic, well foliated, usually folded and bright gray. Apparently, the located to the west of the Otu Fault are at the same stratigraphic level and correspond to the highest-grade zone of the Cajamarca Complex; the increase of the metamorphic grade would be the cause of the gradation.

These rocks form a mosaic limited by faulty blocks. They are partially covered by younger sediments and are intruded by the Diorite of Segovia, between the Otú fault and the Magdalena river valley, feldspathic quartz predominate in which amphibolite and marble lenses are found (Feininger et al., 1972). The texture is granular hyphidioblastic of medium to coarse size and the predominant composition is quartz, plagioclase and potassium feldspar; in the majority of gneiss biotite and muscovite coexist, the protolith of these gneiss seems to have been varied; in some places they are massive and seem to correspond to metamorphosed felsic plutonic rocks, while in another they are stratified and appear to come from sediments, banded amphibolite lenses of varying thickness, appear associated with the gneiss and seem to correspond to silos of basic rocks metamorphosed to the amphibolite facies.

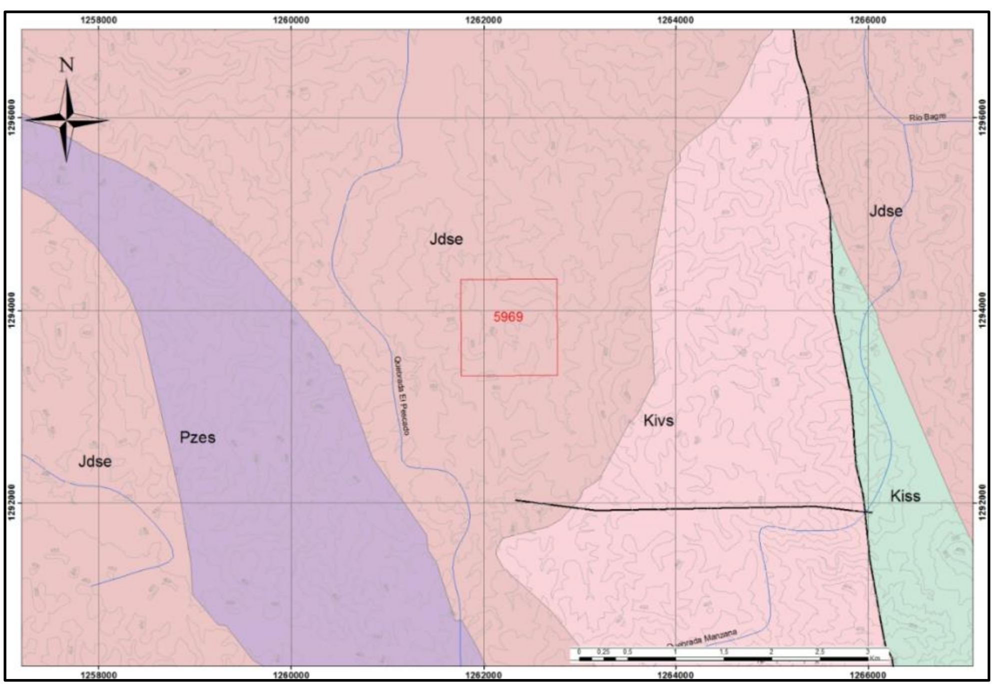


Illustration 2.2-1 Regional Geology Map.
Source: INGEX, 2015

2.2.1.1.2 Quartz-Sericitic Skids (Pzes)

Belonging to the Cajamarca Complex. This unit is presented as a series of graphite shales in which the dark gray or black color predominates; this unit is widely distributed in the complex, they have schistose structure finely laminated in layers of 3 to 5 mm, intensely folded, with veins of milky quartz of variable thicknesses that adapt to the forms caused by the deformation. The course of the schistosity varies between N10 ° E and N20 ° W, with geological dip marked to the East.

The metamorphic paragenesis found indicate regional metamorphism conditions, sometimes with superimposed events of low to medium degree and low pressure in the green schist facies to low amphibolite. The protolith corresponds to pelitic clay sediments with variable content of organic matter (Gonzales, 2001).

2.2.1.1.3 Quartzite (Pzq)

Well defined and regionally mapped quartzite groups are found in the different stratigraphic units that compound the Cajamarca Complex, they are interspersed with micaceous schists, it is difficult to separate both lithologies.

The Cajamarca complex in the area of the department of Antioquia contains three series of progressive regional metamorphism, each one characterized by a succession of different facies and mineral zones. The series of lowest degree of metamorphism, is located on the western flank of the central mountain range (Feininger et al., 1972) and is limited by the San Jerónimo fault, the second series comprises most of the metamorphic rocks within the green schist and amphibolite facies and the third comprises the rocks of a relatively higher degree to the west of the Otú fault and are basically feldspathic and aluminum gneiss, these three series are similar and the contacts are transitional, locally affected by thermal effects produced by intrusions.

The quartzite present gradational variations to shale sericitic quartz, marked by the increase in the content of micas and decrease in the content of quartz; this indicates lateral changes in the basin, with an increase in the clay material that is deposited (González 2001).

Paragenesis indicates conditions of low pressure, medium to low degree of metamorphism and are located between high green shale grades to low amphibolite (González, 2001).

2.2.1.2 IGNEOUS ROCKS

The igneous rocks present in the study area are represented by intrusive rocks belonging to the Diorite of Segovia and volcanic rocks belonging to the vulcanite's de Segovia, both located chronologically in the Mesozoic age.

2.2.1.2.1 Diorite of Segovia (Jds)

In general, it is about an elongate body in a north-south direction, located east of the Otú-Pericos fault that coincides with the regional tectonic sense, it has a length of 270 km and a width in its central part of 50 km, it is constituted by diorite with textural and compositional gradational variations; these diorites vary from massive too lightly laminated and intrude rocks from the Cajamarca Complex.

More specifically, based on the catalog of stratigraphic units in Colombia (González & Londoño 2002), it is said to constitute a plutonic body of batholithic dimensions, 5,600 km2 with some smaller bodies geographically separated and sometimes located to the west of the tectonic system that it largely controls its location, but due to its petrographic characteristics and relations with metamorphic rocks, it has been considered genetically related; in the northern part, this body is divided into two, separated by a set of metamorphic rocks in tectonic contact, to the east marked by the Palestine Fault and to the west by that of El Bagre (Feininger et al., 1972; Kassem & Arango , 1977).

In the works carried out in the ridge of San Lucas, the oriental body has been called Oriental or Norosí Batholith (Bogotá & Aluja, 1981, Ballesteros, 1983), but it is clear that there is a geographical continuity towards the south with the dioritic body of Segovia (Diorite of Segovia).

It is an elongated body in the north-south direction, in the sense of the regional structures of the Central Cordillera, whose relations with the metamorphic rocks can be both tectonic and intrusive; it shows, in this case, a well-defined contact aureole with the presence of pelitic hornfels of medium degree of metamorphism.

The predominant composition is dioritic to quartz dioritic with local variations to quartz monzonites - granodiorites and gabbro; The most representative part of this pluton is constituted by dioritic and quartz dioritic rocks, massive to slightly laminated and strongly gneissic; laminated rocks are characterized by the presence of bands with diffuse contacts and different proportions of felsic and mafic minerals. Some of the gneissic rocks are cataclastic, although they could be partly protoclastic; near the tectonic contacts with precambrian gneiss are heavily sheared and the original structure has been largely destroyed.

The rock is phaneritic equigranular of medium grain, dark greenish gray color mottled, locally, with pink crystals of potassium feldspar surrounded by a plagioclase crown of cream color and gives a rapakivi structure (La Honda and Alicante rivers, and Pava stream).

Near the Otú fault, there are abundant autoliths of fine granular mafics and the presence of small faults. Irregular melanocratic dykes, sometimes with metamorphic textures, occur locally (González & Londoño 2002).

The Diorite of Segovia is the embedding body of the auriferous quartz veins where the most important and highest yield gold mining operations are carried out in Colombia (Rodríguez & Pernet). The age of this body corresponds to the beginning of the Middle Jurassic based on the isotopic age of 160 ± 7 Ma K/Ar in hornblende reported by Feininger et al. (1972), in a sample from the Montecristo quarry.

2.2.1.2.2 Segovia vulcanite (Kivs)

They are elongated bodies east of the Otú fault and limited, largely by the El Bagre fault, east of Remedios and Segovia, are related to sediments located in the east of the Otú fault, between the Nus and El Bagre faults (Feininger et al. al., 1972) east of Segovia, a town in the northeast of the department where the name is assigned; they extend north to the latitude of the Municipality of Zaragoza, Antioquia (González 1992).

The sedimentary-volcanic belt extends for 90 km, with an average width of 6 km and irregularly extends in its northern end. Volcanic rocks are more abundant in the western part of the strip, which is controlled by Fault Nus.

The volcanic rocks are indicated on the map as independent lithological units in those areas where they predominate over sediments, but it is not always possible to make the separation and in the sedimentary unit subordinate vulcanite appear. In the extreme north, the relationship of vulcanite with dioritic rocks of Diorite of Segovia is clear, but apparently the related sediments rest in discordance.

There is no known data on the age of these rocks, however their relationship with marine sediments allows them to be assigned an age, thus, the carbonaceous shales in the Tigui, Bagre and Pocuné rivers, as well as in the Las Palmas and El Infierno ravine contain fossil remains of ammonites from the Lower Cretaceous, more exactly Hauterivian-Aptian (González 1992); age adopted for these rocks.

2.2.2 SEDIMENTARY ROCKS

The sedimentary rocks that emerge in the area of influence are characterized by having a marine component and were formed in the marine transgression of the Cretaceous.

2.2.2.1 SEDIMENTITES EAST OF SEGOVIA (KIVS)

It is an informal name used to describe some sedimentary rocks related to basic volcanic rocks located east of the Municipality of Segovia and of Otú fault (González 2001); it is a black carbonaceous shale, stratified with siltstones, sandstones, conglomerates, quartz conglomerate ridges, mudstone and basic volcanic rocks; near the Otu fault some lenses of fine granular limestone of gray color appear.

The stratification is from vertical to sub vertical and the stratification planes are micro filled and striated; the fossils observed in this unit (gastropods and pelecypods) locate the unit in the Upper Albian Lower Aptian (Feininger et al., 1972).

2.2.2.2 QUATERNARY DEPOSITS

Quaternary deposits are included that are the result of the recent denudation of the area, such as alluvium, flows, colluviums, torrential flood deposits and ejection cones; these deposits, unbound, are mostly mapped at the local level, yet they are very important because of the information they offer from the surrounding lithologies, the morph dynamic processes acting and the accumulation of materials of economic interest such as gold; In general, it presents particles of varied composition and size, among which are those of diorite and granodiorite, as well as those of rounded quartz with poor selection.

2.2.2.3 REGIONAL STRUCTURAL GEOLOGY

Several authors interpret three deformative phases with influence in the area of interest, which start from a structure of regional character as the Otu Fault and that concentrates the greatest amount of efforts, this structure presents directions that vary from NNE to NNW and high angles of dip, as well as the extension of hundreds of kilometers on the course and thicknesses of up to hundreds of meters including the shear zone; from there second and third order structures are detached.

The second order structures have a subparallel address to the main structure; These structures have extensions in courses of up to tens of kilometers and are tens of meters thick (Illustration 2.2-2).

On the other hand, there are structures of third order, subordinated to the previous ones, these structures are oblique to the previous two and harbor most of the mineralization, without ignoring mineralized zones in the second order structures; this type of third order structure has a few kilometers of course and thicknesses of up to several meters; It should be noted that not all third order structures are mineralized and those that are mineralized are not mineralized in their entirety.

Echeverry et al. 2009 proposes a simple compression model where secondary and tertiary Riedel structures are generated (R, R1, X, P) where the maximum stress incidence angle ($\sigma 1$) with respect to the surface has the highest prevalence (Illustration 2.2-3).

Within this model, R corresponds to the structure type Riedel or syngenetic which shares the same direction of the fault generated by maximum effort (R), while R1 corresponds to the Anti-Riedel or Antithetical which have opposite sense to the failure, these two correspond to the system of second order structures, while those of third order correspond to the type X and P; the type Y structure would be the syngeneic structure.

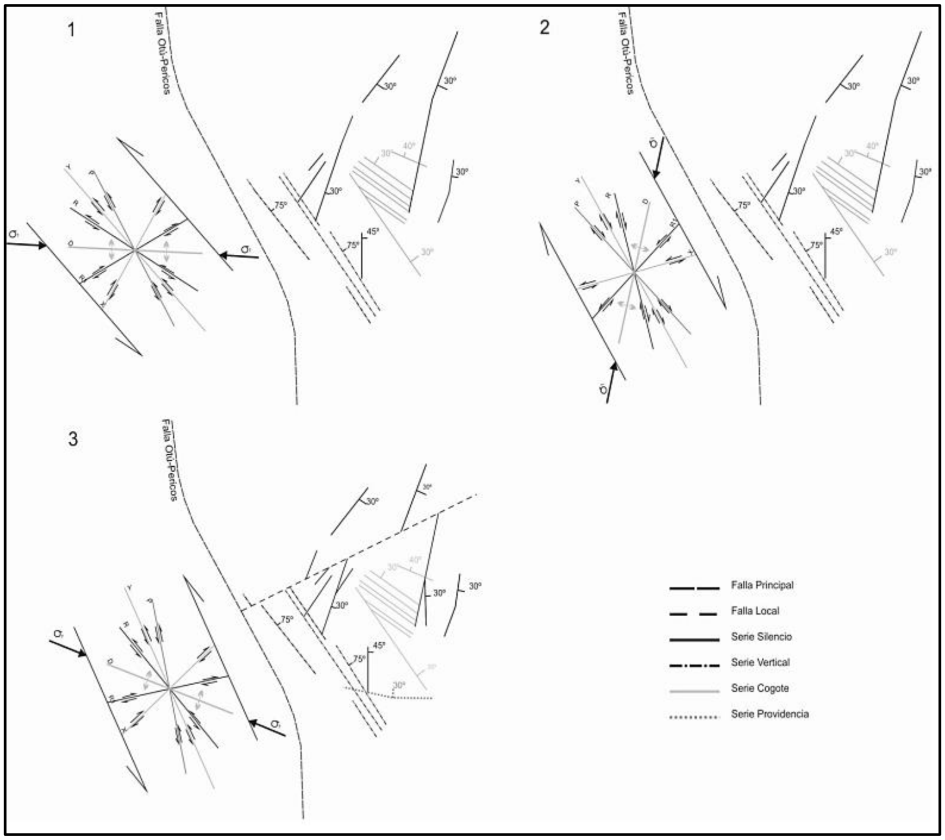


Illustration 2.2-2 Diagram of structure formation with the 3 main events (Echeverry et al., 2009).

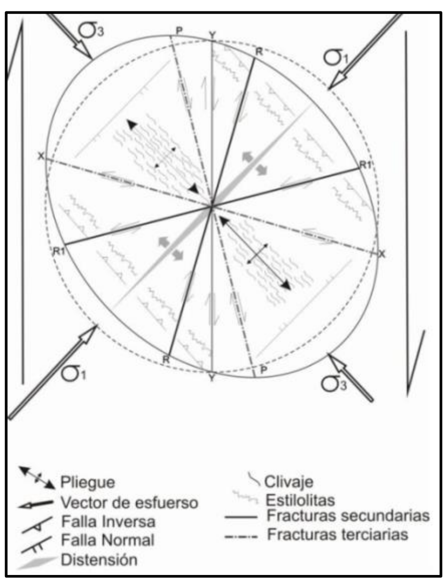


Illustration 2.2-3 Fracturing model (Rossello, 2009).

2.2.2.4 REGIONAL GEOMORPHOLOGY

The study area is located on the eastern flank of the Cordillera Central, in the eastern part of the department of Antioquia, the relief gradually decreases from west to east towards the Magdalena River, characterized by moderate hills and sub-rounded forms.

Regionally, the zone of interest is framed within the physiographic unit called mountains of San Lucas (foothills of the San Lucas mountain range). The heights do not exceed 2500 meters above sea level.

2.2.3 GEOLOGY OF THE DEPOSIT

2.2.3.1 LOCAL GEOLOGY

The presence of 4 geological units was determined within the area of influence of the P-23 project, listed below, in order of abundance we have Granodiorite, Diorite, Alluvial Deposits and Diabase (Illustration 2.2-7)

2.2.3.1.1 Granodiorite

This unit has the greatest coverage within the area of influence of the P-23 project; it is characterized by presenting a phaneritic holocrystalline texture with variations from equi to inequigranular, leucocratic equi, varies from hypidiopimorphic to allotriomorphic, presents localized textural changes with overgrowth of plagioclase; compositionally, quartz, plagioclase, amphibole and some Ferro Magnesians are presented; the magnetic properties are generally very slight, the predominant hydrothermal alteration in this unit is the chloritization that is generally seen disseminated and in nests, from mild to moderate in its intensity, as well as the silicification that can become strong, pervasive what sometimes it masks the original texture of the rock.

Weathered rock, this unit appears with orange and yellowish-brown colorations, the general texture of the residual soil is sandy, most of the outcroppings are moderate to strongly weathered.

As for the mineralization, the occurrence of fine granular pyrite is very slight to mild, disseminated and occasionally chalcopyrite, most of the mineralized structures are embedded in this lithology.

2.2.3.1.2 Diorite

Diorite holocrystalline, phaneritic, equigranular, leucocratic, hypidiomorphic, presents variations in the size of the crystals until micro diorite (Illustration 2.2-4 and Illustration 2.2-5), in general there are slight to moderate magnetic properties due to the occasional presence of magnetite and Potassium alteration accompanied by secondary biotite and potassium feldspar; This rock is presented as dykes inside the granodiorite; the contact is not clear between the units, rather than intrusive, the relationship can be associated to different crystallization phases of the batholithic body where the magmatic differentiation allows the evolution of the fluid depending on the conditions that in depth facilitate the formation of the crystals.

The predominant alteration in this rock is chloritization, usually it is disseminated or patches; also, silicification is observed, superimposed, very slight; the outcrops are very scarce and of poor quality; hand samples are usually seen oxidized.

The residual soil and the saprolite of this rock is of reddish hue, mainly it presents clayey and without mineralization observed; the textural variations within the body allow the generation of clay-sandy soil of orange tones.

Illustration 2.2-4 Outcrop of Diorite tributary of ravine Pepas.
Source: Ingex Mining group.

Illustration 2.2-5. Hand sample obtained, Diorite.
Source: File Ingex Mining group.

2.2.3.1.3 Diabase

The term diabase is commonly used to name basaltic andesites that vary from aphanitic to micro granular in texture, the coloration that presents is generally dark greenish and the magnetic properties vary from mild to moderate in the fragments observed in the logging process; no outgrowth of diabase has been identified in the field without alteration, in general it is seen mildly to moderately weathered and it is not possible to clearly identify the physical properties of the rock (Illustration 2.2-6).

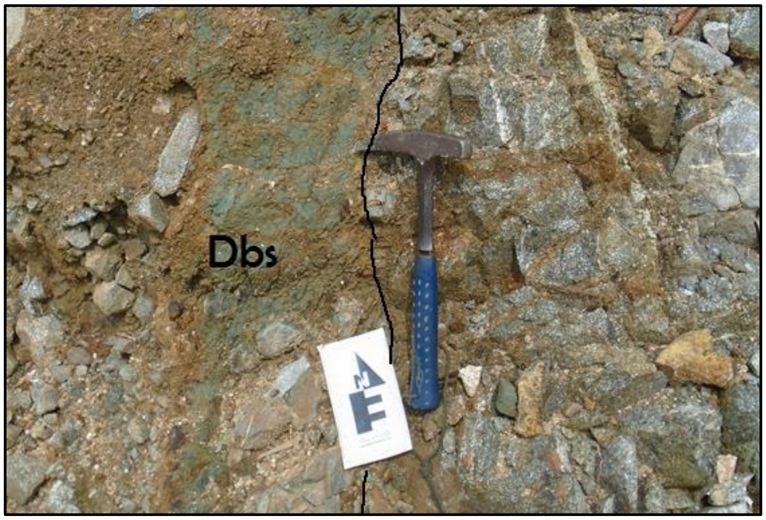


Illustration 2.2-2. Diabase dike (Dbs) weathered without mineralization.
Source: Ingex Mining Group

The alteration of this unit is marked by the presence of chlorite hydrothermal alteration as isolated nests; the mineralization is very incipient and is given by disseminated fine granular pyrite.

2.2.3.2 ALLUVIAL DEPOSITS

The alluvial deposits in the area of interest are marked by those generated by the Ravine Pepas and its nearby tributaries such as Ravine El Sapo; they are restricted to the vicinity of this tributary.

There is not an appropriate point to elaborate a stratigraphic column of the deposit, even so, it is appreciated that in areas of lateral undercutting, fine clay and fine sand materials are presented to the ceiling and to the base, gravel and pebbles clasts; the general composition is of igneous clasts mainly granodiorite, followed by diorite and aphanitic rocks type basalt and diabase, the selection is good, sub-rounded to rounded and with medium curvature, the sediment has mild to moderate magnetic properties due to the high presence of mafic minerals, mineralization is observed by occasional incipient pyrite. The local geology map is as follows (Illustration 2.2-7)

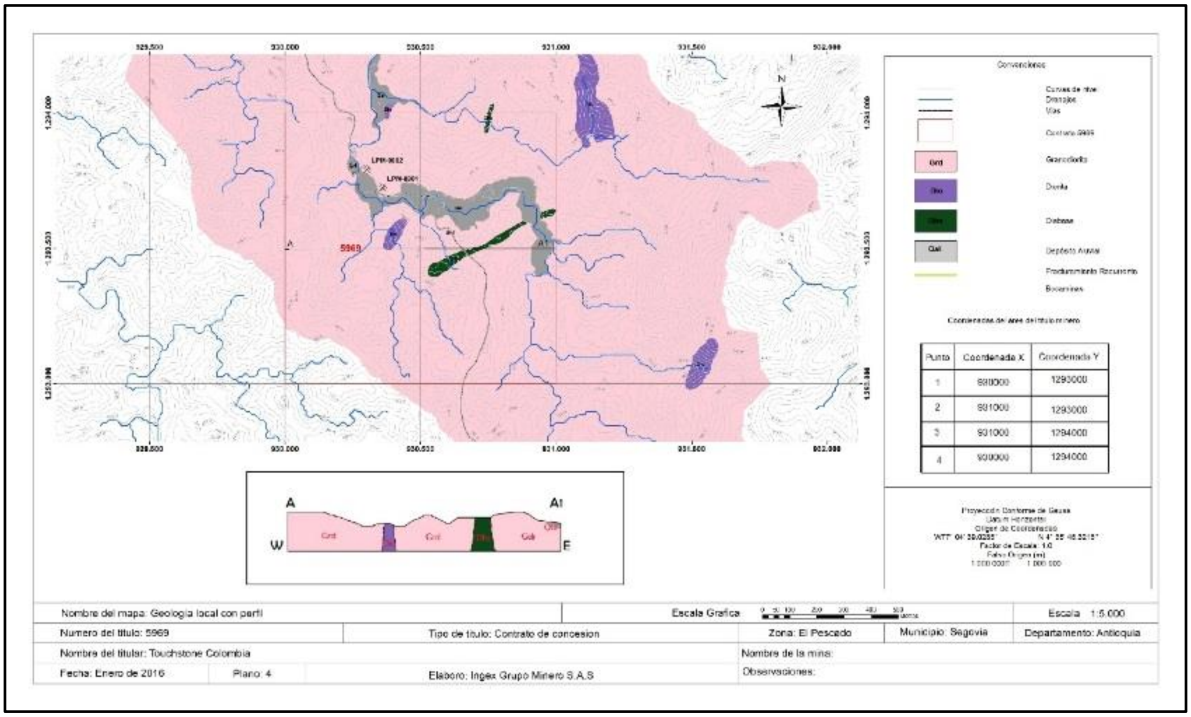


Illustration 2.2-7. Map of local geology
Source: Ingex Mining Group S.A.S

In detail of the petrographic analysis, we have that the rock is presented as a dune holocrystalline phaneritic equi to inequigranular, ranging from hypidiomorphic to anhedral and from mesocratic to leucocratic to a lesser extent, presents plagioclase crystals in greater percentage, quartz, epidote, calcite, ferromagnesium and occasional sulfides, the rock presents textural variations with changes in the size, the form of presentation of the crystals and the amount of ferromagnesium; for a better understanding, a petrographic description of a thin section elaborated from a drill core extracted within the exploratory campaign is presented below (Illustration 2.2-8).

Illustration 2.2-8. Nucleus analyzed in thin section on the left polished sections on the right.

In this section, two rocks with different mineralogy and degrees of alteration were found; which are in contact by a quartz vein that contains opaque minerals with irregular shapes and calcite veins at the edges; calcite veins traverse the two rocks (Illustration 2.2 9, Illustration 2.2 10 and Illustration 2.2 11).

One of the rocks presents microlite or microporphyritic texture with cryptocrystalline grain size and calcite veins that cross it; It is a very altered rock with fluently oriented plagioclase, it is practically constituted by a clay matrix, which can be the product of the alteration of the plagioclase and the epidote; some calcite crystals are observed replacing epidote (pseudo-morphism); This rock can be classified as diorite.

The epidote presents grain sizes between (0.5-1.3 mm) and the clinozoisite between (0.3-1.7 mm); exhibit subidioblastic to xenoblastic texture and porphyroblastic texture; the opaque shows subhedral to anhedral forms with grain sizes between (0.2-0.5 mm).

The other rock present in the section contains minerals that are altering and calcite veins that also cross it; the mineralogy found in this rock corresponds to plagioclase, calcite, epidote, clinozoisite, quartz and opaque minerals; the quartz presents wavy extinction, and sub grains; the plagioclase is fragmented with inclusions of epidote, clinozoisite and some veins of calcite (skeletal texture); some plagioclase retain their tabular form with sizes between (1.3-1.7 mm).

The opaque ones present subhedral forms and some, tabular forms with inclusions of epidote (skeletal texture); in their majority, they are observed very granular; the epidote and the clinozoisite do not present very defined forms, but anhedral and fragmented forms (skeletal texture), the epidote is altering to clay.

Regarding the quantification of minerals, we have:

• Plagioclase 70%

• Quartz 15%

• Epidote 10%

• Calcite 2%

• Opaque 2%

• Clinozoisite 1%

This other rock could be classified as a Quartzite.

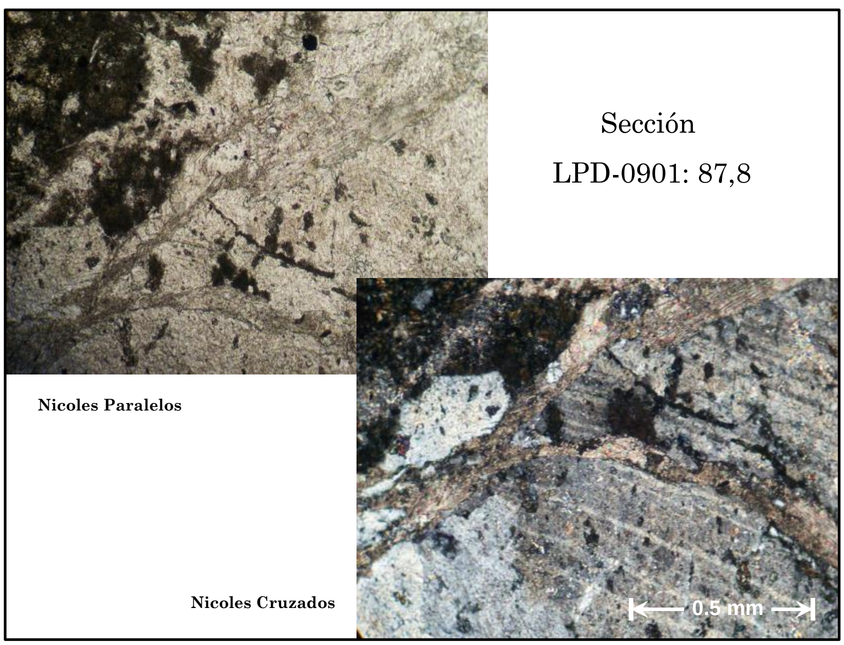


Illustration 2.2-9. Plagioclase crystals with epidote inclusions, plagioclase altering the epidote and clay and calcite veins.

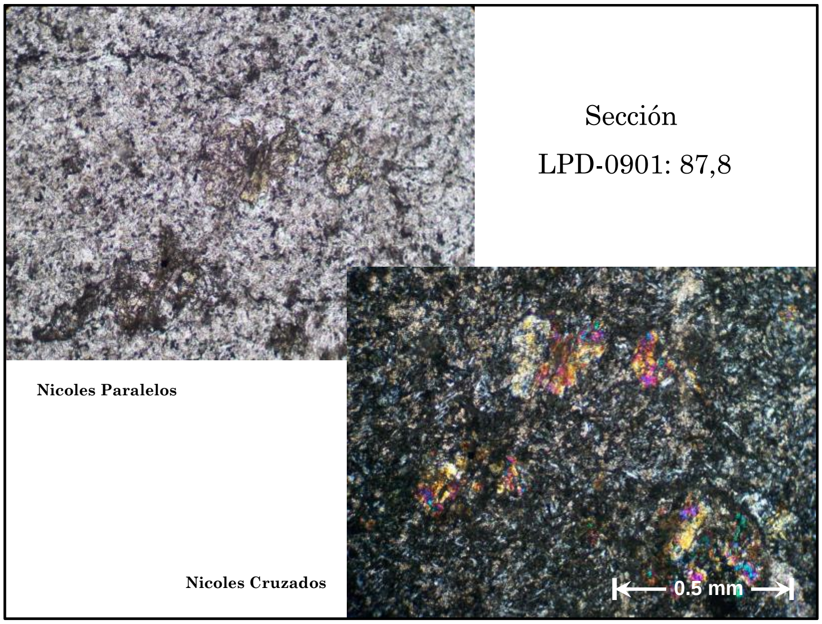


Illustration 2.2-10. Porphyroclasts of epidote in a fine granular matrix.

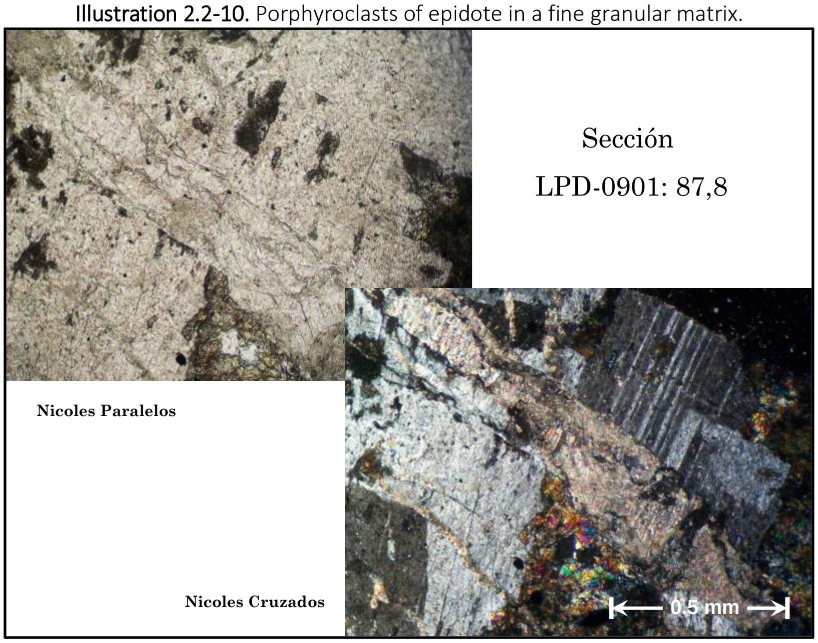


Illustration 2.2-11. Calcite vein, tabular plagioclase crystals with epidote inclusions and epidote porphyroblast.

Regarding the analysis of opaque minerals, we have (Illustration 2.2-12):

- **Sphalerite:** presents a medium to fine granular texture.
- **Pyrrhotite:** occurs in large fractured masses forming anhedral crystals.

- **Chalcopyrite:** it is forming anhedral crystals, with medium granular texture and in some parts, it is replacing the pyrrhotite by its fractures.
- **Bargain**

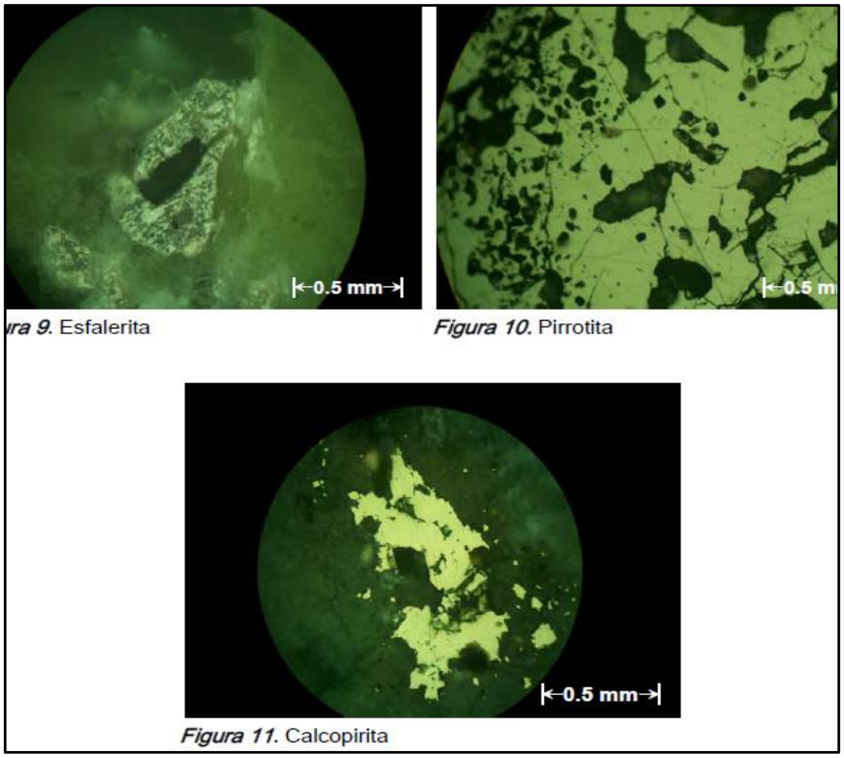


Illustration 2.2-12. Analysis of opaque minerals.

From the point of view of the mineralized structures, in general terms, structures with addresses NNE, NE and NNW are identified, in all cases the facing direction is at W, the angles of dip vary between 25 and 80 degrees; they are composed of sometimes milky quartz, thicknesses from 1 to maximum 3 meters, in sectors we can see arrangements in druse, the structures are also accompanied by sulfides, especially pyrite sometimes subordinated to marcasite, to a lesser extent chalcopyrite and subordinate galena, also euhedral arsenopyrite can be seen in isolated crystals, these present gold accompanying said associations; the characteristics of the veins are essentially hydrothermal mesothermal, although the thickness of the structures cannot be ruled out 100% that the deposit is orogenic gold type.

Finally, there are some small alluvial deposits formed by gravel, sand and silt. They are located in the alluvial terraces of the drainages, mainly the Ravine Pepas and El Sapo that are not of greater interest due to the type of deposit of interest in this case is not alluvial; we do not have a stratigraphic column of the alluvial deposit, we can observe on the surface numerous boulders of diorite, granodiorite and milky quartz mainly with variations from sub-angular to rounded, with a medium general sphericity and poor selection, giving the idea of a polymictic deposit.

2.2.3.3 LOCAL STRUCTURAL GEOLOGY

As evidenced by Regional Geology, the 5969 license is located in an area of active tectonic influence, in which the position and movement of both syngeneic and post-genetic structures play a very important role; given the proximity of the Otú-Pericos and Nus Faults, which are located within the Palestinian fault system and which limit the Diorite of Segovia to the east and west.

The interpretations from the structural point of view associated with the Segovia Remedios Mining District (DMSR) that are related to the development and characteristics of the mineralized zones and their behavior become valid; This being said, there is a series of features in the sector that certify the influence of the surrounding larger structures, especially in regard to the direction of the efforts and movement of the structures of lower order.

The predominant fractions in the sector have N/S, NNE/SSW and NNW/SSE addresses; generalizing, the dips in most of the cases appear towards the W, the angles of dip are variable, and they are presented from 30 to 80 degrees depending on the proximity with some local structure.

In general, based on the observations of underground exploratory galleries and on the data taken in the process of logging of drilling cores, in license 5969 the efforts are dextral and are associated with a zone of dilatational stress.

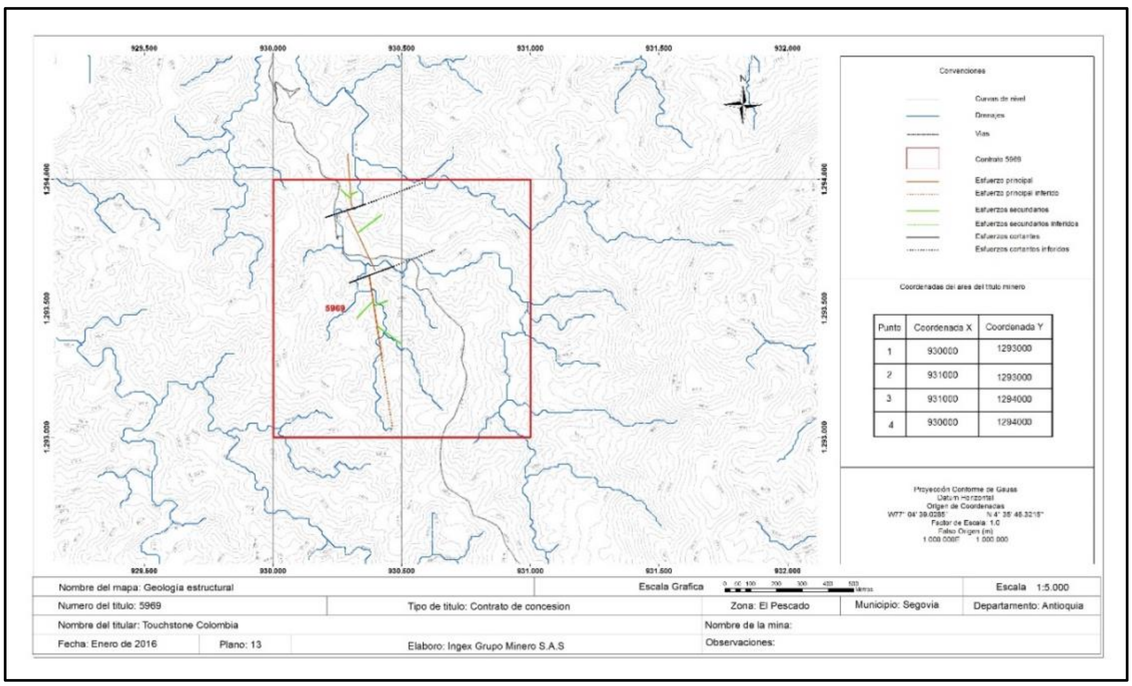


Illustration 2.2-13. Local structural geology Mining Concession 5969.

2.2.3.4 PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE MINERALS TO BE EXPLOITED

During the exploratory campaigns in the concession contract, systematic samplings of soils, rocks, sediments and 2 samples for metallurgical analysis were carried out. Below, some of the results obtained in the different samplings are presented.

AcmeMet

GRAVITY CONCENTRATION REPORT

GeoMinEx Consultants Inc.

Project No: 12018
Test No: G1
Sample: Bulk Composite #1

Date Completed: 12-Sep-12
Operator: MT

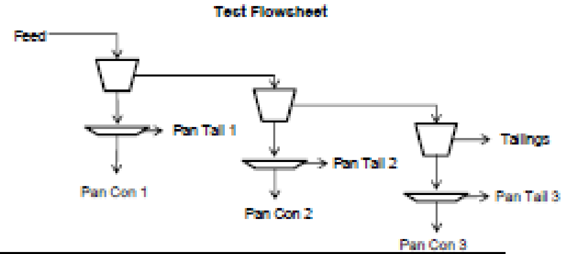
Objective: To determine the material's amenability to centrifugal gravity concentration at P80=194um

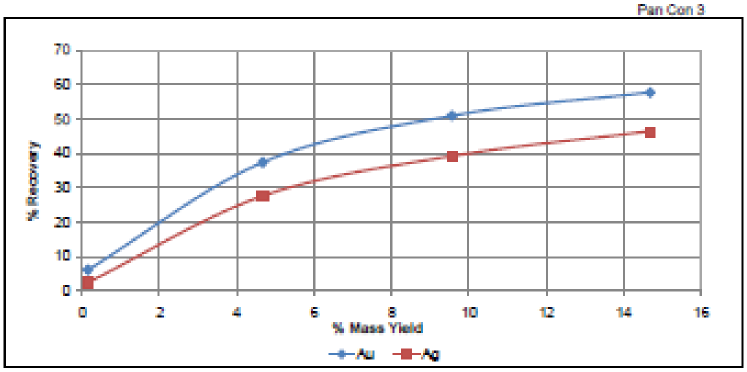
Products	Weight		Assay		Recovery	
	g	%	Au g/t	Ag g/t	Au %	Ag %
Pan Con 1	3.0	0.15	235.1	92.0	6.1	2.5
Pan Tail 1	88.3	4.52	40.0	31.0	31.3	25.1
Gravity Concentrate #1	**91.3**	**4.67**	**48.3**	**33.0**	**37.4**	**27.6**
Pan Con 2	3.1	0.16	51.6	21.0	1.4	0.6
Pan Tail 2	92.6	4.74	14.8	13.0	12.1	11.0
Gravity Concentrate #2	**95.8**	**4.90**	**16.0**	**13.3**	**13.6**	**11.7**
Total Gravity Concentrate 1-2	**187.0**	**9.57**	**30.8**	**22.9**	**51.0**	**39.3**
Pan Con 3	3.1	0.16	19.6	3.0	0.5	0.1
Pan Tail 3	96.9	4.96	7.3	8.0	6.2	7.1
Gravity Concentrate #3	**100.1**	**5.12**	**7.7**	**7.8**	**6.8**	**7.2**
Total Gravity Concentrate 1-3	**287.1**	**14.69**	**22.7**	**17.8**	**57.8**	**46.5**
Gravity Tailings	1667.0	85.31	2.9	3.5	42.2	53.5
Calculated Head	**1954.1**	**100.00**	**6.8**	**6.8**	**100.0**	**100.0**
Assayed Head			5.8	5.5		

Test Conditions

Solids: 25 %
P80: 194 microns
Frequency: 55.3 Hz
Force: 150 G
Pressure: 1 Psi

Test Flowsheet





2.2.3.4.1 Analysis of particle size

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PARTICLE SIZE ANALYSIS

GeoMinEx Consultants Inc.

Project No: 12018
Test No: G1
Sample ID: Head Sample

Date Completed: 27-Aug-12
Operator: MT

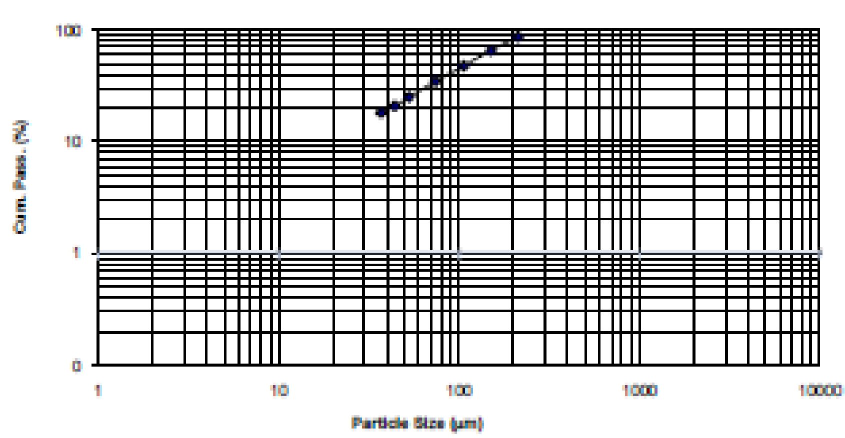
Grinding Conditions

Mill No.: 88-01
Grinding Media: 20 stainless steel rods

Grinding Time: 8 min
Sample Weight: 2 kg
Pulp Density: 65% w/w

Sieve Size		Weight		Cummulative (%)	
U.S. Mesh	Microns	(g)	(%)	Retained	Passing
70	212	8.42	14.0	14.0	86.0
100	150	12.62	21.0	35.0	65.0
140	106	10.73	17.8	52.8	47.2
200	74	7.74	12.9	65.7	34.3
270	53	5.67	9.4	75.1	24.9
325	44	2.49	4.1	79.2	20.8
400	37	1.66	2.8	82.0	18.0
Undersize	-37	10.85	18.0	100.0	
	TOTAL:	60.18	100.0		

80 % Passing = 194 µm
50 % Passing = 113 µm



2.2.3.4.2 Cyanidation test

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CYANIDE LEACH REPORT

GeoMinEx Consultants Inc.

Project No.: 12018
Test No.: C1
Sample: Bulk Sample #1

Date Completed: 2-Oct-12
Operator: AC

Objective: To determine amenability of sample to cyanide leaching at P80=190 microns

TEST CONDITIONS

Solids:	2,049 g
Solution:	3,000 g
Solids:	41 %
Size - P_{80}:	190 µm
Initial NaCN:	1.0 g/L
Target pH:	10.5
Test Duration:	48 hours

TEST DESCRIPTION

- sample was ground to P80=190 microns
- repulped to 40% solids
- adjusted to and maintained pH 10.5 and 1.0 g/L NaCN
- sampled at 4, 8, 12, 24, and 48 hours
- test ended after 48 hours
- filtered and displacement washed with hot cyanide solution followed by two hot water displacement washes
- all samples assayed for Au content

HEAD GRADE

	Au	Ag
Calculated Total:	6.42 g/t	N/A g/t
Measured Total:	5.80 g/t	5.5 g/t

LEACH TEST DATA

Time	NaCN		Lime	pH		dO_2	Slurry Weight	Solution			
								Vol.	Assay Vol.	Au	
(hours)	(g/L)	(g)	(g)	before	after	(mg/L)	(g)	(mL)	(mL)	(mg/L)	(mg)
0	1.00	3.01	2.69	6.5	10.7		5,000	2,951			
4	1.00			11.0	11.0	8.2	5,010	2,961	30	2.33	6.90
8	1.00			10.7	10.7	9.0	4,990	2,941	30	2.71	8.04
12	1.00			10.7	10.7	8.7	4,960	2,911	30	2.88	8.48
24	1.00			10.7	10.7	8.8	4,930	2,881	30	3.52	10.38
48	1.00			10.4		8.5	4,905	2,856		3.91	11.51
Total		3.01	8.22								

SOLIDS

Time	Total Residue		
	Weight	Au	
(hours)	(g)	(g/t)	(mg)
48	2,049	0.80	1.63

CYANIDATION RESULTS

Time	Distribution		Reagent Consumption	
	Au		NaCN	$Ca(OH)_2$
(hours)	(%)		(kg/t)	(kg/t)
4	52.5		0.02	
8	61.2		0.03	
12	64.5		0.05	
24	79.0		0.06	
48	87.6		0.08	4.01
Residue	12.4			
Total	100.0			

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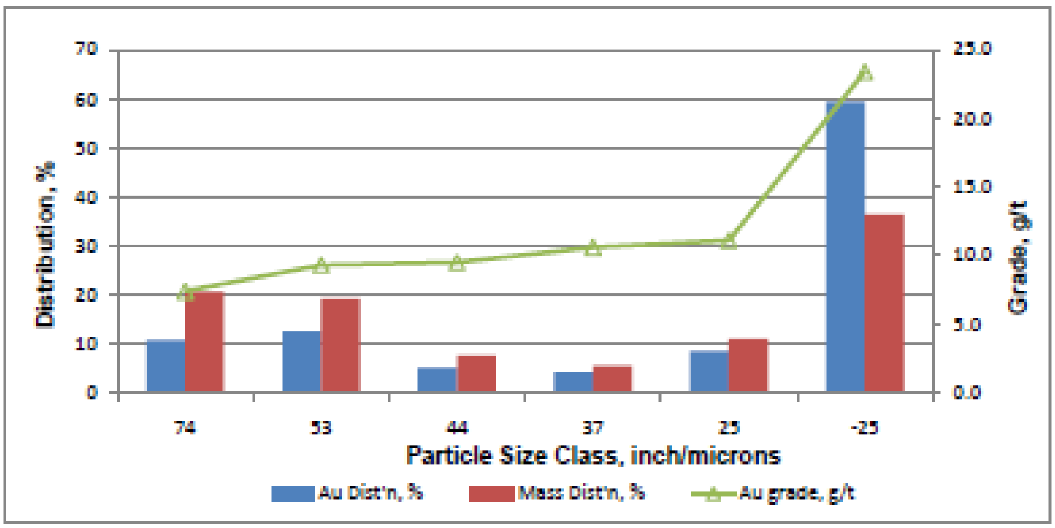
SIZE ASSAY REPORT

GeoMinEx Consultants Inc.

Project No: 12018
Test No: C8
Sample: CN Leach Residue

Date Completed: 26-Nov-12
Operator: MT

Sieve Size		Weight		Grade, g/t	Distribution, %
Tyler Mesh	um	g	%	Au	Au
200	74	62.6	20.61	7.40	10.65
270	53	58.1	19.12	9.30	12.43
325	44	23.0	7.57	9.50	5.02
400	37	16.8	5.53	10.60	4.10
500	25	32.9	10.83	11.10	8.40
Undersize	-25	110.4	36.34	23.40	59.41
CALCULATED TOTAL:		303.8	100.00	14.31	100.00



2.2.3.4.3 Flotation test

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FLOTATION TEST PROCEDURE

GeoMinEx Consultants Inc.

Project No: 12018
Test No: F1
Sample: Pepas #1

Date Completed: 8-Oct-12
Operator: Ashis Chand

Objective: To conduct scoping test to determine amenability to flotation @ P80=72um

STAGE	TIME (min)	pH	ADDITION Reagent	ADDITION (g/tonne)	COMMENTS
Grind (2.0kg)	25	5.9			
Rougher Flotation					
Condition 1		6.6			
	2		PAX	50	
			3418A	25	
Rougher Float 1	3	6.8	MIBC	72	Until barren
Condition 2		7.0			
	2		PAX	50	
			3418A	25	
Rougher Float 2	2	7.1	MIBC	36	Until barren
Rougher Scavenger Flotation					
Condition	3	5.6	$CuSO_4$	200	
	2	5.7	PAX	25	
			3418A	10	
Scavenger Float	4	6.0	MIBC	18	Until barren

Reagent Addition:

STAGE	H_2SO_4 g/tonne	PAX g/tonne	3418A g/tonne	$CuSO_4$ g/tonne	MIBC g/tonne		
Grind	0	0	0	0	0		
Rougher	0	125	50	0	108		
Scavenger	0	25	10	200	18		
Total	0	125	50	200	126		

Test Conditions:

STAGE	Cell L	RPM	Air m^3/hour	P80 um
Rougher	5.0	1800	0.4	72

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FLOTATION TEST REPORT

GeoMinEx Consultants Inc.

Project No: 12018
Test No: F1
Sample: Pepas #1

Date Completed: 24-Oct-12
Operator: AC

Objective: To conduct scoping test to determine amenability to flotation @ P80=72um

Products	Weight		Assay			Recovery		
	g	%	Au g/t	Ag g/t	S %	Au %	Ag %	S %
Rougher Con 1	85.8	4.3	128.5	103	2.55	77.3	61.7	81.2
Rougher Con 2	60.3	3.0	14.3	19	0.16	6.0	8.0	3.6
Total Rougher Con	**146.1**	**7.3**	**81.4**	**68**	**1.56**	**83.4**	**69.7**	**84.8**
Scavenger Con	80.2	4.0	8.0	10	0.07	4.5	5.6	2.1
Total Rough+Scav Con	**226.3**	**11.4**	**55.4**	**48**	**1.03**	**87.9**	**75.3**	**86.9**
Tailings	1767.2	88.6	1.0	2	0.02	12.1	24.7	13.1
Calculated Head	**1993.5**	**100.0**	7.2	7	0.14	100.0	100.0	100.0
Assayed Head			5.8	6	0.11			

2.2.3.4.4 Bond index

AcmeMet

BOND MILL GRINDABILITY TEST REPORT

GeoMinEx Consultants Inc.

Project No: 12018
Test No: BWI1
Sample: Pepas #1

Date Completed: 22-Oct-12
Operator: Mark

TEST CONDITIONS

Cycle	Oversize Wt. (grams)	Product Wt. (grams)	Feed Undersize (grams)	Net Product (grams)	Product per Rev. (grams/rev.)	Required Rev. (rev.)
1	1189.3	122.90	-	-	-	0
2	1217.6	94.60	11.96	82.64	0.83	100
3	936.9	375.30	9.20	366.10	0.83	443
4	858.2	454.00	36.51	417.49	1.02	409
5	935.3	376.90	44.16	332.74	1.03	324
6	927.1	385.10	36.66	348.44	1.06	329
7	942.2	370.00	37.46	332.54	1.04	319
8	938.8	373.40	35.99	337.41	1.04	325

SIZE ANALYSIS

Sieve Size		% Passing	
US mesh	µm	Feed	Product
8	2,380	83.5	100.0
12	1,680	68.8	100.0
16	1,190	55.5	100.0
20	841	45.7	100.0
30	595	36.9	100.0
40	420	30.7	100.0
50	297	24.8	100.0
70	210	19.8	100.0
100	149	15.7	100.0
150	105	12.4	100.0
200	74	9.7	100.0
270	53	7.5	67.3
325	44	6.6	53.0
400	37	5.9	42.5

TEST RESULTS

Material Charge Wt.-700 mL(g) = 1,312.20
Test Screen P_1 (µm) = 74
Undersize in Feed (%)= 9.73
Circulating Load (%) = 251.4
IPP (g) = 374.91
Gpr (ave.) = 1.04
Product P_{80} (µm) = 61
Feed F_{80} (µm) = 2,204
BWi (kWh/ton) = 16.1
BWi (kWh/tonne) = 16.8

$$BW_i = \frac{44.5}{P_1^{0.23} \times Gpr^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

2.2.3.4.5 Geochemical Analysis

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **Acme Metallurgical Limited**
868 East Hastings Street
Vancouver BC V6A 1R8 Canada

Project: 12018
Report Date: August 31, 2012

Page: 2 of 2 Part: 1 of 3

CERTIFICATE OF ANALYSIS AML12000197.1

Method		G6	7AR	2A Leco	2A Leco	2A-C	2A-C	2A11	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E
Analyte		Au	Ag	TOT/S	TOT/C	C/GRA	C/ORG	CO2	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th
Unit		ppm	gm/t	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
MDL		0.005	2	0.02	0.02	0.02	0.02	0.02	2	2	5	2	0.5	2	2	5	0.01	5	20	4	2
H1	Rock Pulp	5.355	6	0.11	0.03	<0.02	0.03	<0.02	12	74	10	7	6.3	389	15	492	0.98	<5	<20	5	<2
H2	Rock Pulp	6.260	5	0.10	0.03	<0.02	0.02	<0.02	11	68	<5	8	5.7	384	15	514	0.98	<5	<20	<4	<2

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Vancouver BC V6A 1R8 Canada

Project: 12018
Report Date: August 31, 2012

Page: 2 of 2 Part: 2 of 3

CERTIFICATE OF ANALYSIS AML12000197.1

Method		1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E	1E
Analyte		Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb
Unit		ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm
MDL		2	0.4	5	5	2	0.01	0.002	2	2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2
H1	Rock Pulp	2	<0.4	<5	<5	19	<0.01	0.007	4	475	0.09	147	0.01	0.54	<0.01	0.19	<4	<2	3	<2	<2
H2	Rock Pulp	2	<0.4	<5	<5	19	<0.01	0.006	4	530	0.09	154	0.01	0.52	<0.01	0.18	4	<2	<2	<2	<2

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Project: 12018
Report Date: August 31, 2012

Page: 2 of 2 Part: 3 of 3

CERTIFICATE OF ANALYSIS AML12000197.1

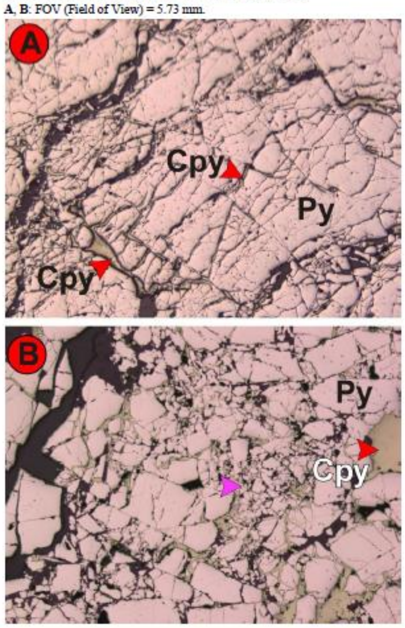
Method		1E	1E	1E
Analyte		Be	Sc	S
Unit		ppm	ppm	%
MDL		1	1	0.1
H1	Rock Pulp	<1	1	<0.1
H2	Rock Pulp	<1	1	0.1

2.2.3.4.6 Mineralogic study

- The precious metal-bearing mineralogy in sample at 71.1 m in DDH - LPD1279 is native gold, petzite (Ag_3AuTe_2), calaverite ($AuTe_2$), very minor hessite (Ag_2Te).
- These precious metal-bearing minerals are associated with pyrite, chalcopyrite and rare altaite (PbTe).
- This precious metal-bearing mineralogy in the former sample is comparable to the mineralogy in a sample at 17.8m in DDH - LPD 1028 which was documented in an unpublished report to Touchstone Gold, dated April 30, 2011.
- It is estimated that the native gold:telluride distribution is 98:2
- This sample and the sample from LPD 1028 contain a very simple mineralogy:
    - very low base metal-bearing minerals with chalcopyrite being the most abundant followed by trace amounts of altaite (PbTe).
    - no sulfosalt minerals
    - pyrite does not contain any detectible trace elements, i.e. arsenic, based on preliminary scanning electron microscope (SEM) investigations.
- Native gold:
    - occurs intergranular to pyrite-silicate, to pyrite-pyrite, as inclusions in pyrite and associated with chalcopyrite in remobilized chalcopyrite-rich veins.
    - pyrite-pyrite and pyrite-silicate textural associations are the most common and the abundance of gold having this textural location will facilitate easy of liberation during milling and cyanide leaching.
    - size is variable from large irregular composite grains as large as 125 microns between pyrite to encapsulated grains in pyrite that range from 50 to <1 micron.
    - present with chalcopyrite in chalcopyrite-filled veins will be easily liberated during milling.
    - has a fineness that ranges from 939 to 948 with the average 942, n=6 based on semi-quantitative SEM analyses.
    - has the same composition regardless of the textural association.
- Tellurides:
    - occur as inclusions in pyrite, in chalcopyrite-rich veins and intergranular to pyrite with the first textural association the most common.
    - are very fine-grained ranging from ~20 to <1 micron; one grain as large as ~150 microns was identified. The encapsulation of very fine-grained tellurides in pyrite will require determining the optimum milling and cyanidization processes to maximize gold-silver recovery from this component of the 1141 mineralization.
- Structural significance
    - DDH LPD 1279 intersected a wide section in the 1141 lode. The sample at 71.1 is positioned within an interval of that intersection that exhibits a well developed fabric at an acute angle to the core axis.

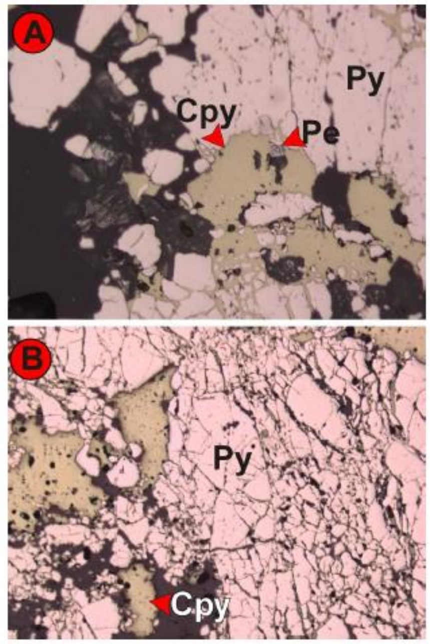
Part I. Ore Microscopy

Plate 1. Photomicrographs, **A**, **B**: reflected light, show the fractured and brecciated (magenta arrow) pyrite (Py) with chalcopyrite (Cpy) having filled fractures. This deformation is superimposed on the initial pyrite-rich mineralized episode.
A, **B**: FOV (Field of View) = 5.73 mm.



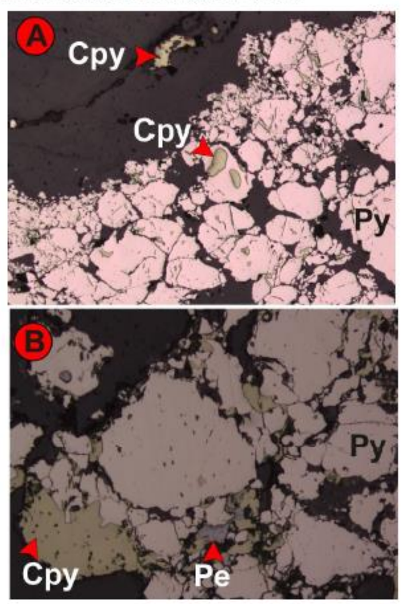
GeoMinEx Consultants Inc. Page 5

Plate 2. Photomicrographs, **A**, **B**: reflected light, show irregular shaped domains and fracture-filling by chalcopyrite (Cpy) with petzite (Ag_3AuTe_2) in initial stage pyrite-rich mineralization. **A**: FOV = 0.36 mm; **B**: FOV = 2.87 mm.



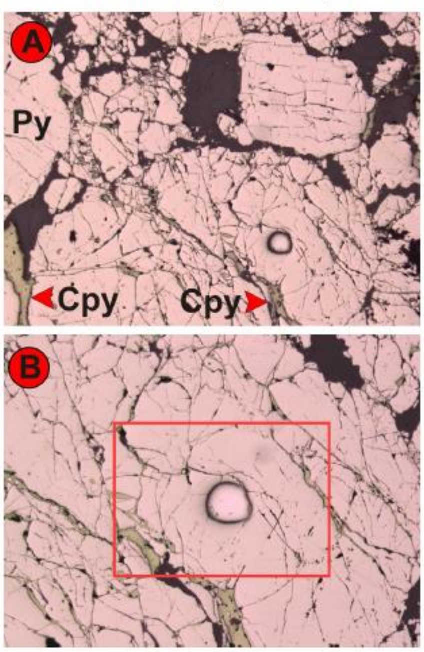
GeoMinEx Consultants Inc. Page 6

Plate 3. Photomicrographs, **A**, **B**: reflected light, show fragmented pyrite (Py) with irregular jagged contacts with silicates. Chalcopyrite (Cpy) has two textural associations: 1) as inclusions in pyrite inferred to be coeval with pyrite crystallization and 2) filling fractures and volumes interstitial to fragmented pyrite. Trace petzite with this second stage of chalcopyrite-mineralization. **A**: FOV = 5.73 mm; **B**: FOV = 0.36 mm.



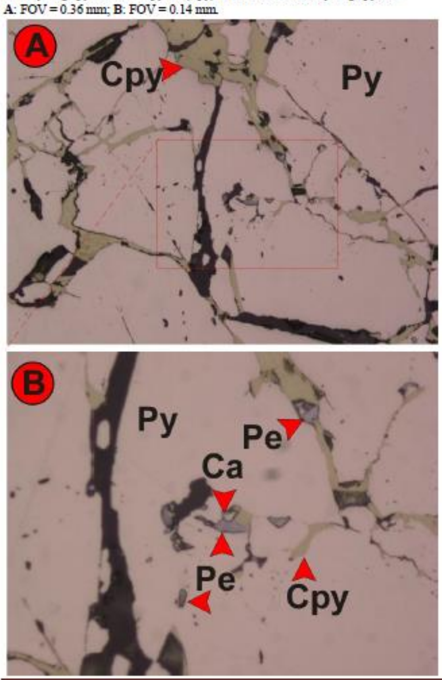
GeoMinEx Consultants Inc. Page 7

Plate 4. Photomicrographs, **A**, **B**: reflected light, show fractured pyrite (Py) with fractured filled by chalcopyrite (Cpy). An equant poly-mineralic inclusion is hosted in the early stage pyrite-rich mineralization. See Plate 18 – SEM data. **A**: FOV = 2.87 mm; **B**: FOV = 1.42 mm.



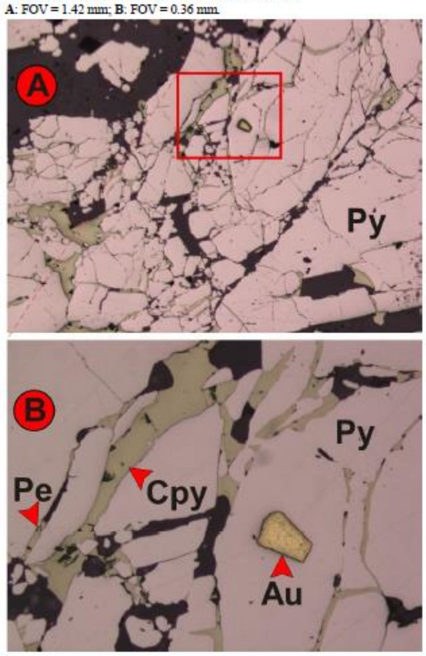
GeoMinEx Consultants Inc. Page 8

Plate 5. Photomicrographs, **A**, **B**: reflected light, show very fine-grained petzite (Pe) inclusions in early stage pyrite. Chalcopyrite (Cpy) fills fractures in early stage pyrite.
A: FOV = 0.36 mm; **B**: FOV = 0.14 mm.



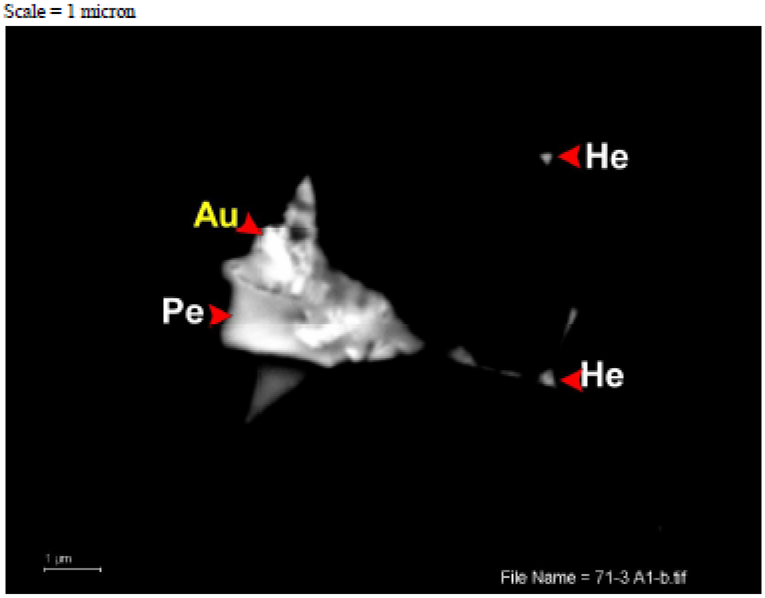
GeoMinEx Consultants Inc. Page 10

Plate 6. Photomicrographs, **A**, **B**: reflected light, show native gold (Au) encapsulated in early stage pyrite (Py) and that pyrite is fractured with chalcopyrite (Cpy) with trace petzite (Pe) filling fractures in early stage pyrite. See Plate 21 – SEM data.
A: FOV = 1.42 mm; **B**: FOV = 0.36 mm.



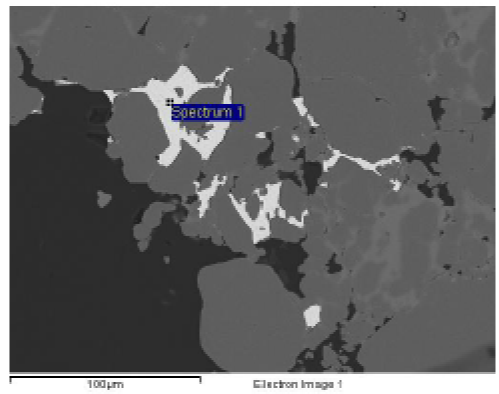
GeoMinEx Consultants Inc. Page 12

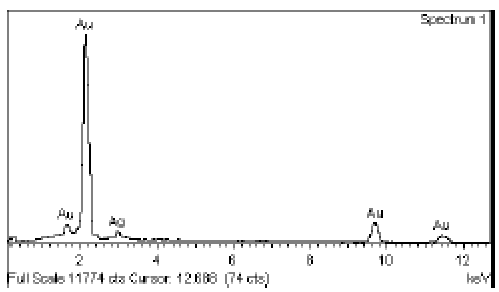
Plate 15. Backscattered electron image of an irregular shaped grain partially enclosed in silicate and pyrite. The grain is composite and is comprised of native gold (Au) and petzite (Pe, Ag_3AuTe).
Scale = 1 micron



Semi-quantitative analysis and energy dispersive spectral image of native gold shown in Plate x.

Element	Weight%	Atomic%
Ag L	5.84	10.11
Au M	94.79	89.89
Totals	100.63	





Comment: The gold is termed native gold with high fineness: 948

2.2.3.4.6.1 Excavation of trenches and mine shaft

In the Mining Concession 5969, trenches were made towards the eastern part of the area; these trenches were developed to verify the continuity in depth of vein-type mineralized structures that can be seen on the surface and facilitate the exposure of fresh rock and to deepen exploration based on the result of previous soil sampling that showed anomalies in this sector; the trenches had a depth of between 1 and 3 meters and lengths of up to 20 meters, in the W-E direction.

Illustration 2.2-14. T39 trench east of Mining Concession 5969.

It should be noted that of the 4 trenches made in the area, 2 of them were developed only in weathered material so none were sampled.

In general, the findings comprised white quartz blocks with mild to moderate presence of iron and manganese oxides; the blocks are fractured with orange colorations in the fractures coming from the saprolite; the little visible mineralization is essentially composed of pyrite, which is mostly oxidized; the results of the sampling corroborate the results of the previous soil anomaly.

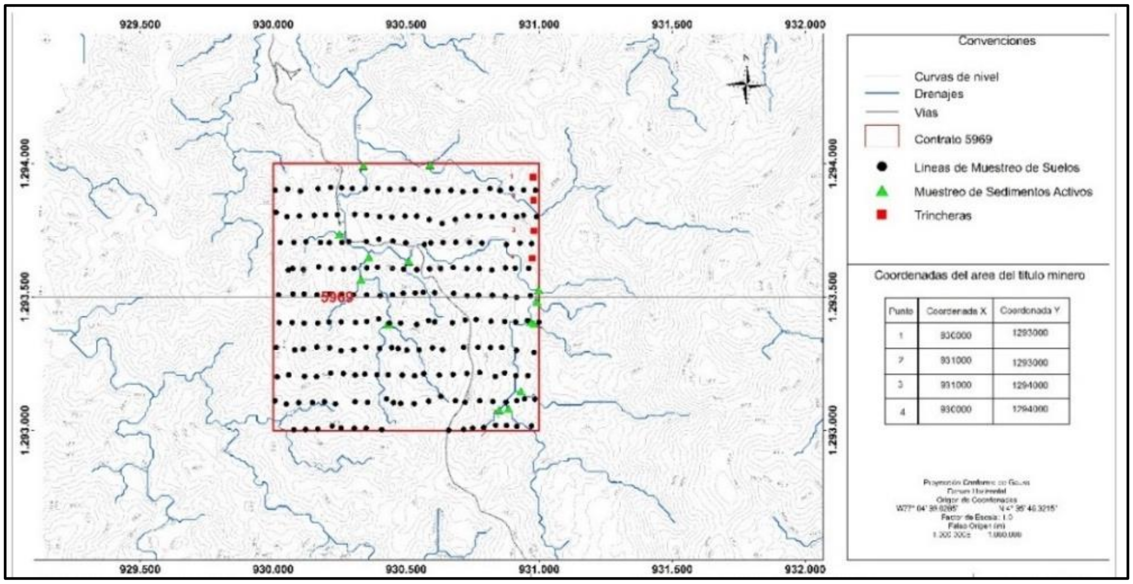


Illustration 2.2-15. Sampling of soils, sampling of sediments, trenches.

2.2.3.4.7 Geophysics

In the Mining Concession 5969, geophysical studies of Induced Polarization and Resistivity were carried out, with the purpose of establishing anomalous values in the subsoil from the surface.

Electrical resistivity measurements of the subsoil are common in geophysical surveys (Illustration 2.2-16); its purpose is to detect and locate geological bodies and structures based on their resistive contrast; The method consists in the injection of direct current into the ground by means of a pair of electrodes and the determination, by means of another pair of electrodes, of the potential difference; The magnitude of this measurement depends, among other variables, on the distribution of resistivity of the subsurface structures, the distances between the electrodes and the injected current.

The induced polarization, is an electromagnetic method that uses electrodes with voltages and currents variable in time to map the variation of the electrical permissiveness (dielectric constant) in the subsoil, with low frequencies.

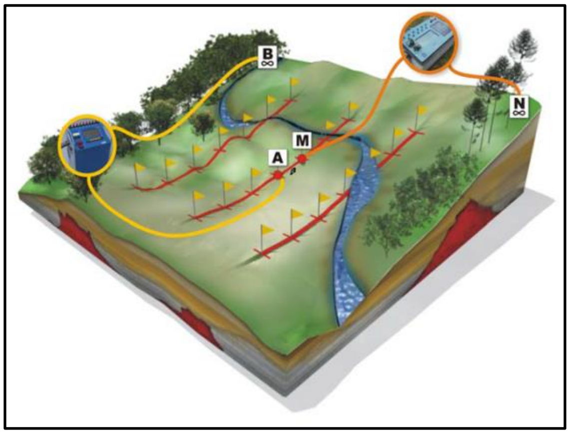


Illustration 2.2-16. Geophysical measurement diagram with pole-to-pole arrangement (left); Field work for electrode placement (der).
Source: Touchstone Colombia, 2013

The induced polarization is observed when a stationary current that crosses two electrodes of the subsoil is interrupted, the voltage does not return to zero instantaneously but decays slowly, which indicates that the load has been stored in the rocks; this charge, which accumulates mainly at the interfaces present between the clay minerals, is responsible for the IP effect; this effect can be measured in the time domain, by observing the decay rate of the voltage, or else in the frequency domain by measuring the phase shifts between the sinusoidal currents and the voltages, it is often used in the exploration of minerals and sometimes allows distinguishing different types of mineralization, the IP method can probe to underground depths of thousands of meters, (Glossary oilfield of Schlumberger).

The increase in the spacing of the electrodes modifies the depth of the measurements; the measurement lines have been spaced every 50 meters in the W-E direction, seeking to obtain measurements perpendicular to the mineralized structures

The map of geophysics is shown below (Illustration 2.2-17):

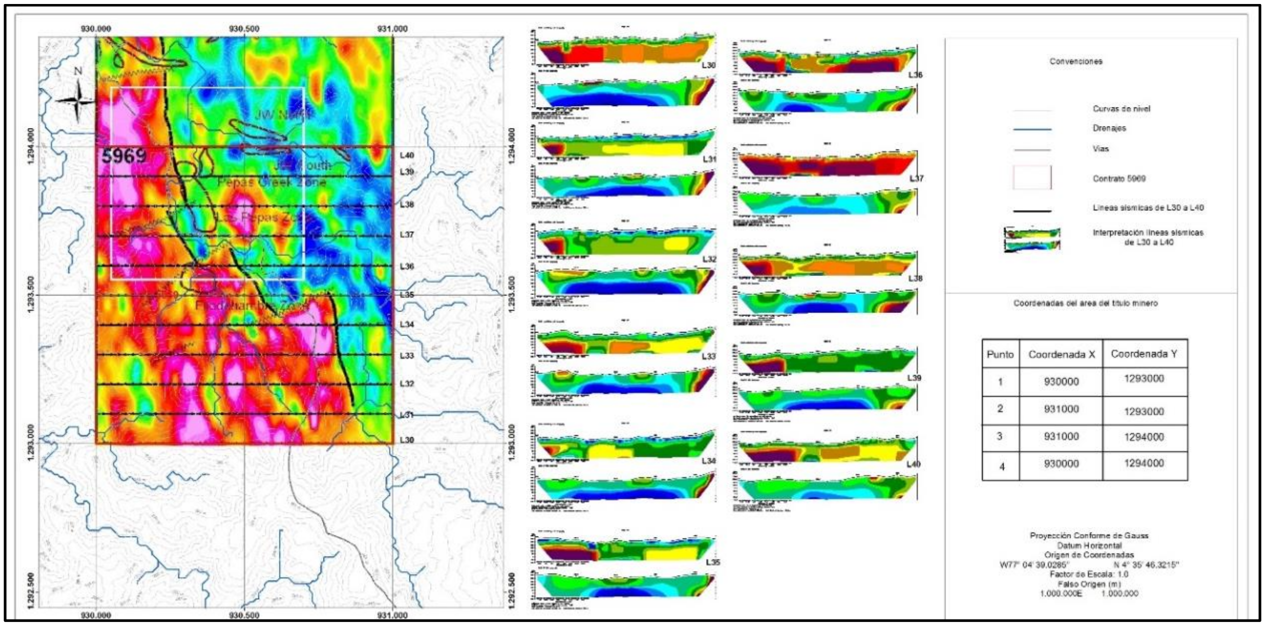


Illustration 2.2-17. Geophysics.

2.2.3.4.7.1 Galleries and exploratory wells

The development of tunnels for underground exploitation has been carried out by inhabitants of the sector in an artisanal way that does not infer significantly in the development of a sustainable, economically viable and sustainable mining project. A total of 2 pitheads or mine entrances were identified within the license, which present maximum developments of up to 50 meters in guidance; It should be noted that currently these works are abandoned

Deep drilling

The drilling program allowed to have a clear knowledge of the lithological units in the subsoil at different depths; These perforations were programmed based on the previous exploration that delimits the areas of interest and spatially locates the structures, the object of the drilling campaigns is to cut the mineralized bodies in deepening, which clearly delimits the body of interest and is possible delimit it and even measure it.

The drilling program in license 5969 was carried out in 2005, by means of drilling companies contracted for this purpose. In total, 1,774 meters were drilled, and 26 wells were made. The perforation map is shown below (Illustration 2.2-19):

The drilling procedure begins with the planning of the perforations and their location in the terrain according to their predefined target; for the correct location of the drilling platform the service of the topography department is used, which, with the help of the total station, locates the drill in the exact position in which it must start its drilling; a geologist verifies the position of the drill, the angle and the azimuth of the drill to guarantee an efficient development of the work.

The recovery of the nuclei (Illustration 2.2-18) must be done with trained personnel; for such effect, such nuclei are measured, marked and located in metallic boxes to pass to the process of logging by a geologist; Before starting the log process in detail, a quick log-in should be made, where the most relevant observations of the well are recorded quickly.

Illustration 2.2-18. Drilling cores ready for the logging process.
Source: Touchstone Colombia, 2013

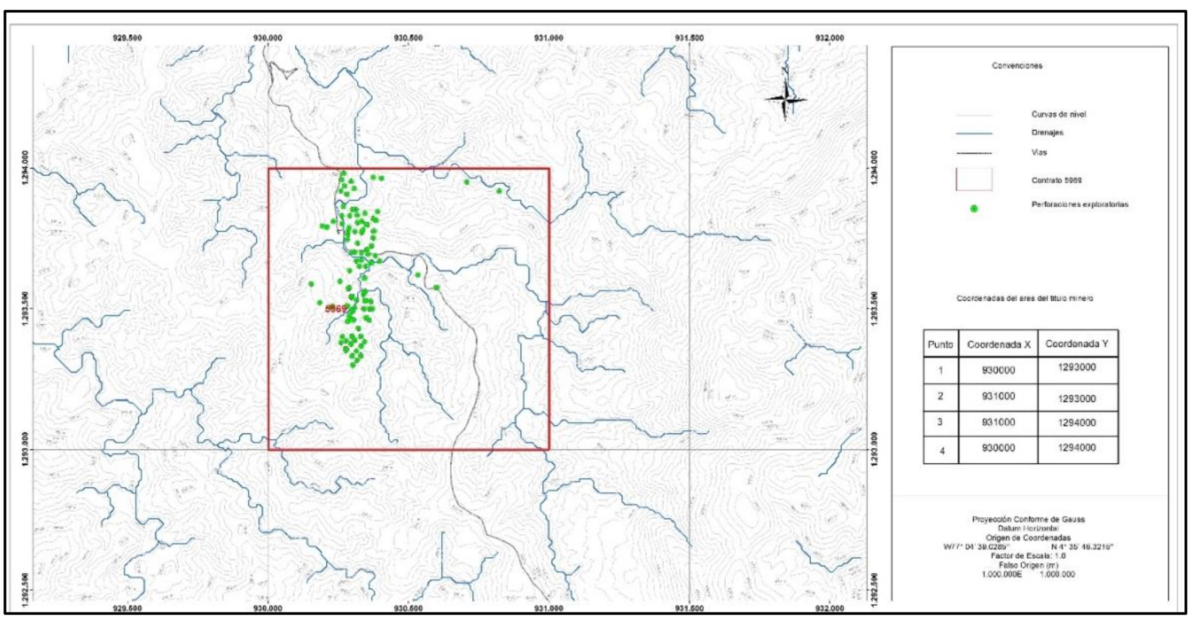


Illustration 2.2-19. Map of perforations

Subsequently, the nuclei are examined in the logging area by a professional in geology, which records their observations in a predefined logging format, which will later be converted to digital format to take advantage of the information in the preparation of the cartography, modeling and calculation of resources, as well as on the topic of rock quality.

According to the geologist's criteria, the areas of the well that will be sampled are established, with the use of a cutting machine that will divide the cores in the direction indicated by the geologist; Afterwards, the sample is packed according to the QA / QC procedures implemented for that purpose, half of the core must remain in the box to be preserved as a witness.

The samples are analyzed in certified laboratories and the results are analyzed and consigned in databases for their use.

2.2.1.1.1 Characteristics of rocks

Several samples were taken in the exploratory stage, both superficial and underground, each with a specific objective; Within the underground samples, samples are taken with special interest in the existing artisanal mining tunnels, these samples are taken as a vein channel perpendicular to the structures; This sampling allows obtaining first-hand geochemical information on the mineralization of the structures, the quality of the elements present and the mineralogical association through a multi-element analysis.

The samples of the veins analyzed in a reflected light microscope conclude that the mineralization consists of pyrite (with local subordination of marcasite), sphalerite and chalcopyrite in smaller quantities. Free gold is presented with ranges of 10 to 100 microns, with the presence of base metal sulphides and gold tellurides. The mineralogy of the gangue is 97 dense quartzes, massive and sub-crystalline, with ferrous carbonates, chlorite, sericite and kalinite; Several generations of quartz are observed, but not all associated with sulfides; sulfides occur in the form of allotriomorphic masses with quartz (Illustration 2.2-20 and Illustration 2.2-21).

Illustration 2.2-20. Extracted material, note Quartz with a high content of oxides and sulfides.
Source: Touchstone Colombia, 2013

Illustration 2.2-21. Well drilling core 1279.
Source: Touchstone Colombia, 2013.

The rock cores obtained in the drilling program were analyzed; the sampling of the areas of interest in the perforations is carried out, the result of these samples, their statistical treatment and their spatial location, are the parameters that contribute most at the moment of the modeling of the mineralized body.

2.2.3.4.9 Calculation of mining resources

The mineral deposit of the El Pescado project, has been exploited for years in an artisanal way by miners in the area. Due to the nature of artisanal production there are no official production records; however, it has been estimated that the total extracted material (mineralized zone of the vein) is approximately 12,157 tons of vein ore. These tons were extracted by artisanal miners in the area.

The recovery of precious metals has been reconstructed from conversations with artisanal miners and is around 25 g / t of gold and through laboratory tests it has been estimated that the tails are containing approximately 16 g / t of gold; therefore, it has been determined that the average head of the deposit is approximately 40 g / t of gold (Data reconstructed with sampling of tails and talks with people).

The Pepas and Filo de Hambre anomalies that make up the El Pescado project are housed within the intrusive phases of diorites and granodiorites, associated with, or part of, the Segovia batholith. The intrusive units are intermediate in the composition, ranging from coarse-grained granodiorites, to fine-grained granodiorites, cross-cut by basaltic finer-grained (diabase) dikes and sills.

Sulphur mineralization is associated with milky quartz, lenticular form (Veta) with possible influence on post-mineral structure, the dominant sulphides in the deposit are pyrite with a lower degree of chalcopyrite, sphalerite and galena.

In the El Pescado Project there are veins with characteristics of hydrothermal to mesothermal, which includes predominantly massive bands of milky quartz with variable amounts of sulfides (pyrite, sphalerite), which occur in segregation veinlets and fill fractures. They present gold about these associations. The quartz veins are generally 2 to 3 meters thick, and in many places, they show a strong fracturing, both in the embossing diorite rock and in the quartz veins. These veins have a NW direction with an inclination of 30 ° on average toward W, the inclination increases until reaching 70°; This area is conducive to work underground, and the low dip area is prone to work on the surface.

The samples of veins analyzed in a reflected light microscope conclude that the mineralization consists of pyrite (with local subordination of marcasite), sphalerite and chalcopyrite in smaller quantities. Free gold is presented with ranges of 10 to 100 microns, with the presence of rare sulfosalt base metals and gold tellurides. The mineralogy of the gangue is 97 dense, massive and sub-crystalline quartzes, with ferrous carbonates, chlorite, sericite and kalinite. Several generations of quartz are observed, but not all associated with sulfides (Illustration 2.2-22). The sulfides occur in the form of allotriomorphic masses with quartz.

Illustration 2.2-22. Hand sample 1 typical of the main area of the project.
Source: Touchstone Colombia, 2012.

In the hand sample 1 extracted from the Pepas anomaly, one can observe the crystalline aggregates of pyrite and in the hand sample (see Illustration 2.2-22) extracted from the same anomaly, observe the two generations of quartz, first phase, free of sulfides (orange) and white quartz with aggregates of pyrite, galena, sphalerite.

Illustration 2.2-23. Hand sample 2 of the main project area.
Source: Touchstone Colombia, 2012.

Based on field and laboratory data, it is concluded that the mineralization occurs in a mineralized fault zone, where the quartz veins appear in the form of "eyes" or elongated puddles in the direction of the fault zone (NW) form anastomosed and with an average dip of 30° W.

The lithological facies in this body do not vary fundamentally in their mineralogical composition and only the relative proportion of the essential phases modifies the petrographic classification. The hydrothermal alteration processes are related to the mineralization that characterize this body both in its southern part (Segovia - Remedios region) and in the north (southern of the Department of Bolívar).

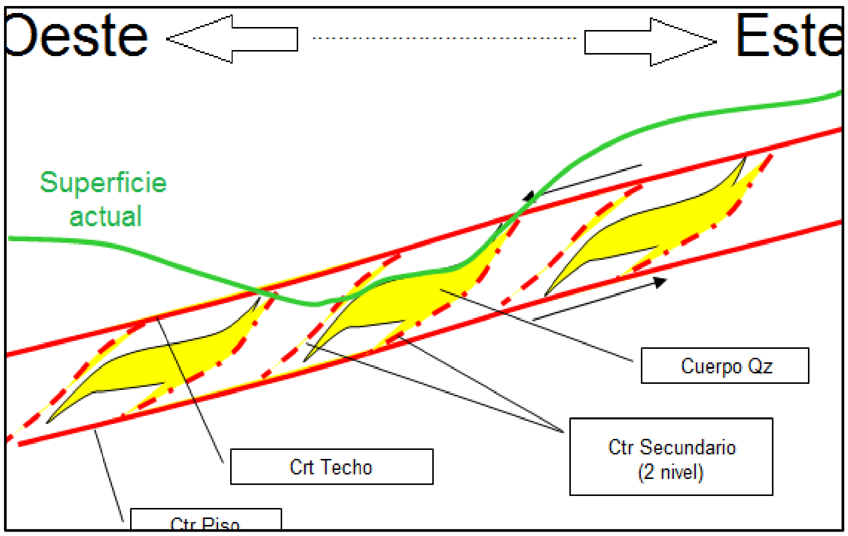


Illustration 2.2-24. Diagram of the possible structural control of the mineralization of the El Pescado project.
Source: Touchstone Colombia, 2012.

It is possible to differentiate three mineralizing episodes which are outlined in the following (Table 2-3).

Table 2-3. Minerals present in the different mineralizing episodes.

MINERALS	EPISODE 1	EPISODE 2	EPISODE 3
PYRITA	▬	▬	▬
ARSENOPYRITE	▬	▬	
SPHERGE	▬		
GALENA	▬	▬	▬
PIRRPTINA		▬	▬
CALCOPIRITA		▬	▬
ESTIBINA		▬	▬
GOLD	▬	▬	▬
SILVER	▬	▬	▬

2.2.3.4.9.1 Mineral resources

As a summary and as a result of the quantification of resources it is necessary to: the deposit has 394,000 tons of resources measured with an average grade of 4.71; 164,000 tons of indicated resources with an average grade of 4.33 and 291,600 tons with an average grade of 3.21. In total there is 849,000 tons with an average grade of 4.12 g / t.

Table 2-4. Summary of geological resources of the El Pescado project.

Zone	Category	Tons	Gold Tenor (g/t)
Pepas	Measured (M)	394.000	4,71
Pepas	Indicated(I)	164.200	4,33
	M&I	558.200	4,6
Pepas	Inferred (If)	291.600	3,21
	M&I&If	849.800	4,12

In the following illustration we can see the distribution of the Gold values (Au) for the two anomalies (Pepas and Filo de Hambre) (Illustration 2.2-25).

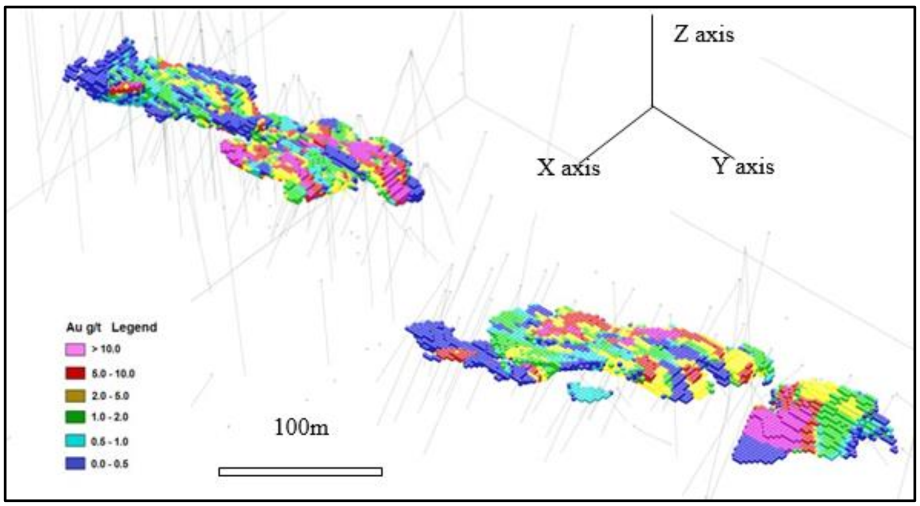


Illustration 2.2-25. Distribution of gold values in the different targets present in the license.

It is noteworthy that the project El Pescado has structures with a NW heading that dip approximately 70 ° to the SW with variable thicknesses between 2 - 3 meters. These structures then obey high-stress areas, where bodies with horizontal tendencies increase their inclination by the action of faults. These structures represent the continuity of the project in an underground operation. The inferred resources, resulting from the construction of the geological model and interpolation, yields 324,187 tons of ore with an average of 4.76 (Table 2-5).

Table 2-5. Inferred resources in Pepas.

Zone	Category	Tons	Gold Tenor (g/t)
Pepas	Measured (M)	-	-
Pepas	Indicated (I)	52.345	3,59

	M&I	52.345	-
Pepas	Inferred (If)	271.841	4,51
	M&I&If	324.187	4,12

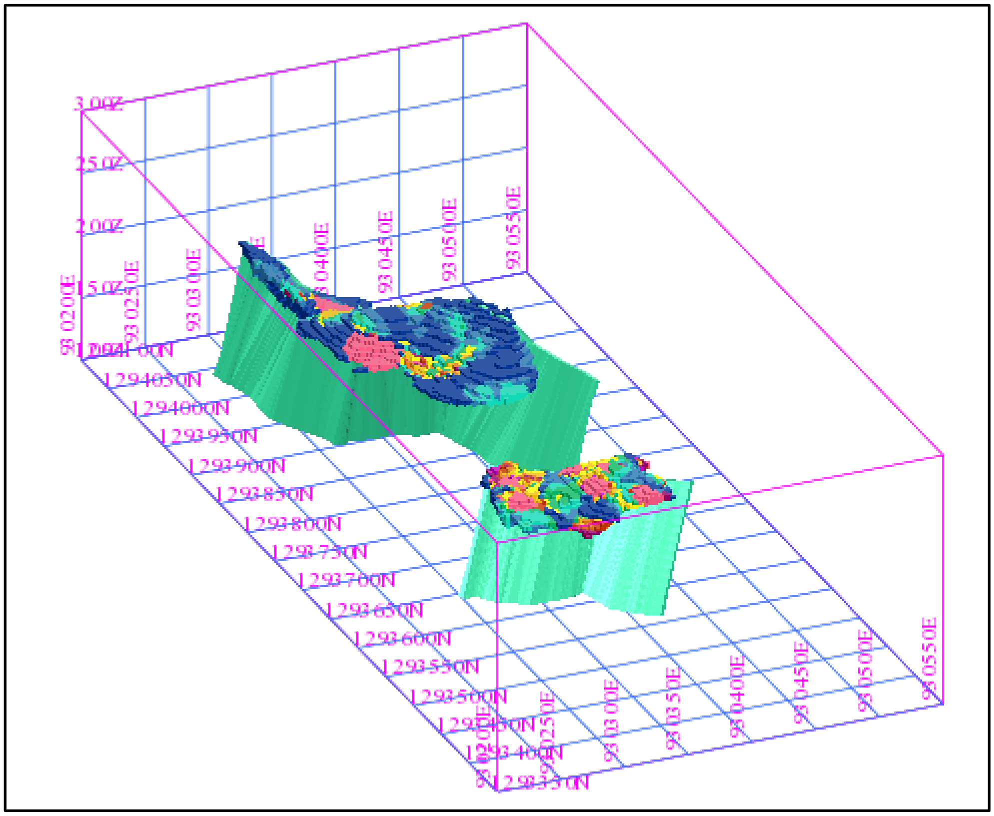


Illustration 2.2-26. Surface mining and underground mining body modeling.

2.2.3.4.9.2 Methodology applied for the calculation of resources

The quantification of resources was carried out using the Gemcom Surpac mining software, by means of the Ordinary Kriging geo-statistical point estimation method. Kriging uses a variogram model to obtain the weightings that will be given to each reference point used in the estimation. Kriging is selected as a methodology for resource quantification because it is the geostatistical method of interpolation accepted in the different stock exchanges m (Canada and Australia) for the quantification of geological resources.

For the quantification of resources, data collected by Touchstone Colombia was used in the exploration campaigns 2009,2010,2011,2012 and 2013, which can be summarized as follows:

- 118 active sediment samples
- 2239 samples of conventional soils
- 64.8 linear kilometers of Induced Polarization
- 61 linear kilometers of magnetometer
- 312 rock samples in tunnels
- 7 trenches
- 15,355.6 meters drilled

Touchstone Colombia, through its exploration campaigns with hunch perforations and core recovery, closed its drilling mesh at distances ranging from 5m to 25m in the anomalous areas of Pepas and Filo de Hambre. According to the JORR Code, this mesh density is suitable for resource quantification and offers high certainty in the geological, structural and geostatistical model interpreted.

2.2.3.4.9.2.1. Database

Laboratory data (SGS and ALS) is recorded in a master database. Once this database is verified, it is digitally linked to a Gemcom Surpac database, created specifically to handle project data.

The database consists of four tables:

1. Table header containing an "X","Y" and "Z coordinates" at the top end of the channel sample and the "length" of the sample
2. Table containing the Direction and Azimuth and Dip of the sample
3. Table containing "Sample number", "From", "To", "g Au/t", and "Ag g/t" input values.
4. Table with an "X","Y" and "Z coordinates" from the upper end of the sample carcass and the "length" of the sample and calculated values for the average of g Au/ty g Ag/t in the standard length composed of 1.0 m (if necessary).

2.2.3.4.9.2.2. Specific gravity

Ten core drilling core samples were sent to Euro Test Control AD laboratory, Sofia, Bulgaria for estimation of specific gravity using immersion methodologies. Average results 2.903g/cm3 (Illustration 2.2-27).

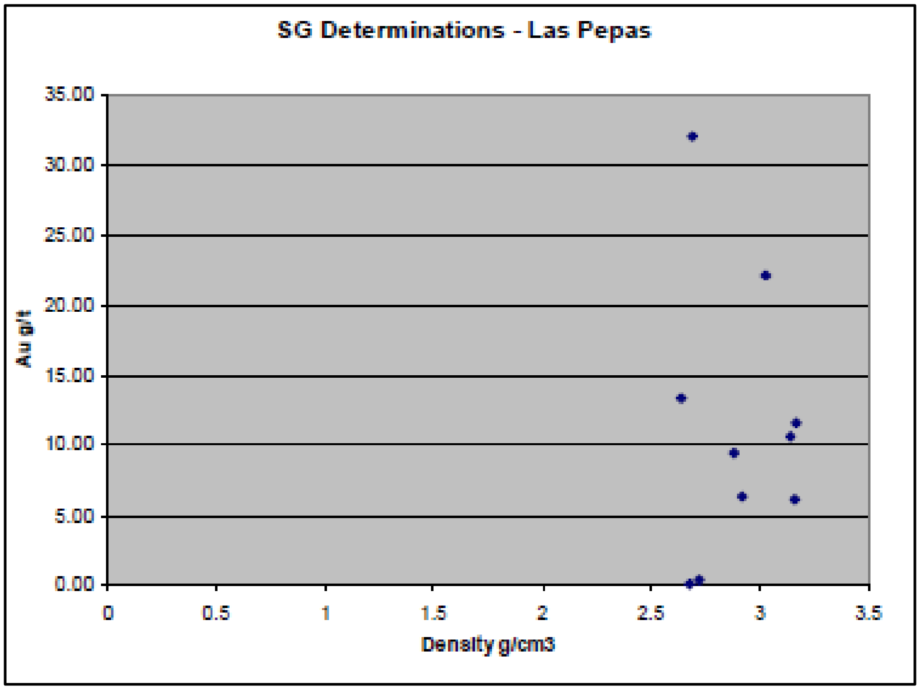


Illustration 2.2-27. Gold dispersion graph Grade VS Specific Gravity Assay.

2.2.3.4.9.2.3. Composite

The composite is the basis of the geostatistical analysis of any mineral deposit, each compound is made up of information such as: x, y, z coordinates, geochemical analysis, density, specific weight and any other relevant information for the calculation of resources. Composite information is extracted from drilling, surface sampling, underground sampling and others. The composite is the 3D database from which the different geostatistical runs (interpolation) are made, resulting in the quantification of mineral resources.

The construction of the El Pescado project was done with the use of Gemcom Surpac software, it was estimated that the maximum length of the compound was 1 m, the information from the exploration campaigns was extracted. This generated a data set of 17,538 composites with a maximum content of 155 g/t gold. The composites for their use were restricted to mineralized zones.

As a result of the compositing process, a 3D point file is generated with the attributes of: perforation ID, tenor, anomaly and data source.

Statistical analysis of the variogram indicates that 99% composite values are within the range of 0-10 g/t Au. This indicates that the upper Cut-off could be estimated at 15g/t.

The following is the Au value histogram of the base compound for mineral resource quantification.

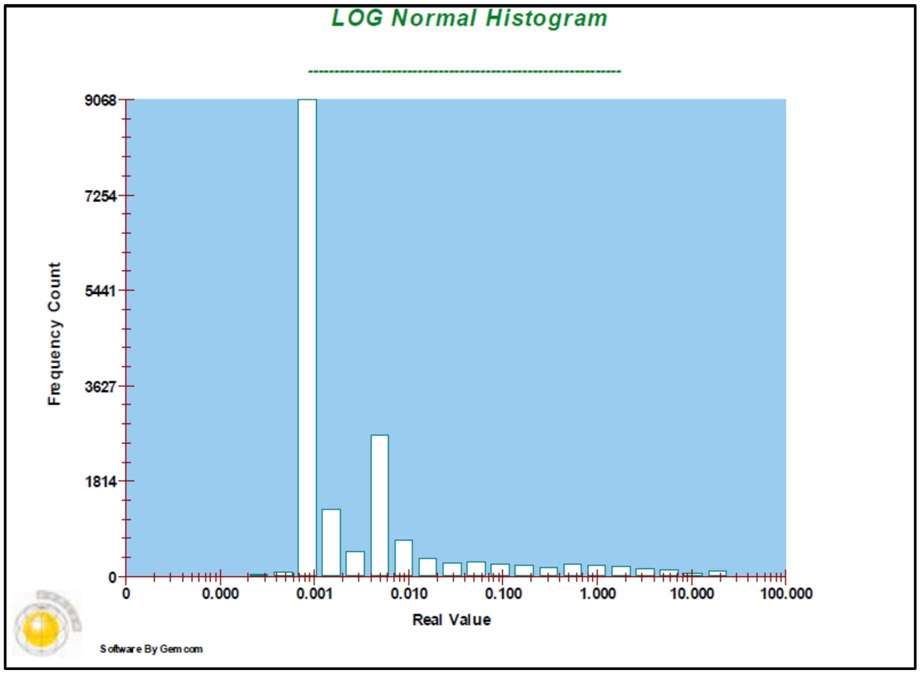


Illustration 2.2-28. Log-normal Histogram of the Golden Composite (Au).

2.2.3.4.9.2.4 Statistical analysis and variograms

For the statistical model, it was concluded that exploratory work provides sufficient geological certainty and test data confirm the existence of high-grade areas within quartz veins. These high-grade areas are not regular but have significant dimensions and a defined shape. Tenors were calculated taking into account the upper Cut-off of 15 g / t gold and the interpolation were restricted to a 2.5 x 2.5 x 2.5m search ellipsoid using Ordinary Kriging for value assignment within the block model.

Basic statistics were applied to the compound for the formation of the variograms and considering that the geometry of the mineralized veins is basically horizontal, with good continuity with very similar ranges in north-south and east-west directions, indicates that the mineralization has an isotropic behavior in the horizontal plane. In the vertical direction of no variogram was evident due to the horizontal geometry, therefore, a range of 3M or three times the length of composite material was adopted.

The resulting range of the semi-variogram constitutes the radius of the search ellipsoids and ultimately, the current search range is 3 times the z-diameter. When analyzing the Au variogram of the compound, it is observed that it allows to choose the Stationary Kriging of order 2, also called ordinary Kriging for the mineralized zone. The parameters for estimation (Table 2-6 and Illustration 2.2-29):

Table 2-6. Geostatistical estimation parameters.

Type of estimation	ORDINARY KRIGING		
Searching ellipsoid	Bearing	Plunge	Dip
	130	0	10
	major/semi-major	major/minor	
	1.023	1.02	
Search Radios	X	Y	Z
	10	12	3
Samples	Min	Max	
	2	16	
Sample limit per well	1		

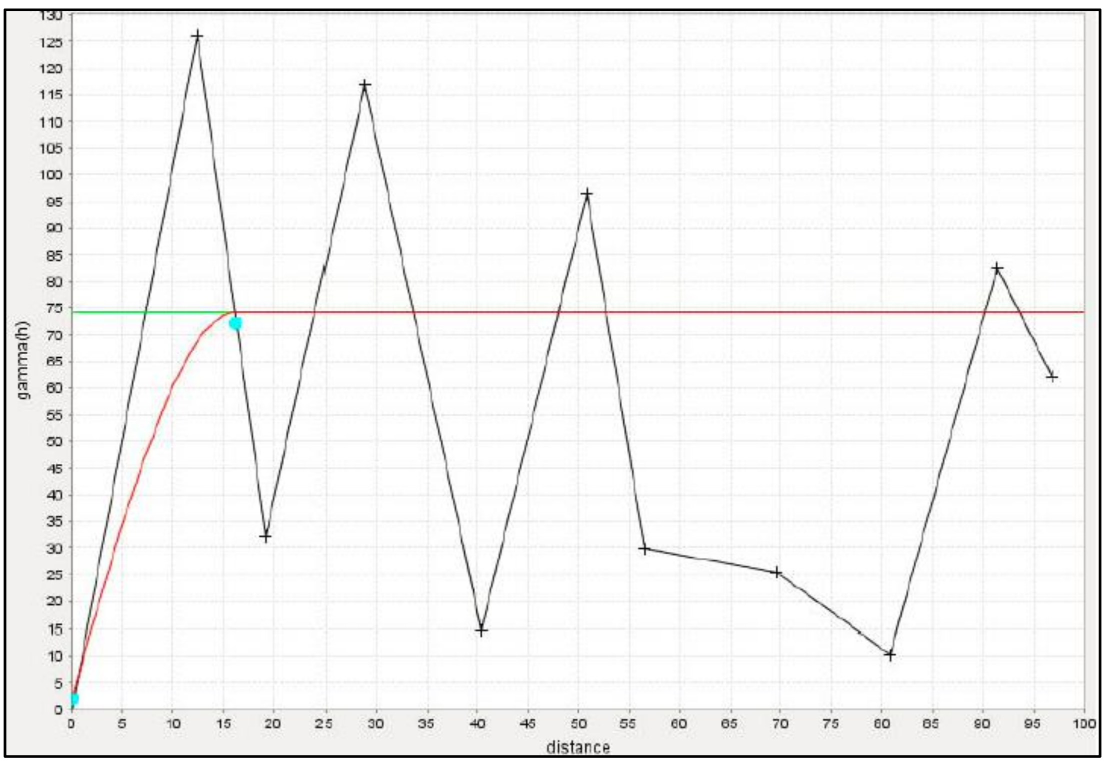


Illustration 2.2-29. Semi-variogram along the major axis (X) for Gold (Au), spread 30o, 10m lag.

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El Cinco & Las Pepas                              Univariate Statistics                                 Page 1
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Univariate Statistics
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Extraction File : C:\GCDBEC\EXTRACT\AU_ALL.MEX
Data Description : ----------------------------------------------------------

Minimum Cutoff Value                          0.000950
Maximum Cutoff Value                        155.520054
Number of Samples <=0                                0
Total Number of Samples Used                      1712

Minimum Histogram Value                       0.000950
Maximum Histogram Value                     155.520054
Number of Class                                     30
Class Interval                                5.183970

Minimum Population Data point                 0.001000
Maximum Population Data point               155.520004
Total Population                                  1712

                                    Ungrouped Data   Grouped Data
Mean                                      1.240418       3.619434
Median                                         N/A       2.710033
Geometric Mean                            0.004063       2.816996
Natural LOG Mean                         -5.505950       1.035671
Standard Deviation                        8.139932       7.785914
Variance                                 66.258491      60.620460
Log Variance                              7.341464       0.181713
Coefficient of Variation                  6.562248       2.151141
Moment 1 about Arithmetic Mean            0.000000       0.000000
Moment 2 about Arithmetic Mean           66.258491      60.620460
Moment 3 about Arithmetic Mean         6334.952781    5736.807963
Moment 4 about Arithmetic Mean       749444.058376  660944.206326
Moment Coefficient of Skewness           11.745759      12.154622
Moment Coefficient of Kurtosis          170.708889     179.856583
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El Cinco & Las Pepas                              Univariate Statistics                                 Page 2
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Normal Histogram Tabulation
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CLASS_FROM	CLASS_TO	COUNT	MEAN	FREQ_%	CUM_COUNT	CUM_MEAN	CUM_FREQ_%	DEC_COUNT	DEC_MEAN	DEC_FREQ_%
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5.184920	10.368890	27	7.787818	0.016	1665	0.243454	97.2547	74	26.061027	4.3224
10.368890	15.552860	12	12.418333	0.007	1677	0.330573	97.9556	47	36.558402	2.7453
15.552860	20.736831	6	17.262483	0.004	1683	0.390936	98.3061	35	44.834997	2.0444
20.736831	25.920801	4	22.090000	0.002	1687	0.442387	98.5397	29	50.539655	1.6939
25.920801	31.104771	7	27.602857	0.004	1694	0.554620	98.9486	25	55.091600	1.4603
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36.288741	41.472711	5	37.604000	0.003	1703	0.742082	99.4743	14	74.846429	0.8178
41.472711	46.656681	0	0.000000	0.000	1703	0.742082	99.4743	9	95.536667	0.5257
46.656681	51.840651	1	49.849998	0.001	1704	0.770901	99.5327	9	95.536667	0.5257
51.840651	57.024621	0	0.000000	0.000	1704	0.770901	99.5327	8	101.247500	0.4673
57.024621	62.208591	0	0.000000	0.000	1704	0.770901	99.5327	8	101.247500	0.4673
62.208591	67.392561	1	66.199997	0.001	1705	0.809276	99.5911	8	101.247500	0.4673
67.392561	72.576531	0	0.000000	0.000	1705	0.809276	99.5911	7	106.254287	0.4089
72.576532	77.760502	1	73.940002	0.001	1706	0.852143	99.6495	7	106.254287	0.4089
77.760502	82.944472	2	81.050003	0.001	1708	0.946052	99.7664	6	111.640001	0.3505
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93.312412	98.496382	0	0.000000	0.000	1708	0.946052	99.7664	4	126.934999	0.2336
98.496382	103.680352	0	0.000000	0.000	1708	0.946052	99.7664	4	126.934999	0.2336
103.680352	108.864322	1	108.510002	0.001	1709	1.008991	99.8248	4	126.934999	0.2336
108.864322	114.048292	0	0.000000	0.000	1709	1.008991	99.8248	3	133.076665	0.1752
114.048292	119.232262	1	114.309998	0.001	1710	1.075249	99.8832	3	133.076665	0.1752
119.232262	124.416232	0	0.000000	0.000	1710	1.075249	99.8832	2	142.459999	0.1168
124.416232	129.600203	1	129.399994	0.001	1711	1.150249	99.9416	2	142.459999	0.1168
129.600203	134.784173	0	0.000000	0.000	1711	1.150249	99.9416	1	155.520004	0.0584
134.784173	139.968143	0	0.000000	0.000	1711	1.150249	99.9416	1	155.520004	0.0584
139.968143	145.152113	0	0.000000	0.000	1711	1.150249	99.9416	1	155.520004	0.0584
145.152113	150.336083	0	0.000000	0.000	1711	1.150249	99.9416	1	155.520004	0.0584
150.336083	155.520053	1	155.520004	0.001	1712	1.240418	100.0000	1	155.520004	0.0584

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El Cinco & Las Pepas — Univariate Statistics — Page 3

Log Normal Histogram Tabulation

CLASS_FROM	CLASS_TO	COUNT	MEAN	FREQ_%	CUM_COUNT	CUM_MEAN	CUM_FREQ_%	DEC_COUNT	DEC_MEAN	DEC_FREQ_%
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0.001418	0.002115	29	0.001738	0.017	1184	0.001016	69.1589	557	0.074007	32.5350
0.002115	0.003156	59	0.002548	0.034	1243	0.001061	72.6051	528	0.090940	30.8411
0.003156	0.004709	61	0.003771	0.036	1304	0.001126	76.1682	469	0.142582	27.3949
0.004709	0.007027	83	0.005170	0.048	1387	0.001233	81.0164	408	0.245432	23.8318
0.007027	0.010485	13	0.008098	0.008	1400	0.001255	81.7757	325	0.657772	18.9836
0.010485	0.015645	12	0.012717	0.007	1412	0.001280	82.4766	312	0.790034	18.2243
0.015645	0.023344	10	0.018830	0.006	1422	0.001305	83.0607	300	0.931916	17.5234
0.023344	0.034832	5	0.028782	0.003	1427	0.001319	83.3528	290	1.066125	16.9393
0.034832	0.051973	12	0.040861	0.007	1439	0.001357	84.0537	285	1.135871	16.6472
0.051973	0.077549	17	0.064060	0.010	1456	0.001420	85.0467	273	1.314627	15.9463
0.077549	0.115711	9	0.090494	0.005	1465	0.001456	85.5724	256	1.606726	14.9533
0.115711	0.172654	20	0.137084	0.012	1485	0.001548	86.7407	247	1.784284	14.4276
0.172654	0.257619	19	0.208261	0.011	1504	0.001647	87.8505	227	2.236947	13.2593
0.257619	0.384395	14	0.324746	0.008	1518	0.001729	88.6682	208	2.778675	12.1495
0.384395	0.573559	22	0.463843	0.013	1540	0.001873	89.9533	194	3.244269	11.3318
0.573559	0.855813	22	0.706543	0.013	1562	0.002036	91.2383	172	4.160693	10.0467
0.855813	1.276967	28	1.026787	0.016	1590	0.002272	92.8738	150	5.396385	8.7617
1.276967	1.905374	14	1.502254	0.008	1604	0.002405	93.6916	122	7.897539	7.1262
1.905374	2.843025	17	2.194765	0.010	1621	0.002583	94.6846	108	9.793143	6.3084
2.843025	4.242104	11	3.291061	0.006	1632	0.002710	95.3271	91	12.949817	5.3154
4.242104	6.329681	12	5.354515	0.007	1644	0.002865	96.0280	80	15.633859	4.6729
6.329681	9.444575	16	7.723127	0.009	1660	0.003092	96.9626	68	18.888006	3.9720
9.444575	14.092336	16	11.441131	0.009	1676	0.003344	97.8972	52	24.870907	3.0374
14.092336	21.027302	7	16.797642	0.004	1683	0.003464	98.3061	36	35.121120	2.1028
21.027302	31.375028	11	25.434715	0.006	1694	0.003671	98.9486	29	41.964977	1.6939
31.375028	46.814964	9	35.955095	0.005	1703	0.003853	99.4743	18	56.987458	1.0514
46.814964	69.853032	2	57.446234	0.001	1705	0.003897	99.5911	9	90.322953	0.5257
69.853032	104.228342	3	78.607113	0.002	1708	0.003965	99.7664	7	102.790134	0.4089
104.228342	155.520054	4	125.695180	0.002	1712	0.004063	100.0000	4	125.695180	0.2336

NB. LOG MEANS CALCULATED ON SAMPLES ABOVE ZERO
NUMBER OF POINTS EXCLUDED FOR LOG CALCULATION : 0

2.2.3.4.9.3 Block model and resource estimation

The block model was created in Gemcom Surpac (Illustration 2.2-30 and Illustration 2.2-31) with an origin in 930250mE, 1293300mN at a height of 260m above sea level. The block model then comprised 100 columns, 350 rows and 50 levels of 2.5 meters, for a total model of 1,750,000 blocks.

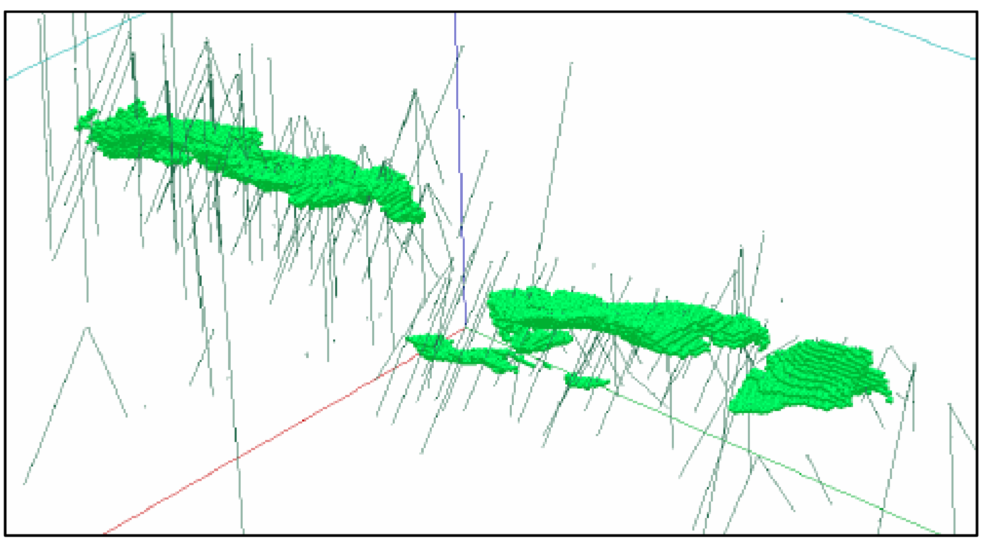

Illustration 2.2-30. 3D view of the block model.

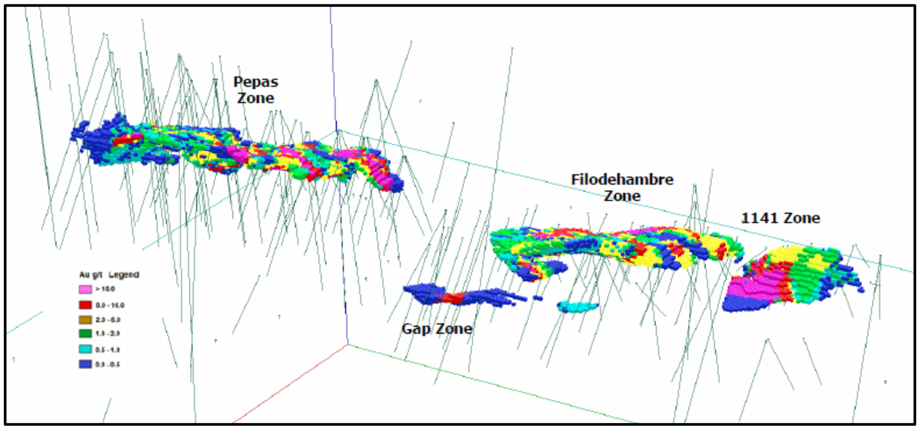

Illustration 2.2-3. 3D view of the blocks model with the assigned values for the interpolation.

2.2.3.4.9.4 Trend analysis

This type of analysis is a very powerful tool that compares input composites against the results of the block model.

For the block model of the Fish Project, it was identified that from south to north is the right direction for trend analysis. This analysis consists of calculating a series of averages for the composite and block model in intervals along the selected direction and plotting curves to see how the block model is functioning and whether the resulting block values represent the actual composite data along the mineralized zones.

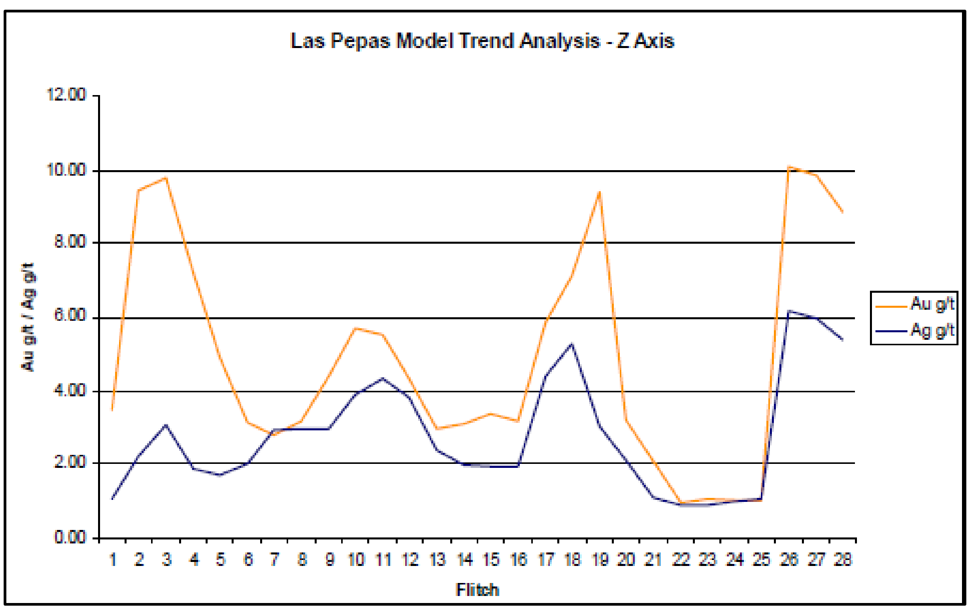

Illustration 2.2-32. Vertical trend analysis graph of the El Pescado project.

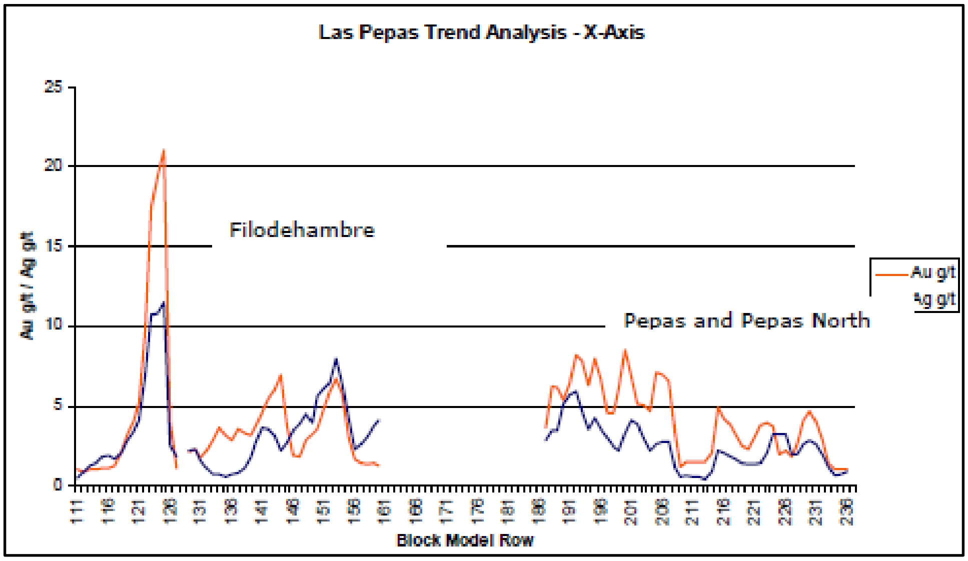

Illustration 2.2-33. S to N trend analysis along the mineralized trend of the El Pescado project.

2.2.3.4.9.5 Results for minerals of interest

The volumes estimated using the geo-statistical method of ordinary kriging are categorized as inferred and indicated and the results of the estimates are presented below (Table 2-7 and Illustration 2.2-34 to Illustration 2.2-36).

Table 2-7. Estimated results by geo-statistical methods.

Zone	Category	Tons	Gold tenor (g/t)
Pepas	Measured (M)	394.000	4,71
Pepas	Indicated (I)	164.200	4,33
	M&I	558.200	4,6
Pepas	Inferred (If)	291.600	3,21
	M&I&If	849.800	4,12

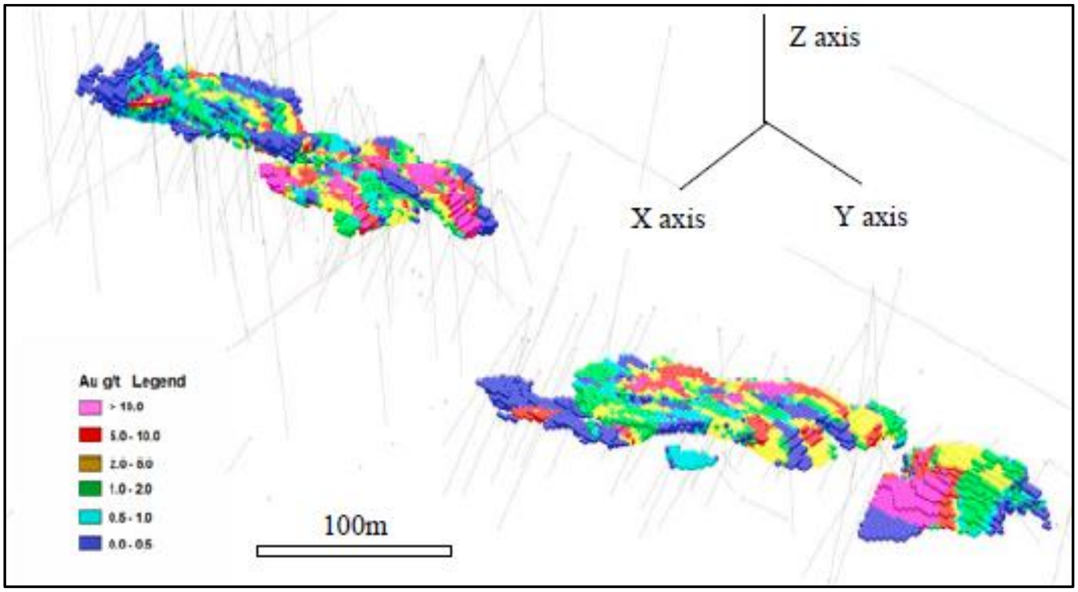

Illustration 2.2-4. Gold tenor’s distribution in the different targets of exploration.

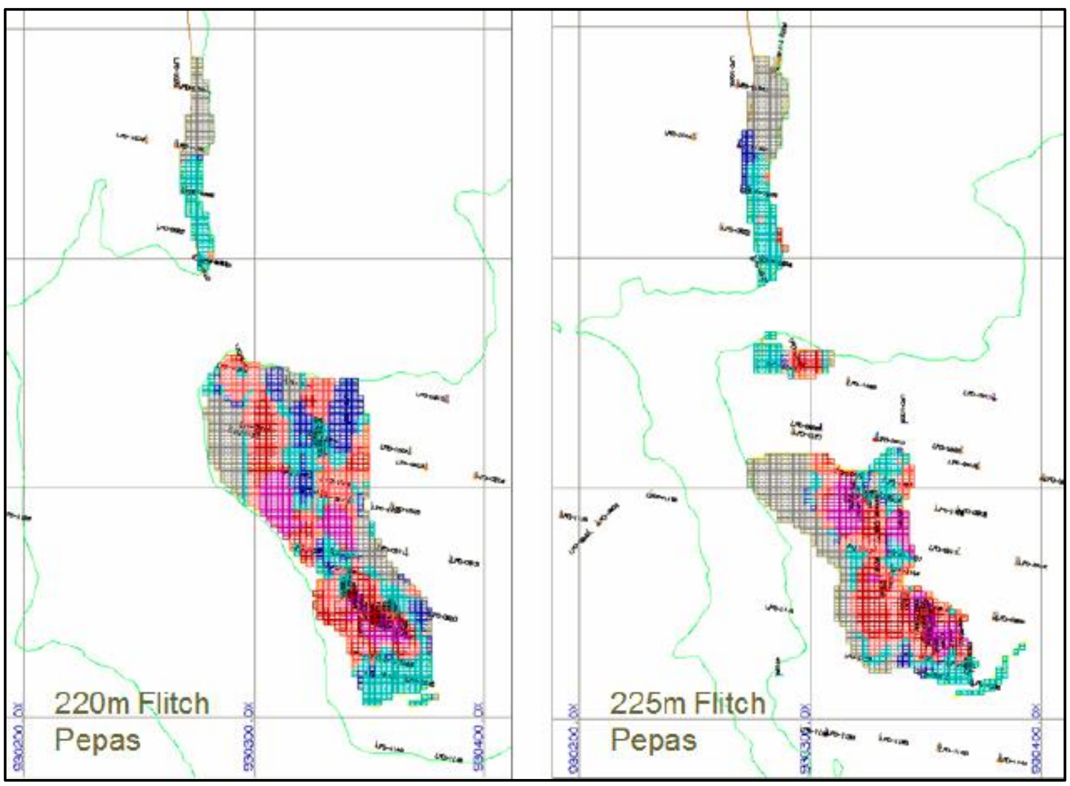

Illustration 2.2-35. Horizontal section at 220m and 225m from the Pepas anomaly.

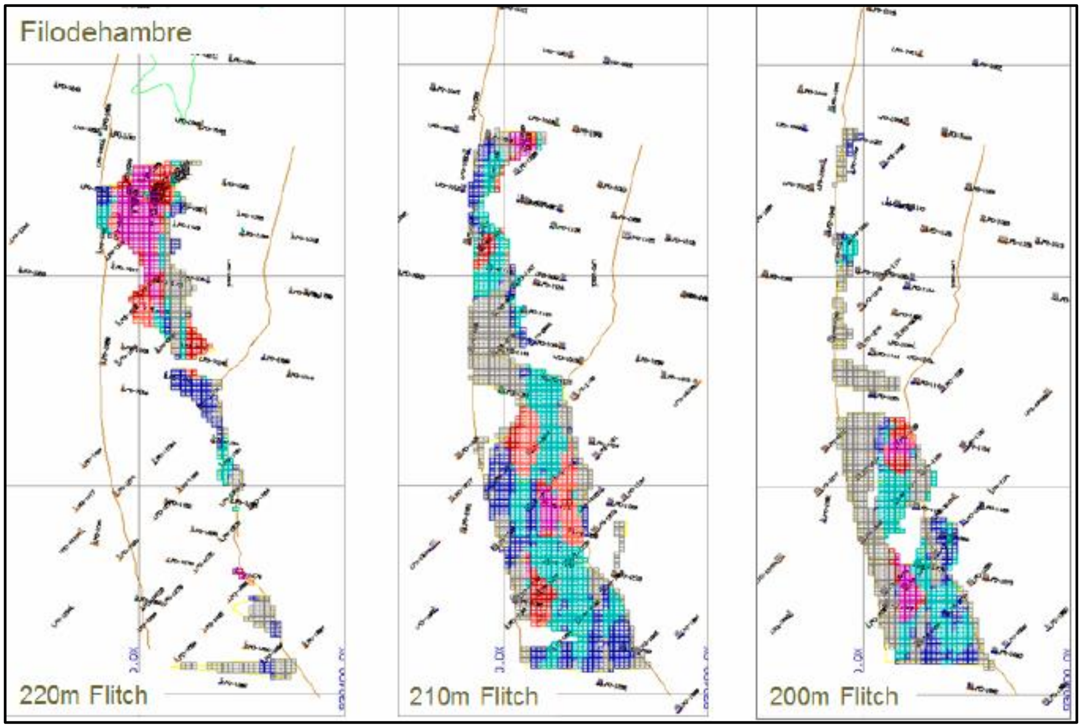

Illustration 2.2-36. Horizontal section at 220 m, 210 m and 200 m from the Hunger Edge anomaly.

2.3 DELIMITATION AND LOCATION OF AREAS TO BE EXPLOITED AND MINING OPERATION AREAS

2.3.1 DESCRIPTION AND LOCATION OF MINING FACILITIES AND WORKS, MINERAL DEPOSITS, PROCESSING AND TRANSPORTATION.

The parameters for the selection of the areas where mining activity is concentrated were developed under four scenarios (excellent, good, regular and bad) (Table 2-8) and with the help of office automation applications (Surpac, ArcGIS, AutoCAD) with which the possible zones for the location of the infrastructure were chosen.

Table 2-8. Parameters for the location of the infrastructure.

Distance of the aperture				
	EXCELLENT	GREAT	REGULAR	POOR
Distance of the aperture (m)	<75	75-150	150-225	>225

Distance of water tributaries				
	EXCELLENT	GREAT	REGULAR	POOR
Distance of water tributaries (m)	>300	250	200-100	<100

Distance to access roads.				
	EXCELLENT	GREAT	REGULAR	POOR
Distance to access roads. (m)	<100	100-250	250-400	>400

Distances to sedimentation pools				
	EXCELLENT	GREAT	REGULAR	POOR
Distances to sedimentation pools (m)	<50	50-100	100-150	>150

Ground slope, for the metallurgical preparation stage				
	EXCELLENT	GREAT	REGULAR	POOR
Pending preparation. (degrees)	<30	30-40	40-50	>50

Slope of the land, for the concentration and melting stage				
	EXCELLENT	GREAT	REGULAR	POOR
Pending the concentration. (degrees)	<5	5-10	10-25	>25

Area required for the preparation stage				
	EXCELLENT	GREAT	REGULAR	POOR
Area for the preparation (L-A) (m-m)	20-10	18-8	16-6	<15-6

Area required for concentration stages				
	EXCELLENT	GREAT	REGULAR	POOR
Area for concentration (L-A) (m-m)	25-15	22-14	20-13	<20-13

Area required for concentration and casting stages.

Avoid that the location of the plant sterilizes the reserves, or that it is on top of an exploitation vein in order to avoid subsidence in the soil and possible failures in the structure of the plant.

As support facilities for this mining project, they are considered:

- Workshops, warehouses, offices, housing, etc.
- Power transmission, transformation and distribution systems adapted to 440 v.
- telephone and internet network communication systems.
- Sources of supply of inputs and services
- treatment and distribution of drinking water.
- wastewater and garbage disposal and treatment;
- drainage and evacuation of rainwater;
- fuel storage and distribution systems.
- Adequacy of roads for access 24 km and adequacy of material transport roads 1.5 km
- Benefit plant
- Adaptation of the nursery
- Powder magazine, in accordance with current regulations.

2.3.1.1 CURRENT FACILITIES

During the exploration campaigns, the company built an infrastructure in the area that will allow it to develop exploration activities. The infrastructure has a capacity to accommodate 60 people; this infrastructure is located in the premises of Gustavo Torres and inside the concession contract 5969 (owned by Touchstone Colombia). The current infrastructure consists of: 1 Casino with capacity for 70 people, 2 bedrooms, 3 storage areas for drilling cores, a warehouse, data communications system.

2.3.1.2 PLANNED INSTALLATIONS

In the first case, an area of 500 square meters will be adapted, where the workshop and dressing room will be built, an office and auxiliary warehouse (120 m2), wooden warehouse (225 m2), and the bathrooms and separated from this infrastructure, but in the same area the powder keg will be installed. All this infrastructure will be installed near the exploitation area and will be used to support mineral exploitation.

A 13,000 to 800V (225 m2) energy transformer, metallurgical processing plant (4000 m2), automotive workshop (414 m2), mechanical workshop (414 m2), bathrooms, water storage tanks (25m2) and heliport (25 m2) will be installed in the mineral processing area. The metallurgical laboratory will be installed in the current office area to support the benefit work.

For the discharge of industrial wastewater, the corresponding discharge permit shall be requested from the Environmental Authority. Pumped mine water will be stored for use in the processing plant; wastewater from the processing plant will be treated in tailings and sedimentation pools to degrade cyanide and reduce the content of suspended particles prior to discharge.

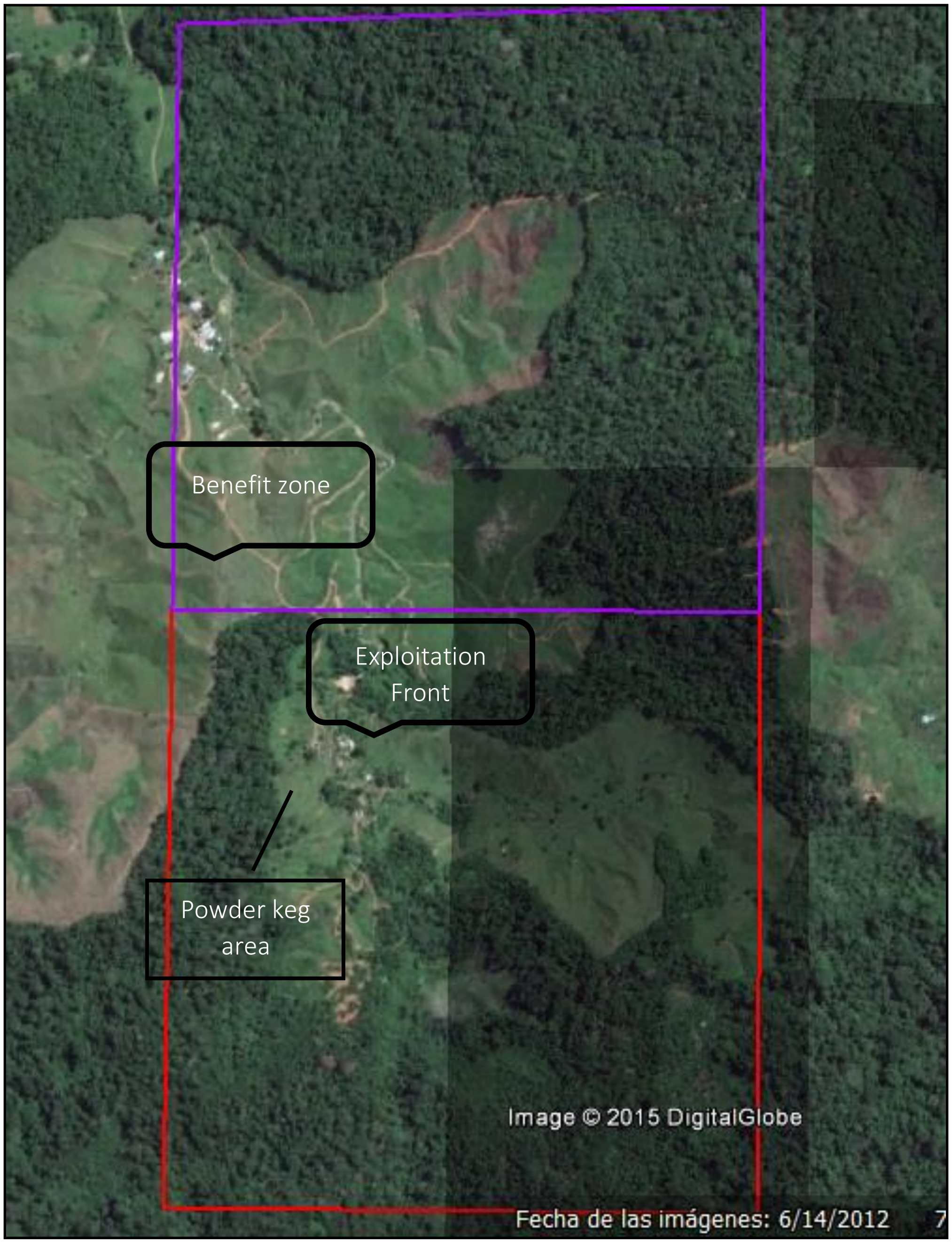

Illustration 2.3-1. Infrastructure projected.
Source: Ingex Group Miner S.A.S.

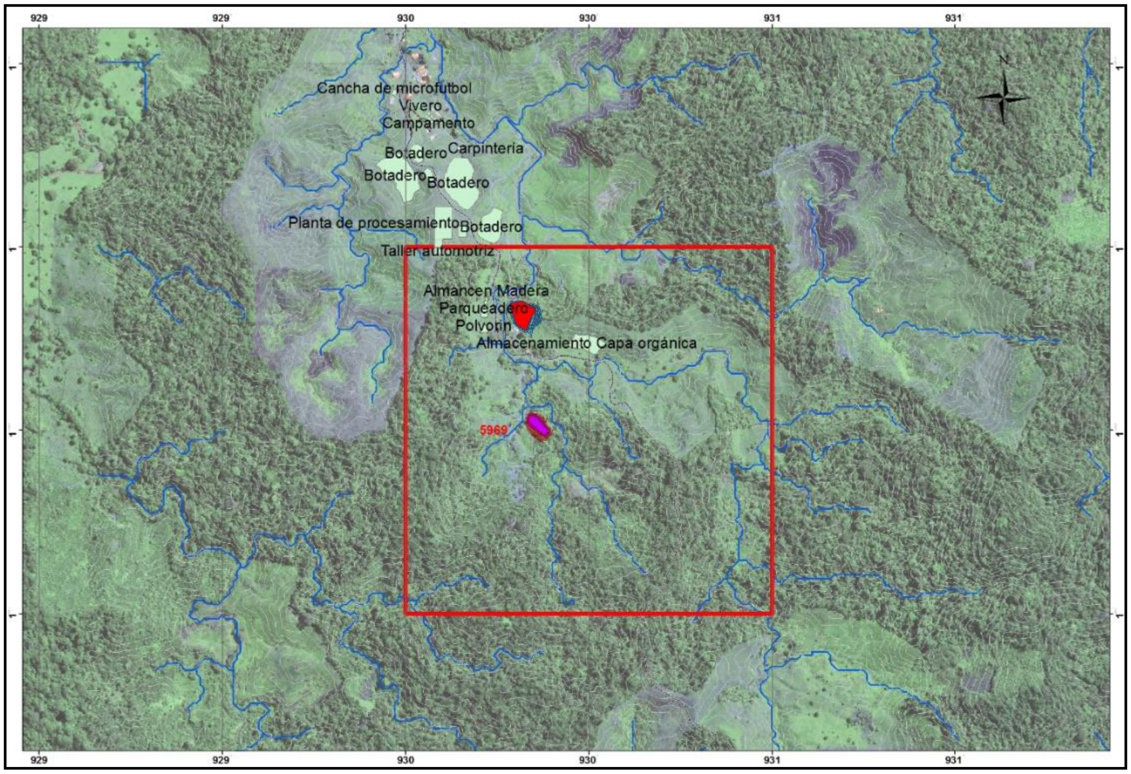

Illustration 2.3 2. Projected Infrastructure Map.
Source: Ingex Group Miner S. A. S.

2.3.1.2.1 Profit plant

The benefit plant will have an area of approximately 4000m2, in which all the necessary equipment for the process of mineral benefit will be available.

Following is a diagram in silver view of the possible location of the mineral processing equipment (Illustration 2.3-3).

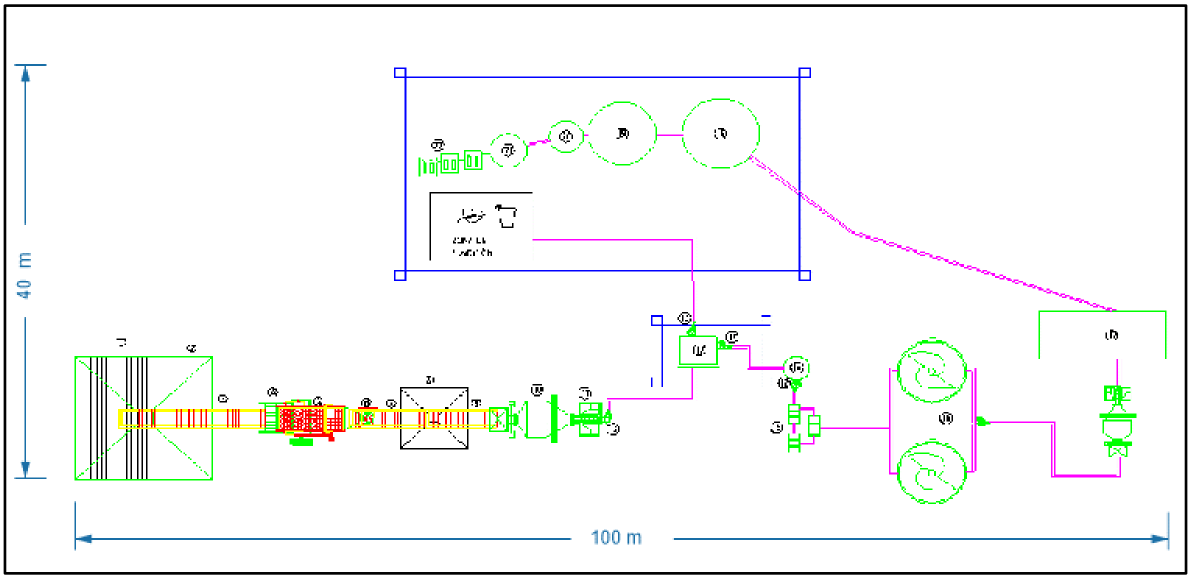

Illustration 2.3-3. Scheme of equipment location in plain view.

2.3.1.2.2 Mechanical and automotive workshop.

Each area will be approximately of 414 m2 and in this one will be carried out the repair and maintenance of the machinery to use; it will be constituted by an office, a bathroom and a room (Illustration 2.3 4 and Illustration 2.3 5) for each one of the following activities:

- Mechanical repairs.
- Welding.
- Washing.
- Vehicle maintenance.

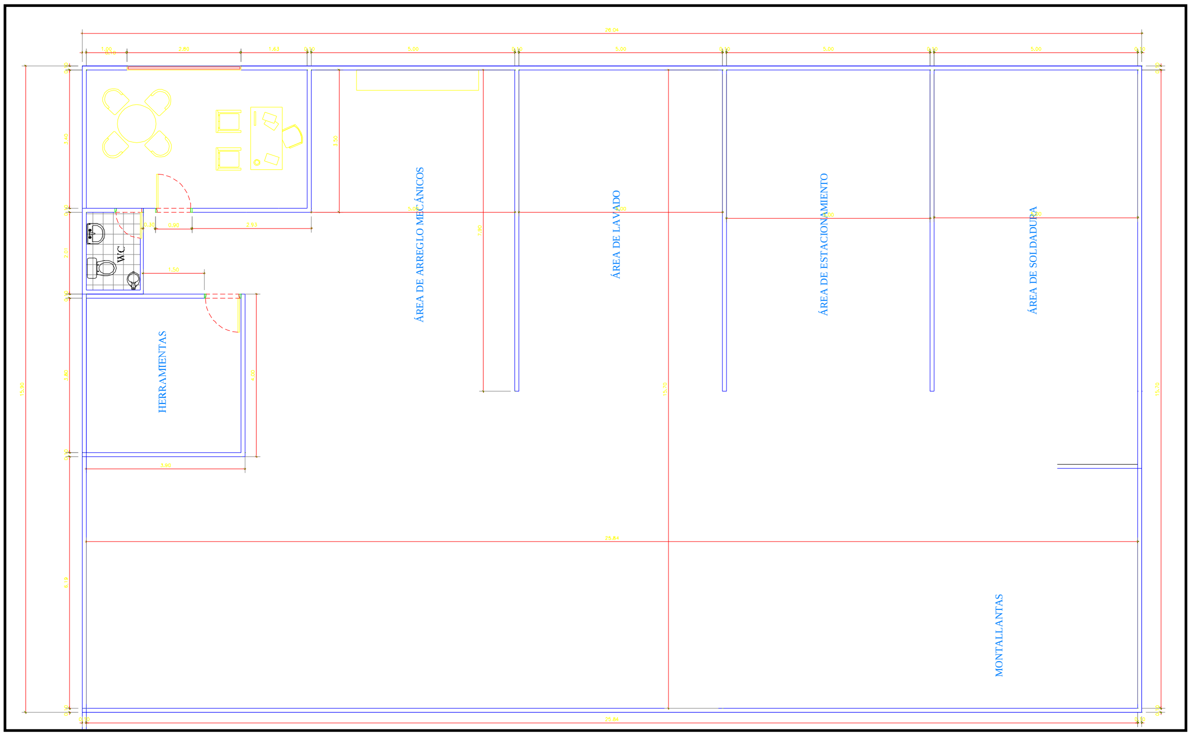

Illustration 2.3-4. Mechanical workshop.

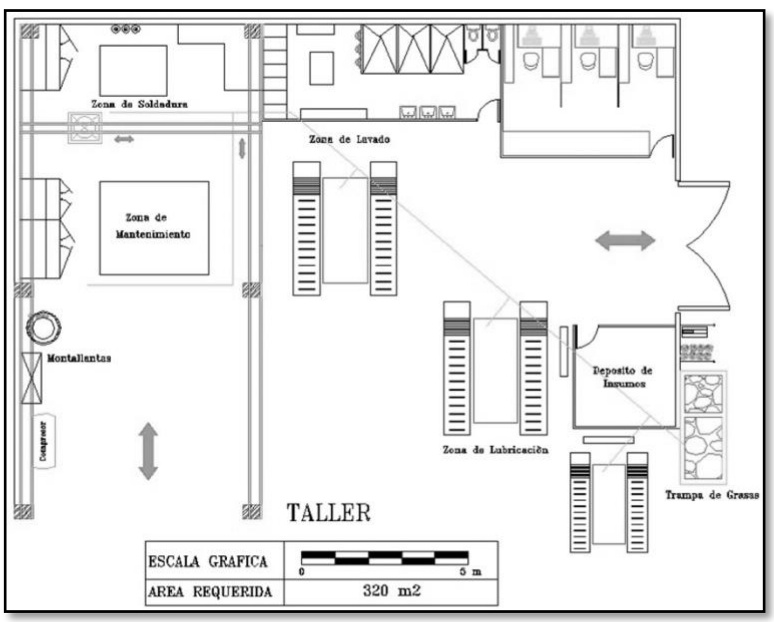

Illustration 2.3-5. Automobile workshop.

2.3.1.2.3 Heliport

The project will have a Heliport with an area of 12m x 12m, close to the gold quarter and which will be used mainly to extract precious metals from the mineral processing process. The safety area of the Heliport is 9 m2 and 16m will be available for the runway (see Illustration 2.3-6, Illustration 2.3-7 and Illustration 2.3-8).

There shall be a protected lateral slope that rises 45° from the edge of the safety area to a distance of 10 m, the surface of which shall not penetrate obstacles, except that when they are on only one side of the FATO, they shall be allowed to penetrate the lateral slope.

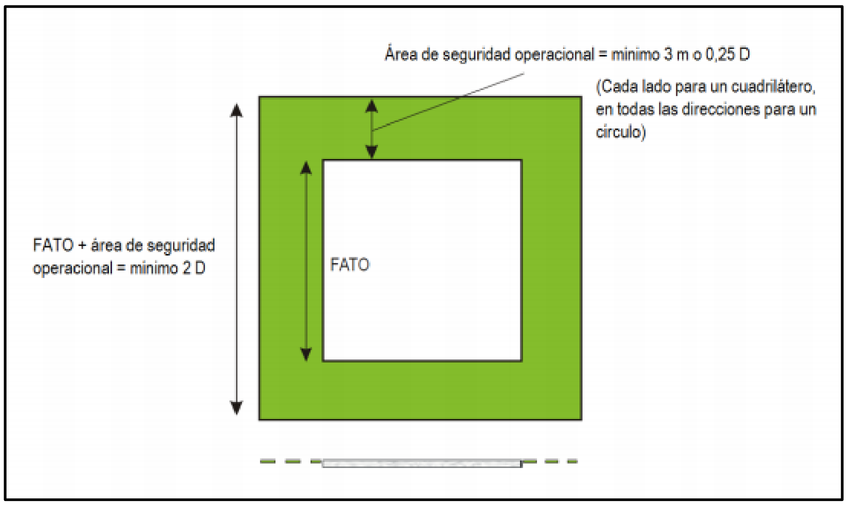

Illustration 2.3-6. Heliport security margins.

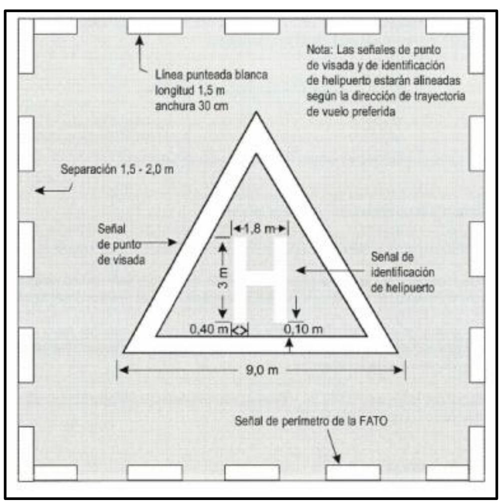

Illustration 2.3-7. Heliport dimensions.

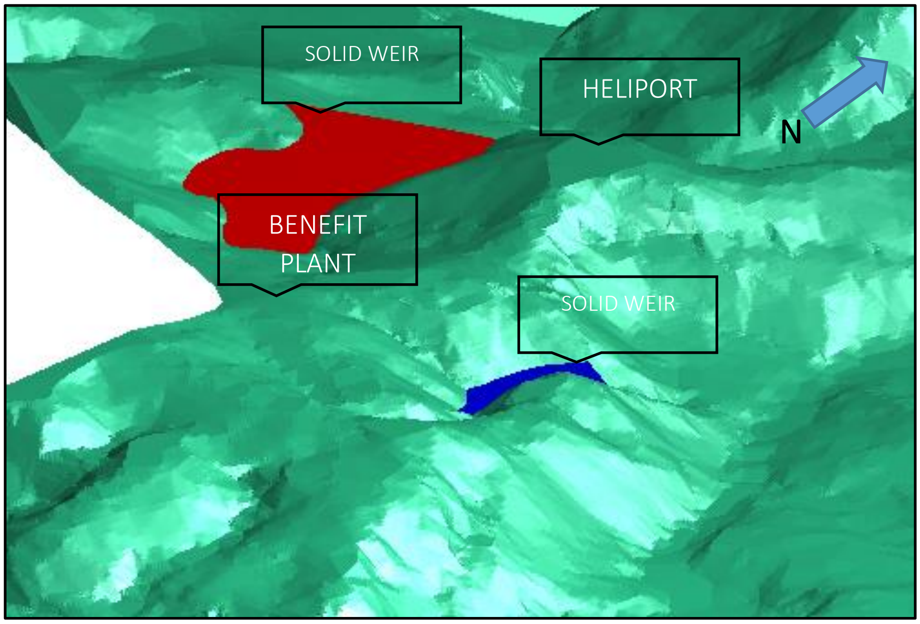

Illustration 2.3-8. Digital Terrain Model with Heliport location.

2.3.1.2.4 Powder keg

The indugel, safety fuses and means of ignition (Table 2-9 and Illustration 2.3-9), shall be stored in a construction with separate sections (powder), bulletproof and fireproof, equipped with an independent ventilation and lighting system governed by regulations, with reinforced concrete walls of a thickness of 60 cm, in addition to metal doors with internal locks for the entrance to each compartment. Two security guards per shift 24 hours a day.

Powders must be located at a distance of 100 m from the entrance, buildings and roads; within a radius of 50 m from the accesses to the powder keg, flammable materials cannot be stored; fire extinguishers must be placed inside each warehouse and outside the powder keg.

The transport of explosives from the powder keg to the work fronts shall be carried out by the powder keg and/or personnel trained for this work; the elements used in blasting (indugel, safety fuses, fulminant, among other types of explosive substances) must be transported in containers of wood, leather, galvanized or plastic sheet, in several compartments, which allow their isolation between each of them. See Decree 1337 of 1987, Title VI.

Table 2-9. Powder keg dimensions

	L (m)	A (m)	H (m)
Powder keg dimensions (m)	15	12	2

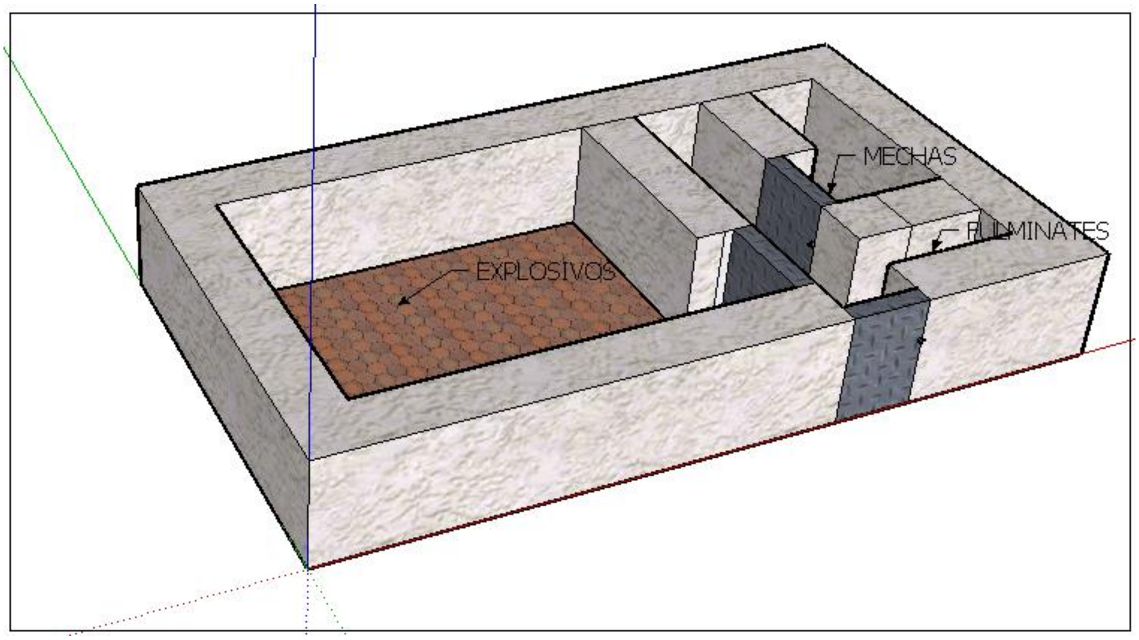

Illustration 2.3-9. Spatial representation of the powder keg.

2.3.1.2.5 Dumping sites

The mining project will implement dumps for waste from the extraction of construction materials (shortly, a large part of which is used as landfill site) and for low-value material from surface mining.

A system of dumps will be implemented with landfills filled in stockpiles, are the so-called stacks consisting of heaps of material of dismounting with slopes formed in all directions leaving a pile of material that will be accommodated by gravity, located in areas that do not interrupt the operation and the topographical conditions of the area allow it, in addition to taking into account the course of the river in the winter season. According to the geomechanical conditions, at the rest angle of the material, the topography, among others, the dumps are designed (Table 2-10).

Table 2-10. Dump Design.

WIDE	**150 m**
LONG	100 m
HIGH	4m
WALL CORNER	35º

2.3.1.2.6 Plant cover storage

For the design of the storage of vegetation cover, the amount of cover that could be generated in the stripping works was analyzed. For the location of the storage, different aspects were analyzed, among them we looked for the minimum possible distance to the extraction site (avoiding large machine tours, which would increase costs notably), topography, stable location, and the lack of resources in the sector where it will be located.

According to geomechanical conditions, at the material's resting angle, topography among others, the specifications of the plant cover storage design are (Table 2-11):

Table 2-11. Plant cover storage design

WIDE	**120 m**
LONG	140 m
HIGH	4m
WALL CORNER	35º

Consideration has been given to the construction of a drainage system on the foundation site, as well as the construction of a surface drainage system to capture runoff water and prevent entry into the landfill for storing vegetation cover.

2.3.1.2.7 Solid weir

In the zone there will be 2 solid dams, one for the solids coming from the flotation stage and one for the solids coming from the cyanidation stage. The capacities of the solid dams are (Table 2-12 and Illustration 2.3-10):

Table 2-12. Capacity projected for the solid weir.

Weir height (m)	Capacity projected (m3)	
	Weir 1	Weir 2
10	1.539	27.358
20	2.768	64.340
30	4.534	87.456

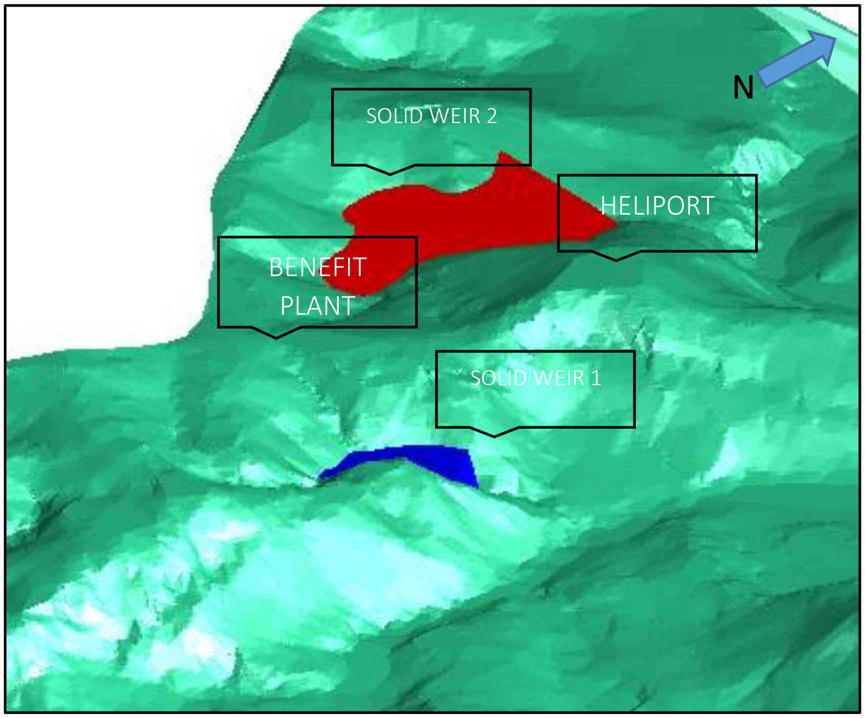

Illustration 2.3-10. Isometric of the solid prey.

2.3.6 PROFIT AND MINERAL PROCESSING

2.3.6.1 SCOPE OF EXPLANATION

The recovery of the metals of interest in the El Pescado project is planned in the assembly of a mining-metallurgical benefit plant where valuable metals from material from the different mining fronts will be recovered. The ore processing mill to be installed will have a capacity of 300 tons per day (Illustration 2.3-11).

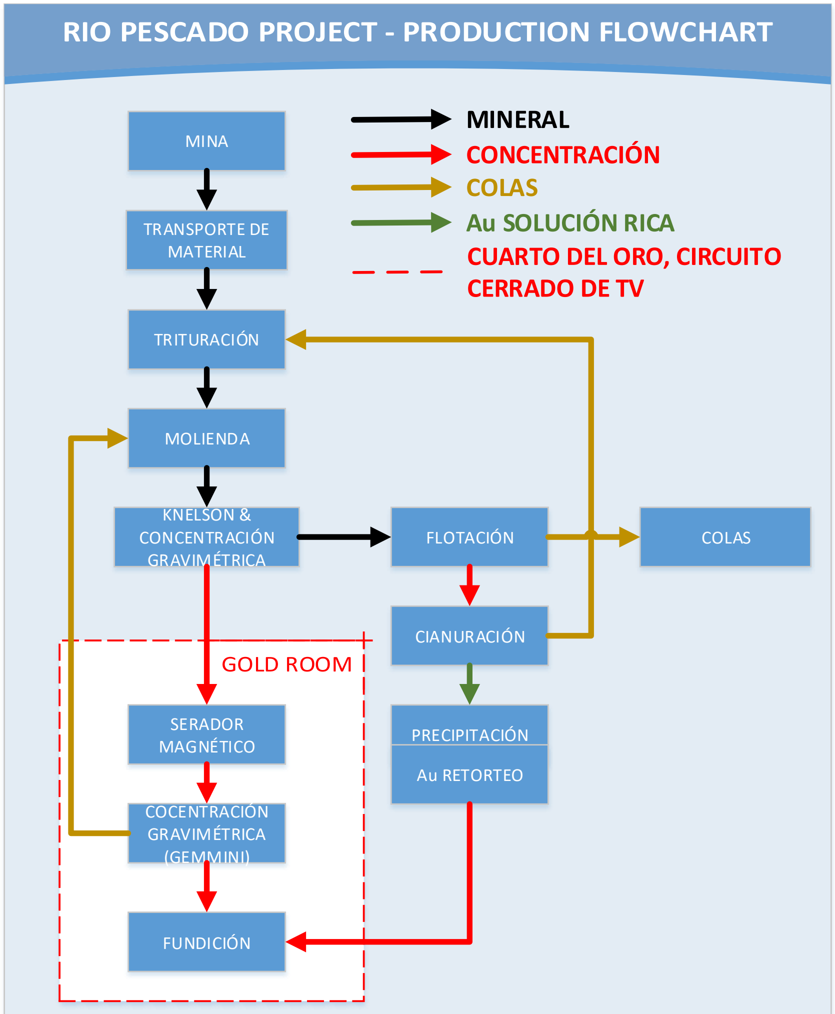

Illustration 2.3-11. Flow Table of the mineral processing plant.

2.3.6.2 MILLING, METALLURGY AND MINERAL PROCESSING OPERATIONS

The mineral processing plant has 3 crushing lines, 2 ball mills in parallel, a gravimetric concentration circuit consisting of a Nelson and a Gemmi 1000 table, a serious flotation circuit of circular cells, a cyanidation stage consisting of 3 stirrers and 2 thickeners and the Merrill Crowe process as a final stage of precious metal recovery. The equipment to be used and the flow diagram of the benefit plant can be detailed below (Table 2-13 and Illustration 2.3-12):

Table 2-13. List of equipment to be used in the mineral processing process.

No	EQUIPMENT LIST	STAGE	No	EQUIPMENT LIST	STAGE
1	300 TON COARSE HOPPER	Shredding	22	CIRCULAR FLEET CELLS	Floating
2	RECIPROCATING FEEDER		23	THICKENER 1	Cyaniding
3	15" X 38" PRIMARY CRUSHER		24	AGITATORS	
4	CONVEYOR BELT 1		25	THICKENERS 1 AND 2	
5	VIBRATING SCREEN 1		26	CYANIDE DEGRADATION REACTOR	
6	SECONDARY CRUSHER		27	RICH SOLUTION TANK	Merrill Crowe
7	CONVEYOR BELT 2		28	CLARIFIER	
8	CONVEYOR BELT 3		29	VACUUM TOWER	
9	300 TON TRANSITION HOPPER		30	VACUUM PUMP	
10	CONVEYOR BELT 4		31	TRANSFER PUMP	
11	CONICAL CRUSHER 36"		32	MIXER CONE	
12	CONVEYOR BELT 5		33	ZINC DOSIFIER	
13	VIBRATING SCREEN 2		34	PRESS FILTER PUMP	
14	CONVEYOR BELT 6		35	FILTER PRESS	
15	FINE GOODS HOPPER 300 TON	Grinding	36	DRYING OVEN	
16	FEEDER		37	TILTING OVEN	
17	BALL MILLS 6' X 8'		38	CONCENTRATES PUMP	
18	CYCLONE BATTERY		39	CONCENTRATES HOPPER	
19	KNELSON CONCENTRATOR 30"	Gravimetric concentration	40	TABLE GEMENI 1000	golden room
20	SOLIDS PUMP		41	CRISOL OVEN	
21	ACONDICIONER		42	POOR SOLUTION TANK	

Source: Ingex Group Miners SAS.

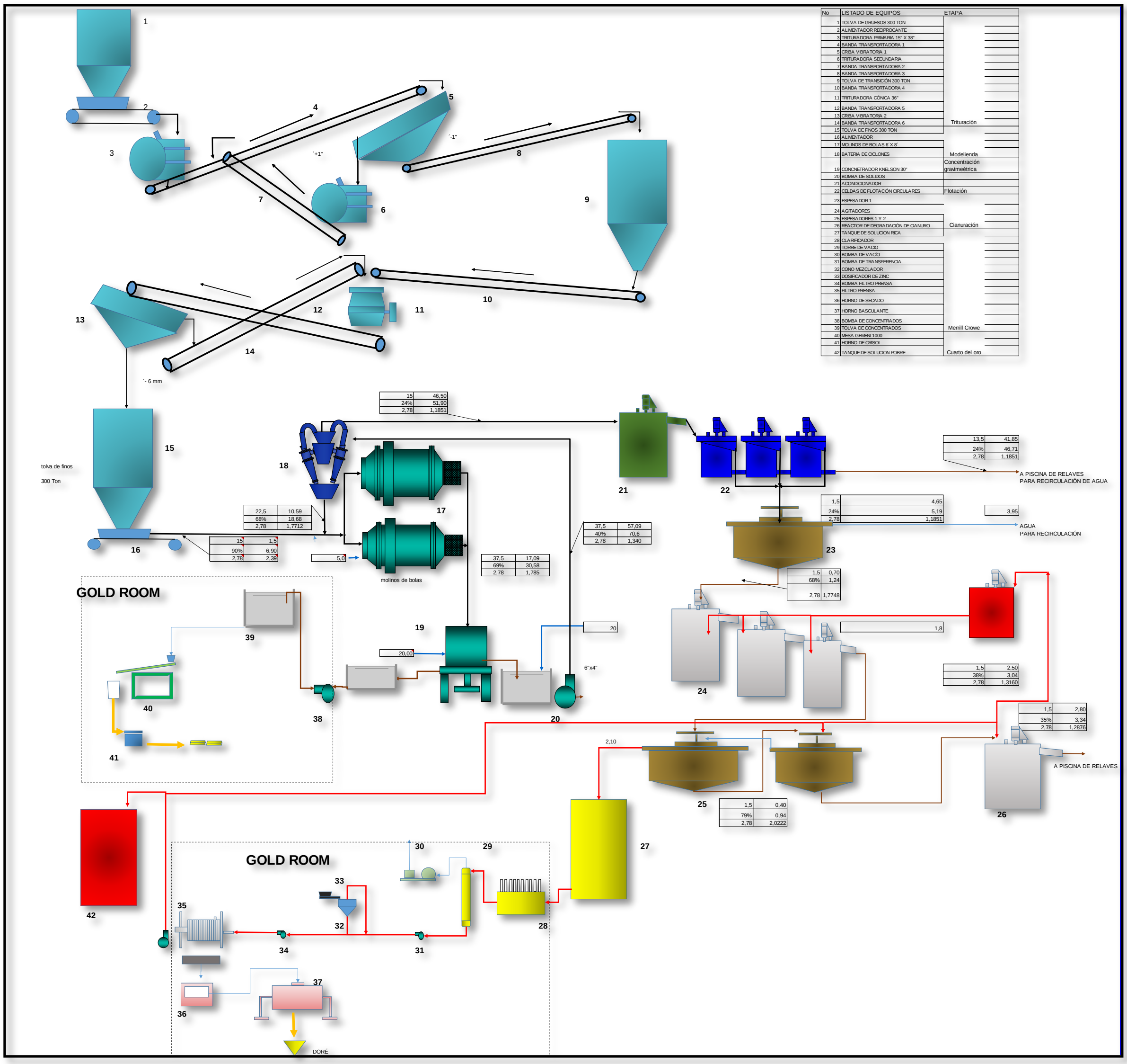

Illustration 2.3-12. Flow Table of the mineral processing plant.
Source: Ingex Group Miner S. A. S.

2.3.6.3 SHREDDING

The material extracted from the fronts of exploitation is transported to the Plant where it is received in a first hopper of thicknesses that has a storage capacity of 300 tons. This hopper must be equipped with a grizzly that does not allow rock fragments larger than 8 "to pass through. From this hopper the material is fed through a reciprocating feeder to the primary crusher, where the first reduction in size is made. After passing through the primary crusher, the material is conveyed by a conveyor belt to screen No. 1, where the material is sorted to a 1 "particle size. The screen rejection is fed to a secondary jaw crusher which is closed looped with screen No. 1. The 1 "pass through screen is stored in a transition hopper which is used for the temporary storage of material with 100% pass through granulomere to 1". Oversized returns to the crusher are made by conveyor belts.

The material stored in the transition hopper is fed by a conveyor belt to the tertiary conical crusher which performs the size reduction work until a granulomere of 100% 1/4 "(6 mm) throughput is obtained. A second vibratory screen fed by another conveyor belt will be installed to transport the conical crusher discharge material. This screen will be used to control the granulometric control of the material to be fed into the milling circuit. Vibratory screen rejection, i. e. particles larger than 6 mm will be returned by another conveyor belt to the conical crusher to ensure that all material obtains the desired particle size. The sorted material is stored in the fines hopper with a storage capacity of 300 tons.

The list of equipment to be used in the crushing stage is presented below (Table 2-14 and Illustration 2.3-13).

Table 2-14. Equipment to be used in the crushing stage.

No	EQUIPMENT LIST	STAGE
1	300 TON COARSE HOPPER	trituration
2	RECIPROCATING FEEDER	
3	15" X 38" PRIMARY CRUSHER	
4	CONVEYOR BELT 1	
5	VIBRATING SCREEN 1	
6	SECONDARY CRUSHER	
7	CONVEYOR BELT 2	
8	CONVEYOR BELT 3	
9	300 TON TRANSITION HOPPER	
10	CONVEYOR BELT 4	
11	CONICAL CRUSHER 36"	
12	CONVEYOR BELT 5	
13	VIBRATING SCREEN 2	
14	CONVEYOR BELT 6	

Source: Ingex Group Miner SAS.

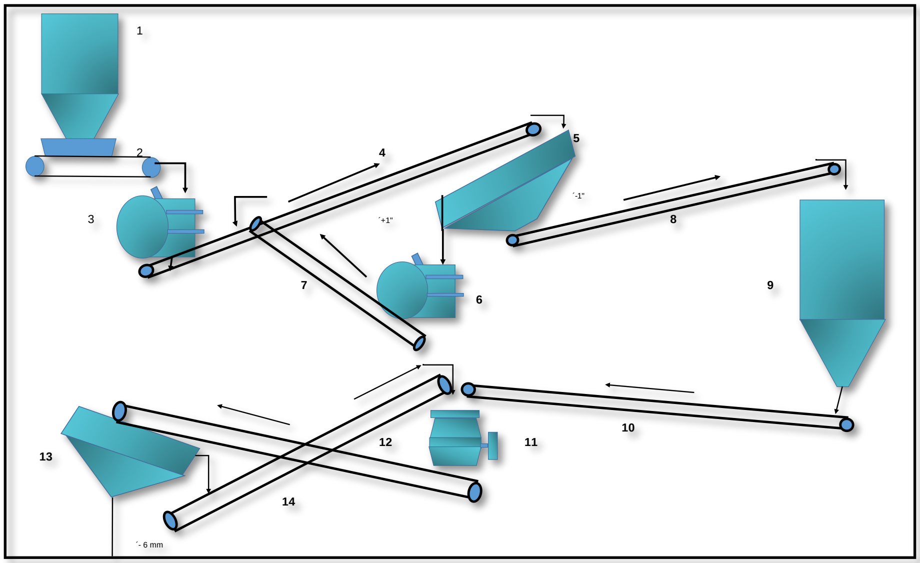

Illustration 2.3-13. Flow diagram crushing stage.
Source: Ingex Group Miner S.A.S.

2.3.6.4 GRINDING

The fines hopper is equipped with two outlets to feed the two 6 X 8 mills that are installed in parallel. Each mill is fed by a belt dispenser.

A water valve adds the amount of fluid needed to obtain a 65% slurry of solids inside the mills. The discharge from the mills is fed to a 30 "Nelson centrifugal concentrator. This device has an independent control system to automatically schedule concentrate discharges after each concentration cycle. The periodically discharged Nelson concentrate is received in a tank designed for this type of material and is automatically pumped to another safety tank in the gold room, where the concentrates will be cleaned. The discharge of the Nelson concentrator falls into a tank equipped with a solids pump that raises the pulp to the cyclone battery which performs the granulometric classification of the grinding. The low cyclone flow returns to the ball mills to close the milling circuit, while the overflow with the 80% granulomere passing through the 200 mesh (75 microns) feeds directly into a conditioning tank where flotation reagents are added.

The following is a list of equipment to be used in the milling stage (Table 2-15 and Illustration 2.3-14)

Table 2-15. Equipment to be used in the grinding stage.

No	EQUIPMENT LIST	STAGE
15	FINE GOODS HOPPER 300 TON	Grinding
16	FEEDER	
17	BALL MILLS 6' X 8'	
18	CYCLONE BATTERY	

Source: Ingex Group miner SAS.

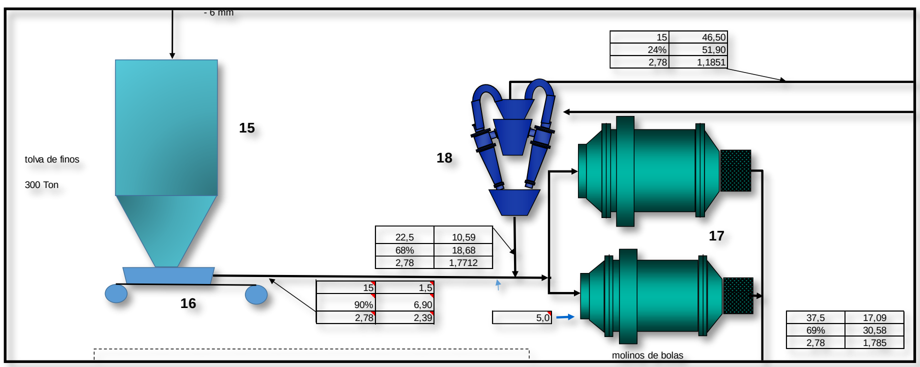

Illustration 2.3-14. Grinding stage flow diagram.
Source: Ingex Group Miner S.A.S.

2.3.6.5 GRAVIMETRIC CONCENTRATION.

As the results of metallurgical studies indicate that the ore contains approximately 50 % gold which can be recovered by gravity, a Nelson centrifugal concentrator with automated central discharge and variable speed drive for gravimetric concentration was installed. This equipment is installed in the closed milling circuit, so that the particles released have a greater chance of being recovered in each step of the equipment. The cleaning of the gravimetric concentrates will be done with the use of a Gemeni 1000 table, which will be installed in a room specially designed for this task. The table concentrate will be dried and melted directly to obtain the ingots, inside the same room. The table tails will be stored and then processed separately for the recovery of gold present in them (Table 2-16 and Illustration 2.3-15).

Table 2-16. Equipment to be used in the gravimetric concentration stage.

No	EQUIPMENT LIST	STAGE
19	KNELSON CONCENTRATOR 30"	Gravimetric concentration
40	TABLE GEMENI 1000	Gold room

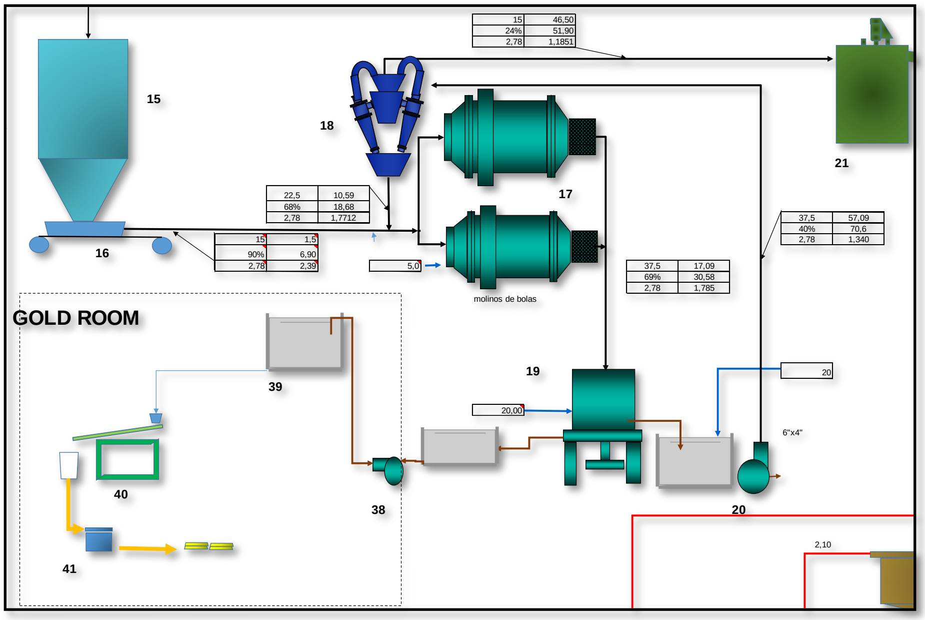

Illustration 2.3-15. Grinding stage flow diagram and gravimetric concentration.
Source: Ingex Group Miner S.A.S.

2.3.6.6 FLOTATION

The conditioned pulp will be fed into a flotation circuit consisting of circular cells in series. Tails from the last cell will be pumped into the tailings dam. There, there is a sufficient area for the sedimentation of solids and make it possible to recirculate water back into the circuit. The pulp of flotation concentrates is transported to a thickener designed for this purpose. The thickened and pH-conditioned pulp is fed into a stirring circuit consisting of three agitators in series (Table 2-17 and Illustration 2.3-16).

Table 2-17. Equipment to be used in the flotation stage.

No	EQIPMENT LIST	STAGE
20	SOLID PUMP	Floating
21	ACONDITIONER	
22	CIRCULAR FLEET CELLS	

Source: Ingex Group Miner S.A.S.

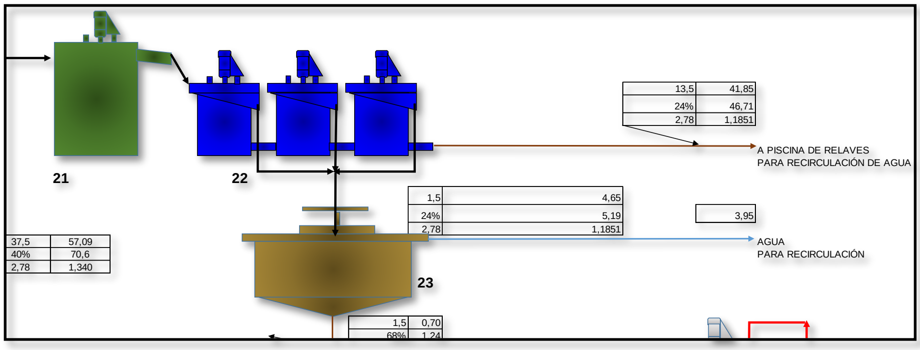

Illustration 2.3-16. Flotation stage flow diagram.
Source: Ingex Group Miner S.A S.

2.3.6.7 CYANIDATION

The dissolution process of valuable metals will be carried out in the three agitators where sodium cyanide solution previously prepared in a special tank is added, following the International Cyanide Management Institute Standards. The residence time calculated for this circuit is 48 hours.

After cyanidation, the pulp is transferred to a countercurrent decantation system consisting of two thickeners in series. The rich solution obtained in this circuit is stored in a rich solution tank and then passed through the Merrill Crowe precipitation system.

The pulp leaving the settling circuit in countercurrent is transferred to a final reactor where the cyanide neutralization process of the solids and solutions will be carried out. After the neutralization process, the pulp is stored in a separate tailings dam, where UV rays complete the cyanide decomposition process. The solution recovered at this dam will also be recirculated to the process (Table 2-18 and Illustration 2.3-17).

Table 2-18. Equipment to be used in the cyanidation stage.

No	EQUIPMENT LIST	STAGE
23	THICKENER 1	Cyaniding
24	AGITATORS	
25	THICKENERS 1 AND 2	
26	CYANIDE DEGRADATION REACTOR	

Source: Ingex Group Miner S.A.S.

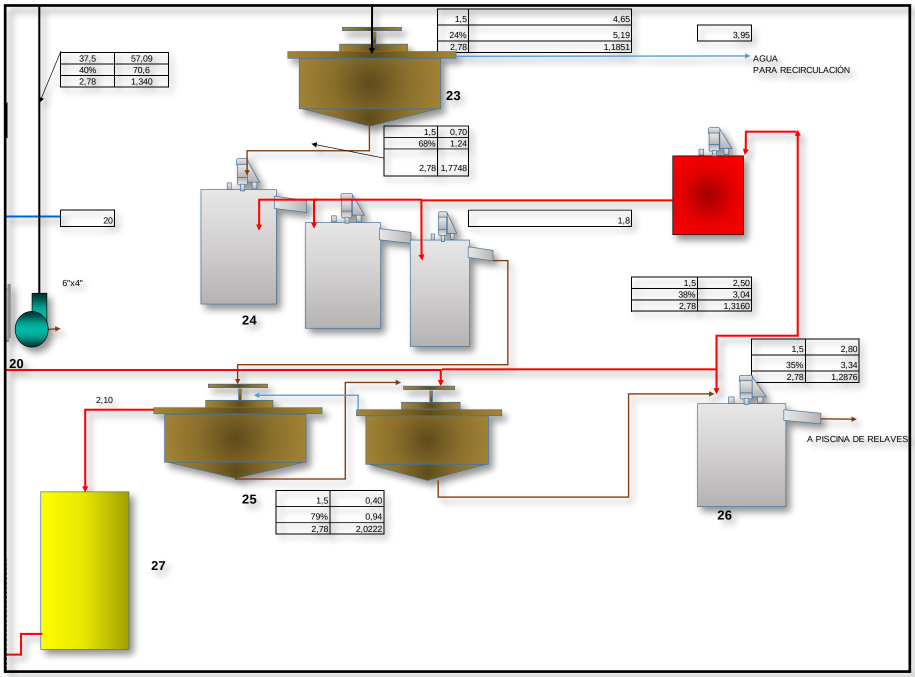

Illustration 2.3-17. Cyanidation stage flow Table.
Source: Ingex Group Miner S.A.S.

2.3.6.8 MERRIL CROWE

The rich solution must, first of all, be filtered in a clarifier composed of filter frames. The filtered solution is then dosed to a vacuum tower, where oxygen is extracted prior to the addition of zinc powder. In a mixing cone the rich solution is brought into contact with zinc powder. Zinc addition is controlled by a special feeder. Finally, the solution is filtered in a hydraulic filter press, where all the zinc precipitate loaded with values is collected. Periodically the precipitate is removed from the filter press, it is received in trays conditioned for this purpose. The pellet trays are loaded into a drying oven and finally melted in a tilting furnace with the appropriate flux mixture to obtain production (Table 2-19 and Illustration 2.3-18).

Table 2-19. Equipment to be used in the Merrill Crowe process and the gold quarter.

No	EQUIPMENT LIST	STAGE
27	RICH SOLUTION TANK	Merrill Crowe
28	CLARIFIER	
29	VACUUM TOWER	
30	VACUUM PUMP	
31	TRANSFER PUMP	
32	MIXER CONE	

No	EQUIPMENT LIST	STAGE
33	ZINC DOSIFIER	
34	PRESS FILTER PUMP	
35	FILTER PRESS	
36	DRYING OVEN	
37	TILTING OVEN	
38	CONCENTRATES PUMP	
39	CONCENTRATES HOPPER	
40	GEMENI TABLE 1000	
41	CRISOL OVEN	Gold room
42	POOR SOLUTION TANK	

Source: Ingex Group Miner S.A.S.

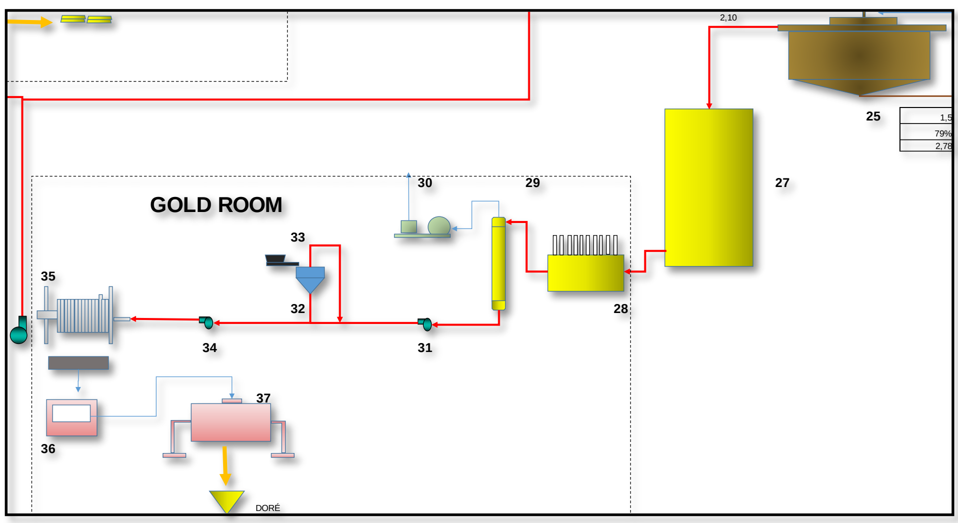

Illustration 2.3-18. Merrill Crowe stage flow Table.
Source: Ingex Group Miner S.A.S.

2.3.6.9 LABORATORY

In support of process control and mine operation operations, a laboratory consisting of the following equipment will be installed on site (Table 2-20):

Table 2-20. Laboratory equipment.

Amount	Preparation
2	Scale
1	Drying oven
1	Shredder
1	Sprayer

Amount	Preparation
1	Dust collector
2	Ro-tap
2	Series of sieves
Foundry and cupellation	
1	balance
2	Foundry Furnace
2	Cupellation furnace
Digestion	
1	extraction booth
1	heating plate
4	Stirrer
1	Muffle
Absorption and gravimetry	
1	Spectrophotometer
2	Balance
1	Ultrasound
1	Chemical trolley

Source: Ingex Group Miner S.A.S.

The laboratory has an approximate area of 13m x 17.5m and within it will be located: 1 office area, 1 reception and sample preparation area, 1 foundry and cupellation area, 1 atomic absorption area and a warehouse (see Illustration 2.5-9). The location of the equipment and the design of the laboratory is presented below (Illustration 2.3-19 and Illustration 2.3-20):

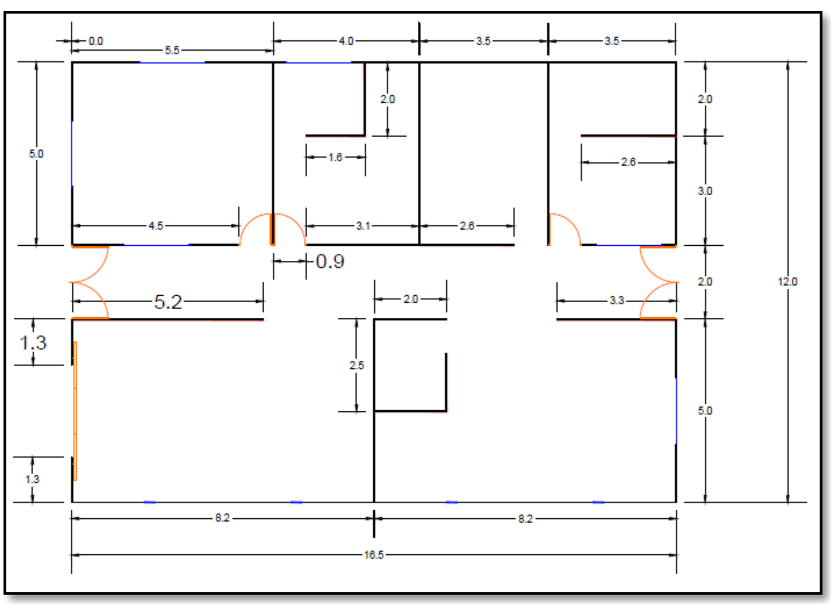

Illustration 2.3-19. Map of laboratory dimensions.
Source: Ingex Group Miner S. A. S.

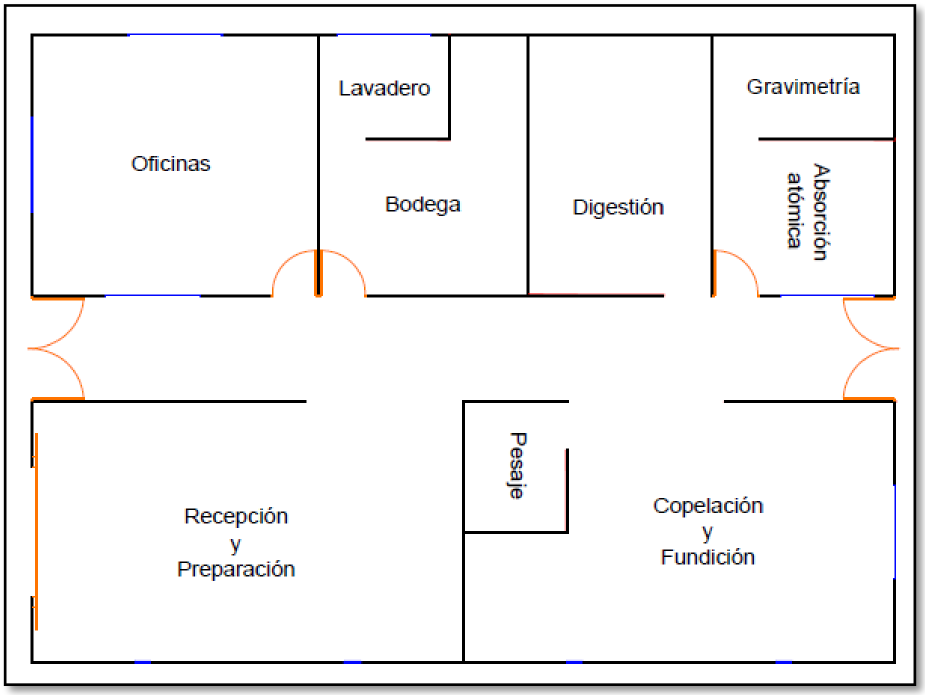

Illustration 2.3-20. Distribution map of the laboratory.
Source: Ingex Group Miner S. A. S.

2.3.6.10 TAILS GENERATED IN THE PROFIT PROCESS

The quantification of solid waste generated in the concentration and cyanidation stages is based on estimates of the solid waste generated during the day (Table 2-21), taking into account that the percentage of sulphides in the vein is close to 10%.

Table 2-21. Waste generated per day.

Stage	Solid waste (ton/day)
Tails Concentration and flotation (ton/day)	270
Cyanide tails (ton/day)	28,5
Foundry tails (ton/day)	1,5

The tails are the result of obtaining gold and are a by-product, are a mixture of crushed rock and water, the materials are concentrated by gravity and procedures are carried out to recover the water or evaporate it.

2.4 PROJECT CHARACTERISTICS

2.4.1 DESIGN AND MINING PLAN

2.4.1.1 OBJECTIVES OF MINING PLANNING

- Rational exploitation of mineral resources.
- Improve productivity and working conditions in the execution of the project.
- Make a schedule for a better disposition of resources (labor, tools, equipment, materials, among others).

2.4.1.2 GENERAL MINING PLAN.

Considering the project's initial approach, the basic operations of the mining plan are described below. The mining activity flow diagram for the study area is presented in Illustration 2.4 1.

For the implementation of mining planning, the amount of mining resources within the mining titling was analyzed. According to this amount, mining planning was designed for the short, medium and long term; time in each was designed to determine what the variation in production could be over different periods of time. Mining planning was carried out on a monthly (short-term), quarterly (medium-term) and annual (long-term) basis.

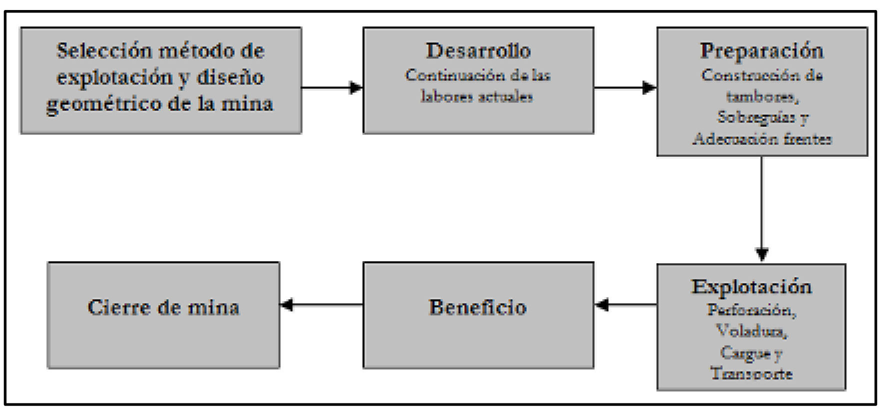

Illustration 2.4-1. General activities of mining planning.

The planning is formulated with the purpose of designing the sequence of exploitation that allows an optimal use of the deposit, in addition to knowing the possible quantity of both sterile and useful material in order to determine the requirements of machinery, inputs, as well as personnel necessary in such periods.

Illustration 2.4-2 shows an outline of the mining works and in-plant processes for the design and planning of the study areas.

Once the calculation of mining resources has been carried out, the method of exploitation is selected, the development and mining preparation tasks are designed. The first of these consists of carrying out all the works necessary to reach the mineral body (wells, nails, accesses, galleries, crosses, among others) and the second refers to the tasks necessary to subdivide and prepare the ore for extraction (guide, drum, on guide, among others). With the calculation of resources, the selection of the exploitation method, the development and preparation tasks, the reserves are calculated.

Currently, due to the ore body disposition and terrain conditions, the three mining options are being considered in the mining project area:

1. Opencast mining.
2. Underground exploitation.
3. Mixed exploitation.

By disposition of the body on the surface and its shape in depth, it is decided to make mixed exploitation of the minerals of interest.

The mining project El Pescado will apply the two mining methods (Surface and Underground), starting with the ore near the surface; later there will be a second stage where it is planned to continue the exploitation underground.

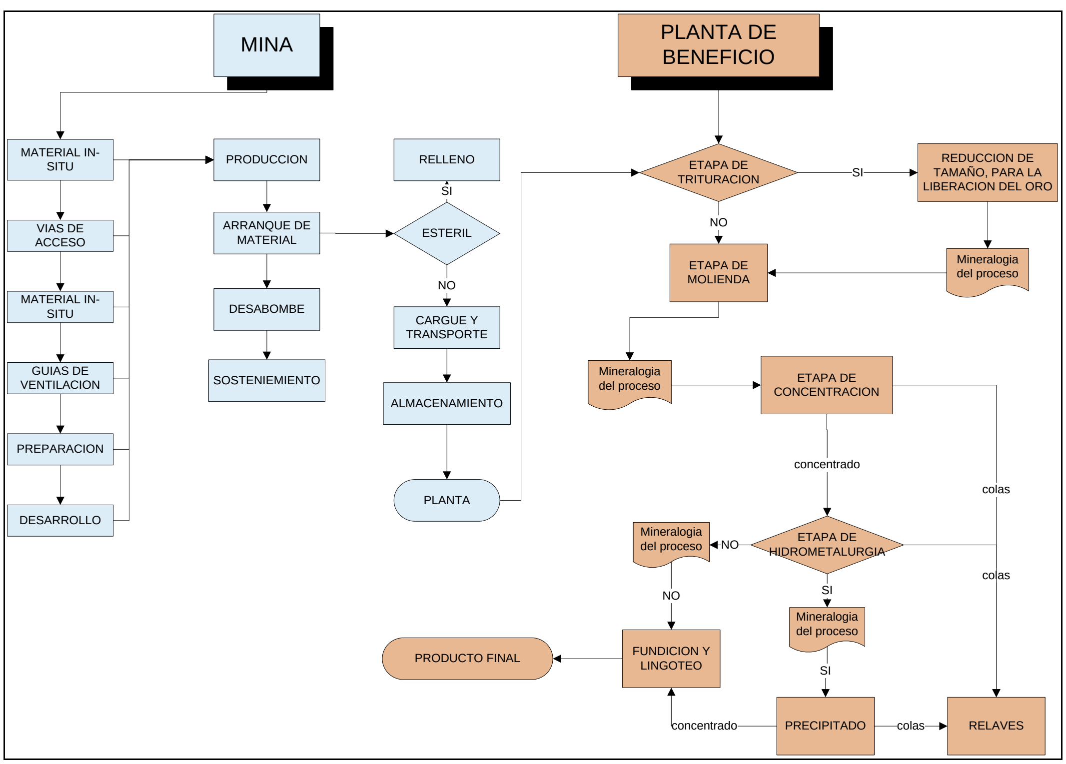

Illustration 2.4-2. General diagram of the mine.

2.4.1.3 ALTERNATIVE METHODS OF EXPLOITATION

The term "mining method" refers to an iterative process from both a temporal and spatial point of view, which allows the mining of the deposit to be carried out by means of a set of systems, processes and machines that operate in an orderly, repetitive and routine manner.

Two characteristic sectors are distinguished in the deposit, generally associated with the rock type and another sector of minor grades where the outcrops in veins predominate. Extraction by underground mining is planned to start from the old works.

2.4.1.3.1 Underground

2.4.1.3.1.1 Alternatives to exploitation methods

The criteria and guidelines to be taken into account when selecting the most suitable exploitation method for the exploitation of a mineral deposit are influenced by a series of parameters, whose domain varies with the geographical situation, level of technological and economic development of the region where it is located.

The plan to address the mining project is based on the selection of the mining method in such a way as to ensure that most of the reserves in the area are extracted. This method of exploitation must be safe, technically applicable and economically viable.

The advantages and disadvantages of existing mining methods are listed below.

2.4.1.3.1.1.1 Chambers and Pillars

It is a mining method executed for horizontal or low angle inclination work by opening multiple excavations or chambers, leaving parts of the useful mineral to support the vertical load (Illustration 2.4-3).

Abutments are left in the ore extraction to support the roof. The chambers are built in a multiple and parallel way. They are made as wide as the characteristics and strength properties of the roof and floor rocks and the same mineral allow. Inside the cameras, the operations of loading, transport, etc. are carried out. The operation is carried out in such a way that the roof of the chamber is kept in place, without the need for fortification for the duration of the exploitation. The pillars that remain between the different chambers leave.

Advantages

- High degree of flexibility.
- Repetitive cycles.
- Easily kindly.
- Enables improvements.
- Very selective system.

- Allows control of dilution.
- The system can be applied on multiple levels simultaneously.
- The same equipment can be used on several operational fronts.
- Easy ventilation.

Disadvantages

- Maintenance of roofs in active areas for long periods of time
- Costly roof maintenance in poor rock quality areas
- Mineral recovery decreases with depth
- Currently, efficient operation by cameras and pillars requires high investments in equipment.
- In very high layers, it is costly to maintain the stability of roofs on the exploitation fronts.

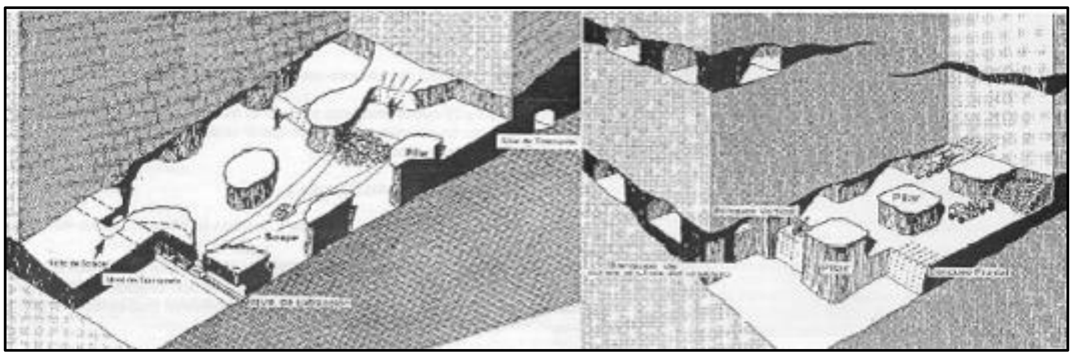

Illustration 2.4-3. Diagram of the camera and abutment method.
Source: Environmental Mining Guide. Operating module.

2.4.1.3.1.1.2 Cutting and filling

It is an ascending method, in which the ore is pulled out by horizontal and/or vertical strips, starting at the bottom of a pit and advancing in an ascending direction. When the entire strip has been removed, the corresponding volume is filled with sterile material, which serves as a working floor for the workers and at the same time supports the walls of the chamber (Illustration 2.4-4).

Advantages

- Recovery is more than 80%.
- It is highly selective, which means that sections of high tenors can be worked on and leave those areas of low tenors unexploded.
- It's a safe method.
- Applicable to heavily dipped reservoirs.
- It can achieve a high degree of mechanization.
- It is suitable for deposits with unsuitable physical and mechanical properties.

Disadvantages

- High operating cost.
- Low yield due to production stoppage as a result of filling.
- High consumption of fortification materials.

The scheme of the cutting and filling method

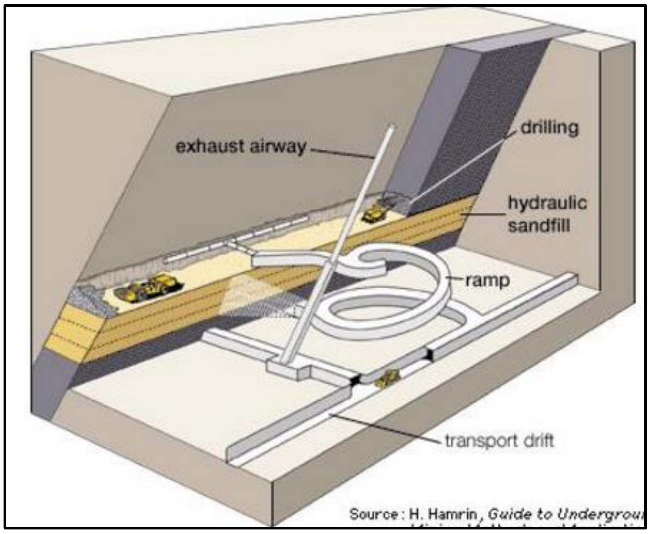

Illustration 2.4-4. Cutting and filling scheme

2.4.1.3.2 Design of the selected method

According to the described characteristics of the possible methods of exploitation, it was determined by using the method of cutting and filling, by the following characteristics:

- It will require a high rate of recovery of the ore at the stage of exploitation, where it will require more than 80% and for this to be done a selective work in the exploitation tasks.
- The sterile ore generated during the production stage will not be transported to the surface, since it will be stored on the operational front itself (that is, thanks to the high thickness of the vein, which generates enough space to store the material when extracted. With the blasting design, it is intended to generate a material smaller than 6 "so that it can be used as filler.
- The same filling material will help to support the rock column, thus avoiding possible subsidence processes and will also help to prolong the useful life of the dump sites located on the surface; these will only store the sterile waste generated during the development and preparation stages.
- The filling of the production blocks with the same sterile material generated will allow the fresh air to be oriented according to planning, and no more air will have to be injected to ventilate those abandoned tasks.

- The following diagram represents the selected method (Illustration 2.4-5):

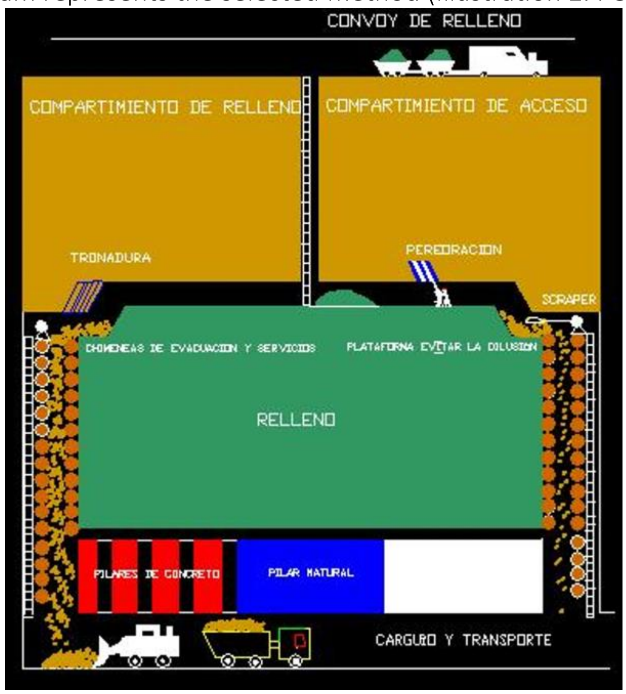

Illustration 2.4-5. Cut and fill scheme.

2.4.1.3.3 Operational Plan

In order to develop the proposed mining method, certain operations must be carried out within each stage of the mining cycle. Every 30 meters, the opening of drums will be started to prepare the production blocks or what can be called a production panel. Once the production block is ready, extraction activities will begin as the exploitation progresses. The vein shall be extracted to the surface, leaving the sterile vein in the space left by the holding in the respective block of production; the sterile vein generated in the development and preparation stages shall be brought to the surface for safe storage in the waste heap area. The sterile generated in production will be stored inside the mine (with blasting design expected grain size less than 6", in order to store more sterile material inside the exploited blocks), this is due to the large thickness of the vein, which when extracted, generates enough space to store the sterile.

2.4.1.3.4 Development work

The fundamental purpose of these tasks is to allow access to the deposit, divide it into levels and blocks of exploitation, as well as to allow the transportation of personnel, supplies and uprooted ore and mining services (electricity, ventilation ducts, compressed air and others). The development work will be carried out with the aim of preparing the blocks of exploitation, always looking for greater production at the lowest possible cost and the ease of transporting the equipment and materials needed for the work.

The development consists of the construction of a vertical well, then it will be carried out

Galleries or crusades to interceptor the vein. Within these tasks one has:

2.4.1.3.4.1 Vertical shaft

Used as the main access, it will consist of a vertical shaft of 5 m*5m, will have an initial length of 180 m, will be carried out on sterile (in order to increase mine recovery) and will be divided into two, one for the transport of ore and the other to extract the material to surface, both by means of a skip. This access will also serve as input for equipment and machinery (Illustration 2.4-6).

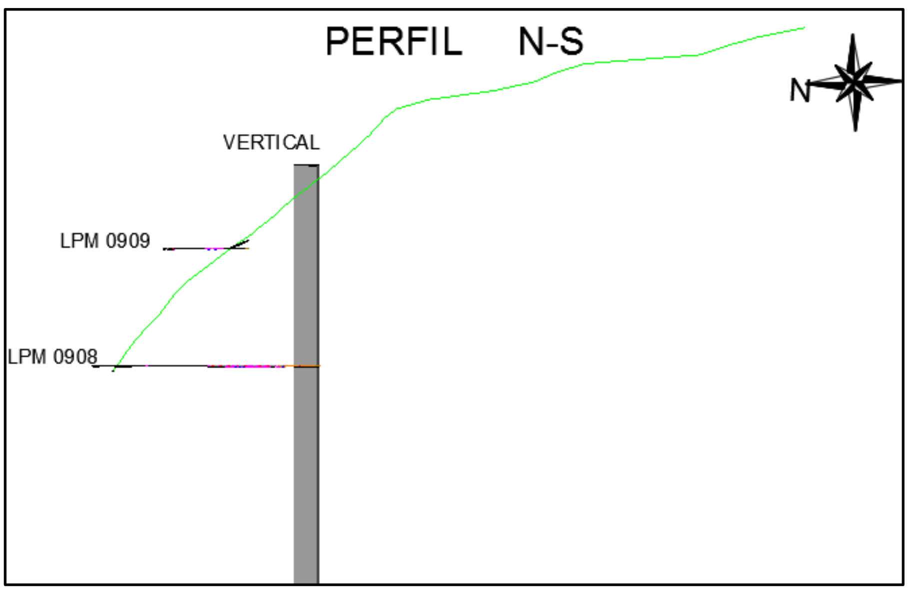

Illustration 2.4-6. Vertical well development.

2.4.1.3.4.2 Cross or Gallery

It will be built every 50 m (they will be perpendicular to the vertical well), it will have a section 5m*5m, its length varies according to depth (the greater the vertical depth, the longer the gallery will be until the vein is cut), it will have a 1% slope, for the evacuation of groundwater. These galleries will be used for the installation of the mining support such as energy, ventilation duct, compressed air, personnel access, as well as for the transportation of ore and sterile material to the storage hopper located in the vertical well (Illustration 2.4-7).

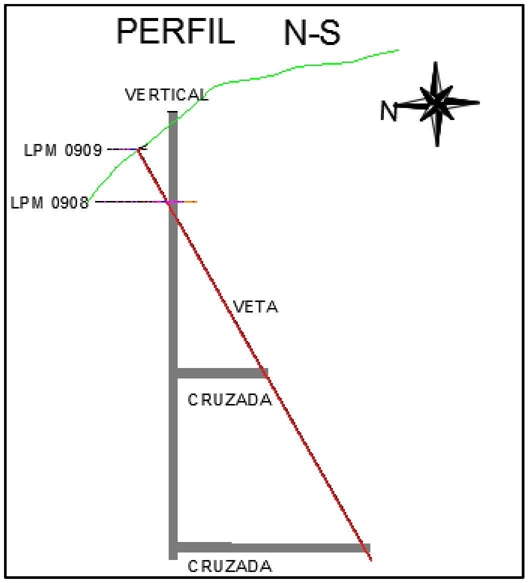

Illustration 2.4-7. Gallery and/or crossover.

2.4.1.3.4.3 Chimney or ventilation drums

It will have a section of 2m*2m, going from the inside of the mine to the surface. To be used in the ventilation circuit for air flow (Illustration 2.4-8).

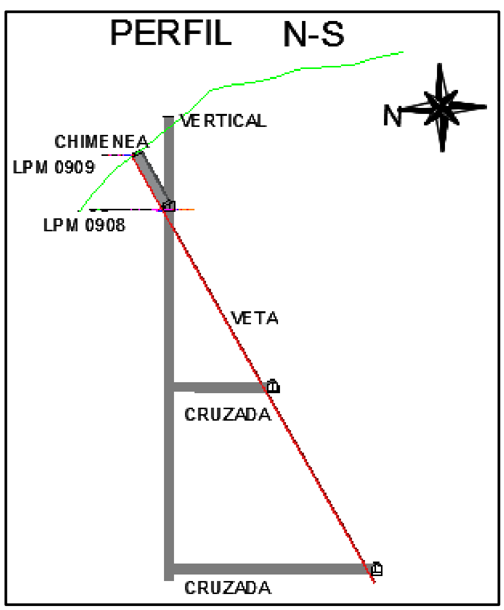

Illustration 2.4-8. Ventilation drum.

2.4.1.3.5 Preparation Work

These are those tunnels that will make it possible to divide the mineral body into exploitable blocks. Within these tasks one has:

2.4.1.3.5.1 Levels or guides

Once the vein is cut through the cross or gallery, the construction of a guide or level following the course of the vein begins. This guide will have a section of 5m*5m, its length will be equal to that of the grain in the course (Illustration 2.4-9).

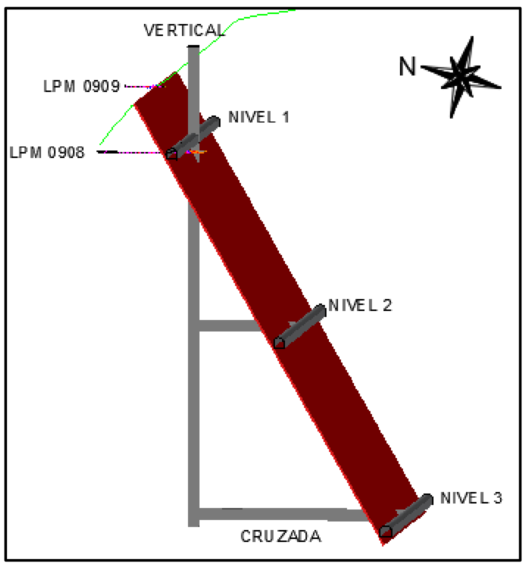

Illustration 2.4-9. Levels and guides in tunneling.

2.4.1.3.5.2 Production drums

Every 25 meters following the direction of the level, a drum used for material discharge will be started. This will have a section of 2m*2m, will serve as a communication between guides, as well as discharge of the ore, personnel passage and design of the ventilation circuit (Illustration 2.4-10).

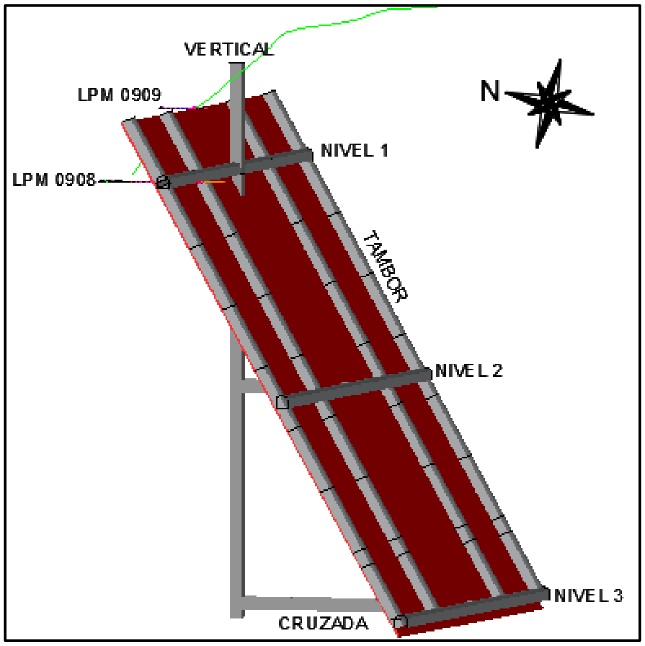

Illustration 2.4-10. Production drums.

At the intersection between the level and the drum, a hopper will be built to store and load material into the locomotive (Illustration 2.4-11), which will transport the material to the hopper located in the vertical well.

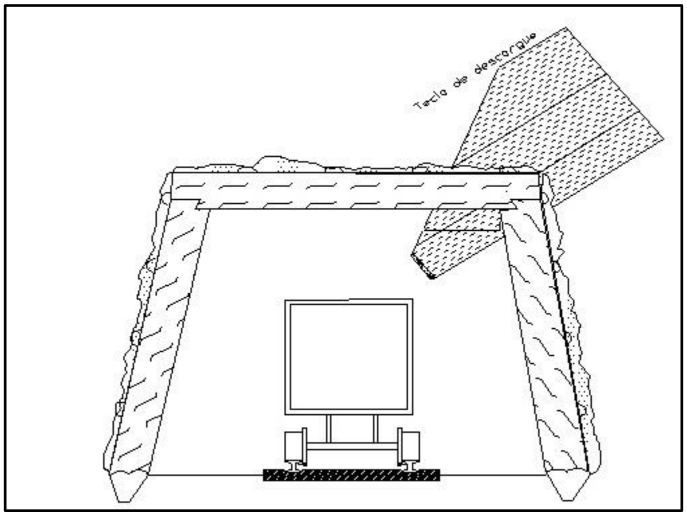

Illustration 2.4 11. Hopper to store cargo.

These are those tunnels that will be used to unload the ore from the blocks or panels of production to the hoppers that will load the metallic cars of 1.6 tons' capacity, these drums once the exploitation of the production blocks is completed, can be closed in order to prevent fresh air from returning to the higher levels without reaching the production fronts that are on the same level.

The drums are advanced every 25 meters along the stipulated levels, starting from this distance, with 2 m of discharge opening and 2m of height measured from the floor of the vein where a safety male will be left no less than four meters.

2.4.1.3.5.3 Over guides

In addition to delimiting the operating blocks, these tunnels are intended to allow the ventilation circuit to be made, in addition to generating free faces for greater blasting efficiency. The diagonals will be tapered from the production drums.

The guides will be built 4 meters above the levels or guide, which is the strip made up of the safety male, the development will be made to communicate two production drums that are contiguous, and its section will be 2m*2m.

2.4.1.3.6 Production tasks

Production work will commence once the preparation of the operational panels has been completed. The different tasks required for mineral extraction, development and preparation are described below.

2.4.1.3.6.1 Drilling and blasting

The drilling will be done mechanically, for this purpose we have two kinds of equipment, a Jumbo Sandvick DR210 with 3.3 m drill bits and a Toyo 280 L pneumatic drill with column and different lengths of drill bits, from 0.9 m to 2.4 m. The drilling diameter ranges from 38 mm to 44 mm, the latter being used in Jumbo.

The jumbo will be used in development and preparation work such as crosses and levels, the Toyo hammer will be used in production work such as drums and farm fronts. The air for the pneumatic perforation will be supplied by a Kaeser 1,240 CFM electric compressor, this compressor was sized to work with different hammers at the same time.

The explosive to be used as a base load will be Indugel Plus 32*250mm and 38*250mm, Anfo in bulk will be used as an explosive column (in areas where there is no humidity). As initiator, Nonel ms detonators of different delay will be used; these detonators will be tied by means of a 3g/m detonating cord, and the last one will be initiated with common fulminant number 8 that is encased in a safety fuse. The system of loading explosives is the same for all tasks, the only thing that will vary is the quantity of explosives to be used.

The drilling system for each job is shown below (Illustration 2.4-12 to Illustration 2.4-14).

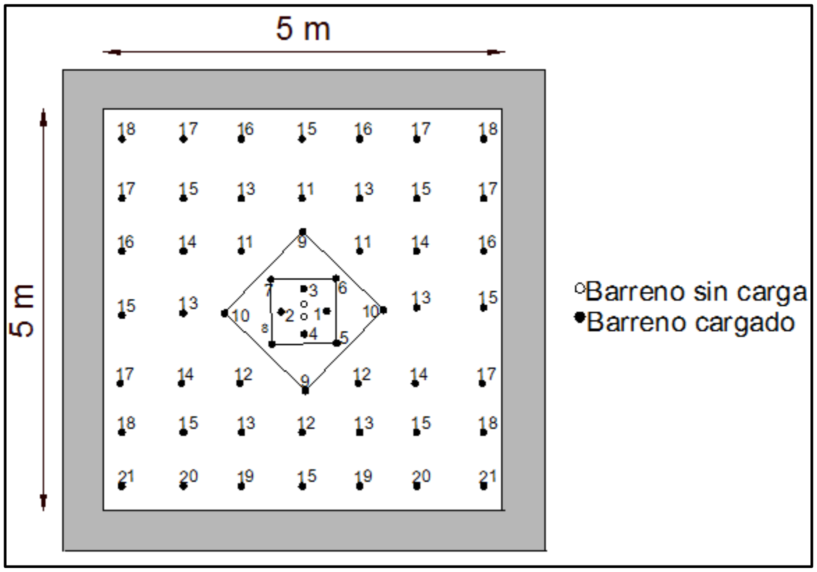

Illustration 2.4-12. Vertical well drilling scheme and initiation sequence.

Variable Income	
Perforation length (m)	1,2
Blasting efficiency	95%
D_1 Drilling diameter (mm)	38
D_2 Empty hole diameter (mm)	51
# Empty Drills	2
Explosive cartridge diameter (mm)	32
Explosive density (g/cm^3)	1,2

Output variables	
Blasting advance (m)	1,14
Q_f Explosive charge concentration (Kg/m)	0,40
Load factor (kg/m^3)	1,09
B Burden (m)	0,64

Front zone blasting	**Burden (m)**	**Spacing (m)**	**Bottom load length (m)**	**Load concentration**		**Featured**
				Bottom (m)	**column (m)**	
Strain (first section)	0,08	0.15	0,5	0,1	0,5	0,2
Strain (Second section)	0,11	0.2	0,5	0,1	0,4	0,3
Strain third section	0,23	0.2	0,5	0,1	0,4	0,3
Strain fourth section	0,48	0.3	0,5	0,1	0,4	0,3
Assistants	0,64	0,70	0,4	0,1	0,20	0,32
Shelters	0,57	0,63	0,2	0,1	0,14	0,32
Gables	0,57	0,63	0,2	0,1	0,16	0,32
Pateros	0,64	0,70	0,4	0,1	0,40	0,13

Explosive	Total consumption by blasting
Indugel (kg)	27.5
Anfo (kg)	0
Total	27.5

Material	Quantity per blasting
Mineral (ton)	0
Sterile (ton)	63
Total (ton)	63

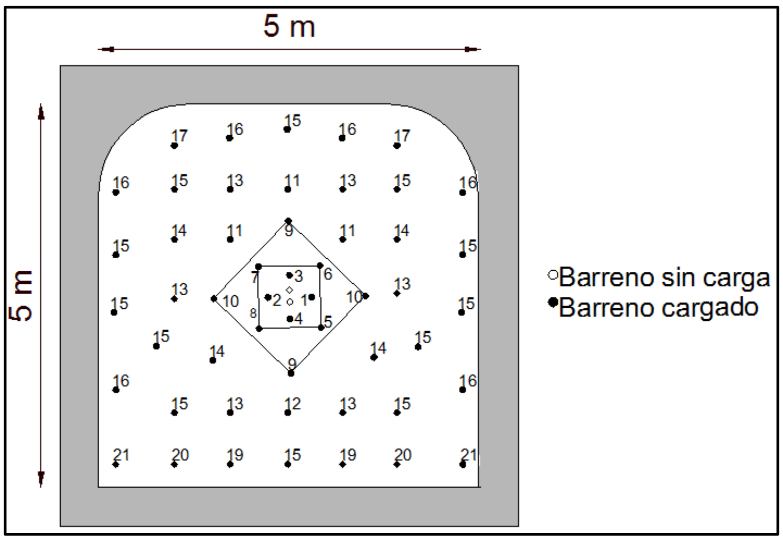

Illustration 2.4-13. Drilling scheme and sequence of Gallery initiation, Crossover and levels.

Variable Income	
Perforation length (m)	3,2
Blasting efficiency	95%
D_1 Drilling diameter (mm)	42
D_2 Empty hole diameter (mm)	51
# Empty Drills	2
Explosive cartridge diameter (mm)	38
Explosive density (g/cm^3)	1,2

Variables Output	
Blasting advance (m)	3,04
Q_f Explosive charge concentration (Kg/m)	0,40
Load factor (kg/m^3)	2,72
B Burden (m)	0,64

Front zone blasting	Burden (m)	Spacing (m)	Bottom load length (m)	Load concentration		Featured
				Bottom (m)	Column (m)	
Strain (first section)	0,08	0.15	1,3	0,1	1,2	0.3
Strain (second section)	0,11	0.2	1,3	0,1	0,8	0.3
Strain third section	0,23	0.2	1,3	0,1	0,8	0.3
Straightens fourth section	0,48	0.3	1,3	0,1	0,6	0.3
Assistants	0,64	0,70	1,1	0,1	0,20	0,32
Shelters	0,57	0,63	0,5	0,1	0,14	0,32
Gables	0,57	0,63	0,5	0,1	0,16	0,32
Pateros	0,64	0,70	1,1	0,1	0,40	0,13

Explosive	Total consumption by blasting
Indugel (kg)	10
Anfo (kg)	154
Total (kg)	**164 kg**

Material	Quantity per blasting
Mineral (ton)	0
Sterile (ton)	187
Total (ton)	**187**

The amount of material per blasting was calculated for the crusade only (this work is performed only in sterile). In level the amount of ore and sterile varies according to the thickness of the vein, however expects 80 tons of ore and 107 tons of sterile.

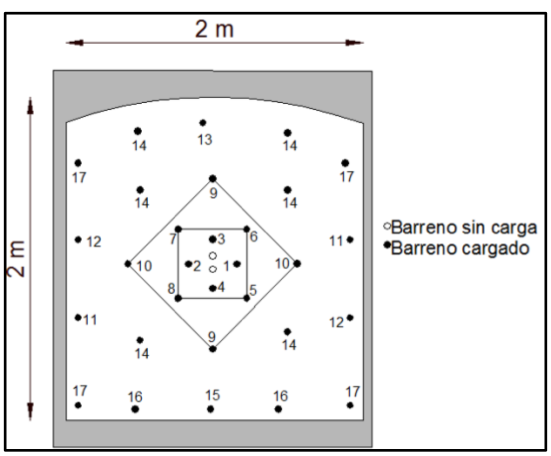

Illustration 2.4-14. Drilling pattern and sequence of drums and over-guides initiation.

Variable Income	
Drilling length (m)	1,2
Blasting efficiency	95%
D1 Drilling diameter (mm)	38
D2 Empty hole diameter (mm)	51
# Empty holes	2
Explosive cartridge diameter (mm)	32
Explosive density (g/cm3)	1,2

Variables Output	
Blasting advance (m)	1,14
Qf Explosive charge concentration (Kg/m)	0,40
B Burden (m)	0,64

Front zone blasting	Burden (m)	Spacing (m)	Bottom loading length (m)	Load concentration		stemming
				Bottom(m)	Column (m)	
Strain (first section)	0,08	0,12	0,5	0,1	0,5	0,2
Strain (second section)	0,11	0,2	0,5	0,1	0,4	0,3
Strain third section	0,23	0,3	0,5	0,1	0,4	0,3
Strain fourth section	0,48	0,3	0,5	0,1	0,4	0,3
Assistants	0,64	0,70	0,4	0,1	0,20	0,32
Shelters	0,57	0,63	0,2	0,1	0,14	0,32
Gables	0,57	0,63	0,2	0,1	0,16	0,32
Pateros	0,64	0,70	0,4	0,1	0,40	0,13

Explosive	Total consumption by blasting
Indugel (kg)	16 Kg
Anfo (kg)	0
Total (kg)	**16**

Material	Quantity per blasting
Mineral (ton)	0
Sterile (ton)	11,6
Total (ton)	**11.6**

The calculation of the quantity of material per blasting was made for discharge drums (according to the expected development, everything will be sterile), in production drums the sterile will be 0 tons and 11.6 tons of ore is expected.

2.4.1.3.6.2 Loading and transport

The loading and transport system will be carried out in different ways depending on the activity and location.

For mining development work such as crusading and preparation as a guide or level, the Sandvick LH204 low profile loader with a 3-ton bucket capacity and HT 10 low profile dump trucks with a 10-ton capacity will be used for the load-transport system (Illustration 2.4-15).

Illustration 2.4-15. Example illustrating loading and transport.

Once the blasting has been carried out and the site is in ideal conditions according to the decree 1886 of 2015, a B2F-211 double-drum Slusher with a 1-tonne 30 HP motor will be used on the operational fronts of the loading and transport system, to transport the material from the overhead track to the drum, where the storage hopper is located, which will be responsible for loading locomotive WR-9 of 2.5 tons per battery, with hydraulic braking system with a dragging capacity of 17 tons. The wagons to be carried by the locomotive will have a capacity of 1.6 tons (Illustration 2.4-16 and Illustration 2.4-17).

The slusher system and wagon design is shown below:

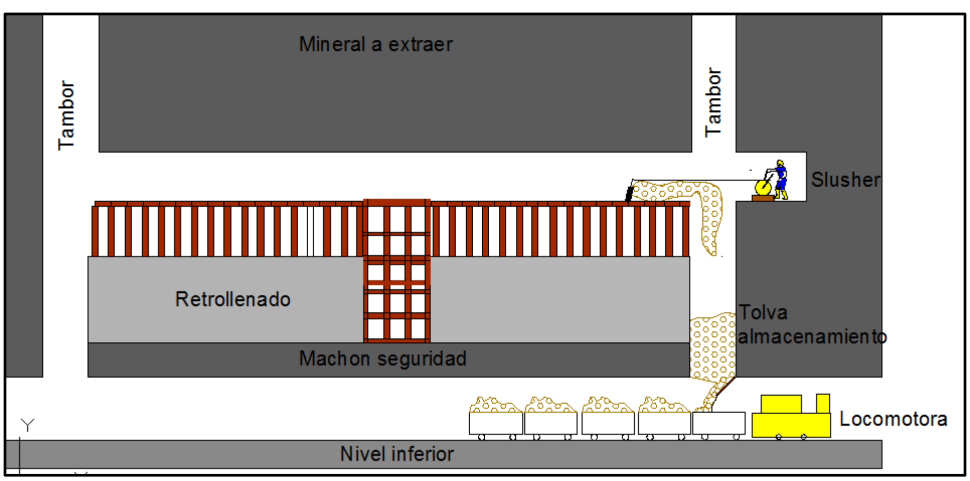

Illustration 2.4-16. Mining exploitation scheme.

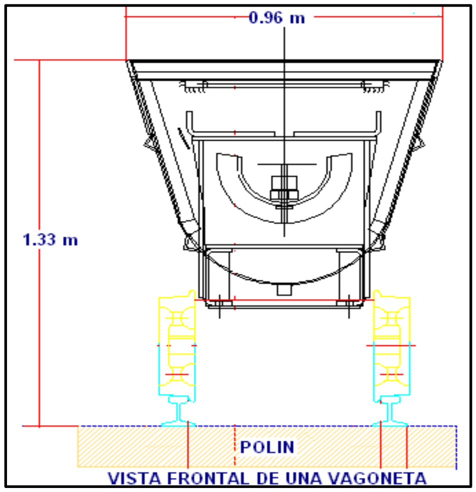

Illustration 2.4-17. Trolleys.

The material generated from blasting will be stored in the main hopper (located in the vertical well), (Illustration 2.4-18) to remove the material by skip (capacity 5 tons) to the surface, pulled by a 1" cable and 50 HP three-phase motor at 440V.

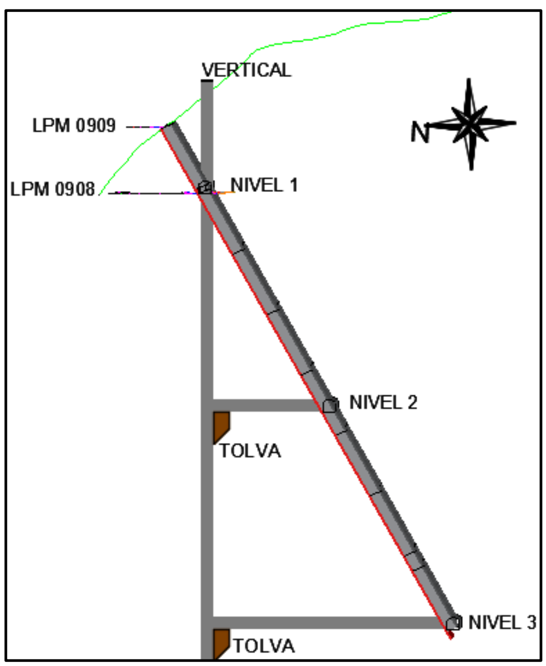

Illustration 2.4-18. Head frame.

Raging

The gauge refers to the track width, that is, the space between track and rail. The width to be used according to the specifications of the locomotive will be 27" (Illustration 2.4-19 to Illustration 2.4-21).

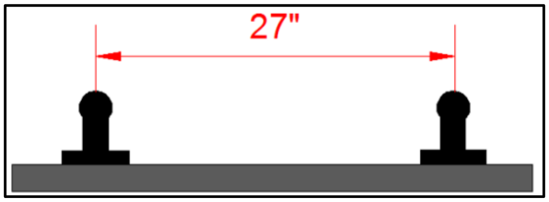

Illustration 2.4-19. Distance between rails.

The rail to be used shall be 25 Lb/yd, 5"*7" sleepers shall be used and the space between them shall be 60 cm.

Illustration 2.4-20. Rail.

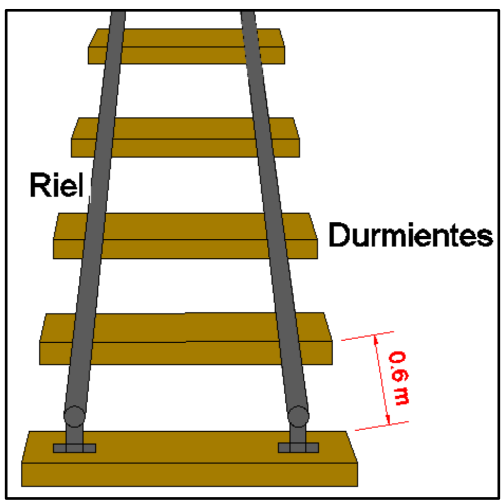

Illustration 2.4-21. Rail system.

2.4.1.3.6.3 Sustainability

There are different methods of support:

In the vertical, crossed and level well, 3-piece Z -U25 horseshoe type steel support will be used; formed by upper beam, two supports, 4 arches clamp, 2 feet support. The objective of these arcs (Illustration 2.4-22) is to secure these areas over the long term (they will be the busiest during the life of the mine).

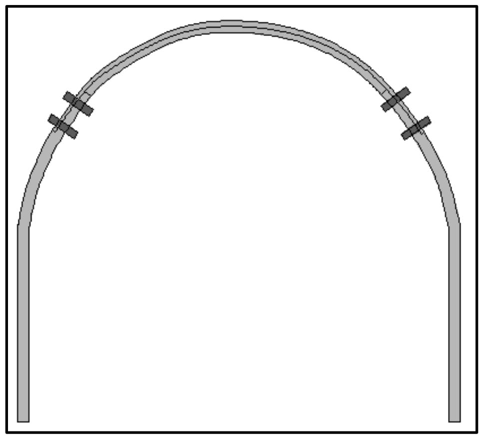

Illustration 2.4-22. Steel arches.

In the guide rails, drums and farm blocks, wood shall be used for support (Illustration 2.4-23). In the area there are different types of wood such as Caguí, Sajino, Coco Cristal, Coco rojo, Sapán among others; however, and according to the experience in working with this type of wood, Caguí is the wood that best fits these needs, mainly due to its resistance to compression and humidity.

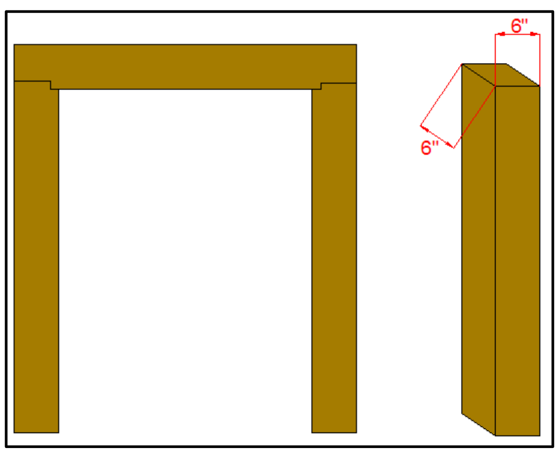

Illustration 2.4-23. Holding German door.

The wood used will be 6"*6" 3m long levers, 3"*8" 3 m long planks will be used for the roof and 2"*8" x 3m long planks for the walls. In places where there are only problems in the ceiling and the walls are firm, saddles will be placed (Illustration 2.4-24).

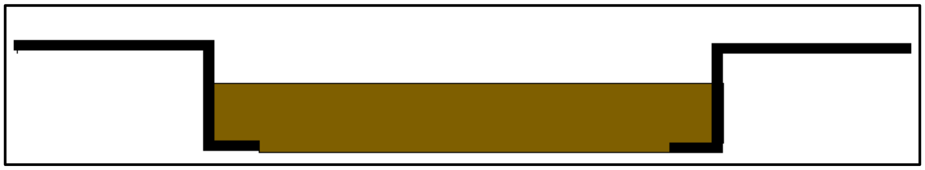

Illustration 2.4-24. Chair.

The saddle consists of placing the cap on two corrugated rods that are anchored to the right and left wall. This saddle omits the levers.

6"*6" wooden baskets shall be used on the farm fronts and filled with sterile material. The purpose of these gray hairs is to secure the roof where the material has been removed (Illustration 2.4-25).

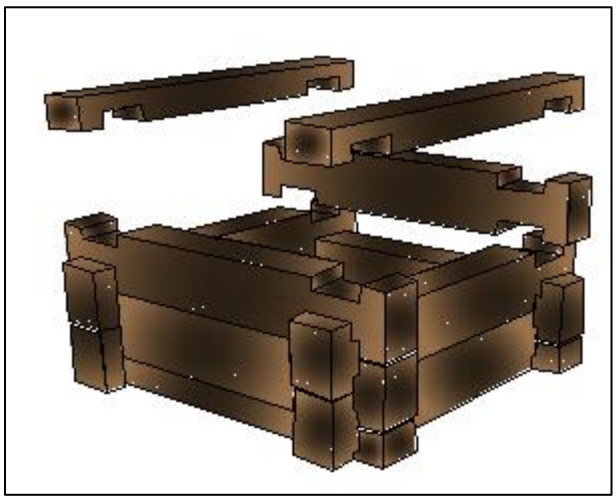

Illustration 2.4-25. Support with baskets.

Split set bolts: To be used for temporary supports; once the bolt enters the drilled hole it expands (Illustration 2.4-26).

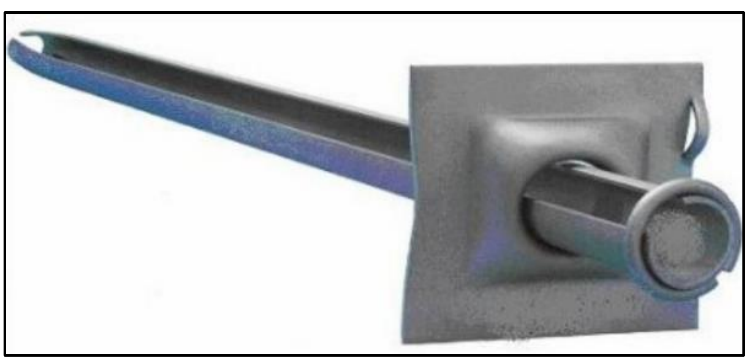

Illustration 2.4-26. Split Bolt Set.

2.4.1.3.6.4 Ventilation

In order to calculate the ventilation system, the current regulations of decree 1886 of 2015 were used, where for the personnel it specifies that:

The minimum volume to be circulated in underground labor, which is calculated taking into account shift of greater personnel, elevation this one on the level of the sea, or harmful vapors, explosive and flammable gases and gases product of blasting, according to the following parameters:

Mineral excavations up to one thousand five hundred meters (1,500 m) above sea level: three cubic meters per minute (3 m3/min) for each worker; and, mining companies of one thousand five hundred meters (1,500 m) and above sea level: six cubic meters per minute (6 m3 /min) for each worker.

The operation is below 1,500 meters above sea level, so a flow rate of 3m3/min was used for the calculation.

For the express machinery:

In underground work where there is transit of diesel machinery (engines, loaders, among others), must the following volume of air for carbon monoxide content of the exhaust:

Six cubic meters (6 m3) per minute for each horse of (H. P.). the machinery, when carbon monoxide content in gases of not more than zero point twelve by (0.12%); or one thousand two hundred (1,200) parts per million ppm.

Four cubic meters (4 m3) per minute per H. P. of the machinery, where the carbon monoxide (CO) content in the exhaust is not greater than zero point zero eight per (0.08%), or eight hundred (800) parts per million ppm'.

The flow rate required to dilute the gases from the diesel engine was calculated at 6 m3 per minute per HP.

For the calculation of the critical flow rate, the amount of air required per person, in machinery and explosives, the calculation of each of these was analyzed:

For personnel

It was calculated with the maximum number of people inside the tunnel in one shift and multiplied by the amount of air needed for each of these.

$Q_{personal}$= # People*3m^3/min

$Q_{personal}$ = 30*3 m^3/min $\Longrightarrow$ $Q_{personal}$ = 90m^3/min

For diesel machinery you have (Table 2-22):

Table 2-22. Diesel engine power.

Quantity	Name	Reference	HP
3	Jumbo	DD210	100
5	dump truck	HT-10	180
3	Charger LHD	LH 204	45
6	Slusher	B2F-211	30

The amount of air required (assuming everyone works at the same time) according to the specifications of the equipment is:

$Q_{equipment}$ = HP of equipment * 6m^3/min

$Q_{equipment}$ = 1515*6m^3/min ⟹ $Q_{equipment}$= 9.090 m^3/min (151.5 m^3/s)

For the explosive, you have it:

Of the explosives to be used, Anfo produces the largest quantity of gases, 1 kg of Anfo produces 17 L of CO and 4 L NXOY.

The formula for calculating the explosive flow rate required to dilute gases is:

$Q = \frac{V}{t_d} * \ln \frac{(K_i)}{(K_f)}$ where:

V = Control volume (Volume of the operating front)

td = Dilution time (45 min)

Ki = Initial concentration (m3 of gas generated per kilogram of explosive)

Kf = Final concentration (according to decree 1886 of 2015)

$Q_{explosives}$ = 88 m^3/min for CO y 312 m^3/min for N_xO_y

Calculated the critical flow rate (diesel machinery) we proceed to calculate the tunnel resistance with the following formula

$$R = 15{,}6\frac{\lambda \times P \times L}{S^3}$$

ʎ = Resistance generated by walls, ceilings and floors over the air

P = Perimeter of gallery section (m)

L = Gallery length (m)

S = Cross-section (m2)

Equivalent tunnel strength is 5,850 Kµ

The estimated power of the ventilation motor is as follows:

$$\text{Power (Kw)} = \frac{\Delta H * Q}{101{,}9 * n}$$ where:

ΔH = total pressure

Q = Air flow rate

n = Aerodynamic performance (80%)

P = 112,5 Kw (150 HP).

The characteristic curve of the mine is (Illustration 2.4-27).

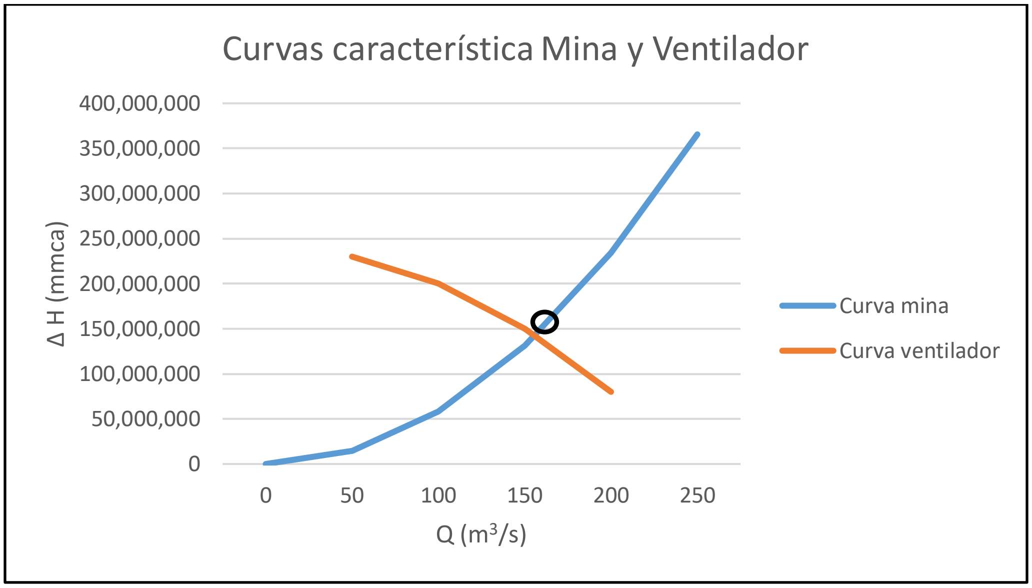

Illustration 2.4-27. Mine characteristic curve.

The fan curve meets the mine's flow requirements; however, a 90 HP auxiliary fan will be used at the beginning of crusade 2.

Also, to reduce the dilution time of gases, an extractor will be placed in each of the chimneys (2 in total) of 40 HP.

The calculation for the power of these engines was carried out with the same formulas as above.

The final ventilation circuit is as follows (Illustration 2.4-28):

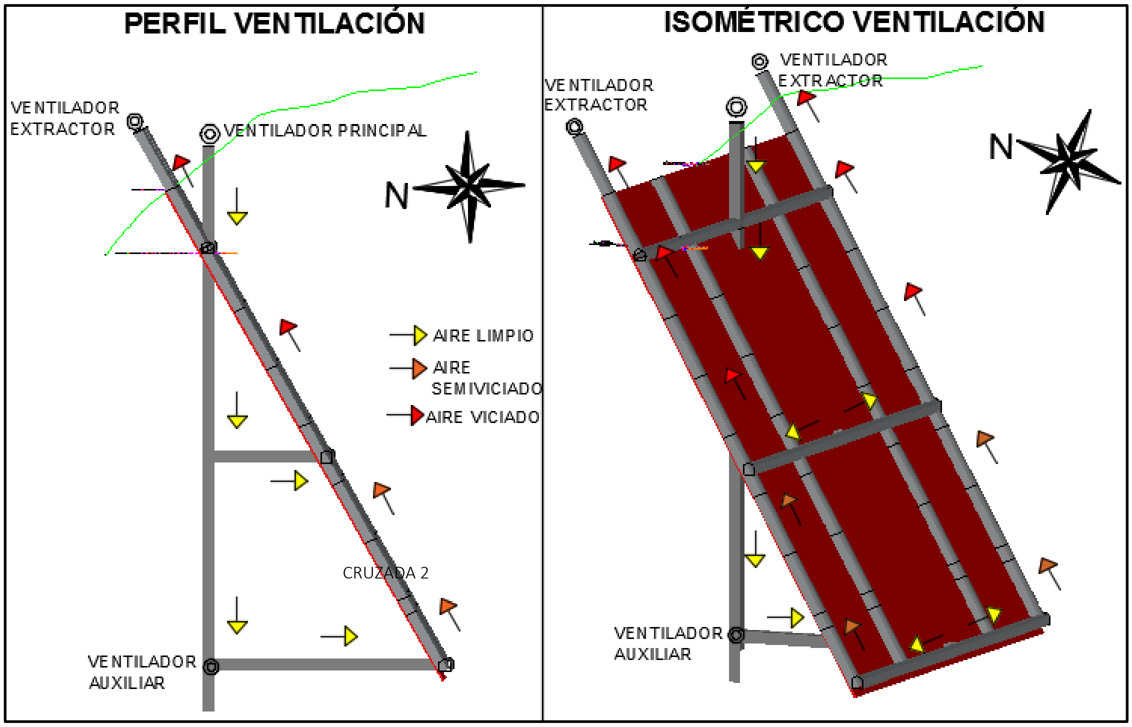

Illustration 2.4-28. Ventilation circuit.

2.4.1.3.6.5 Pumping

Although the hydrogeology study has shown a place with no water depth, a pumping system has been designed for the mine. This system would have two low 10 HP turbines, linked in series, to carry the water to the storage tank, with the objective to decant the solids. The water is removed from the tanks and expelled to the surface by means of a high 25 HP pump.

With this pumping system it is possible to extract up to 28 L/s of water from inside the mine. The pumping system scheme is sampled below (Illustration 2.4-29):

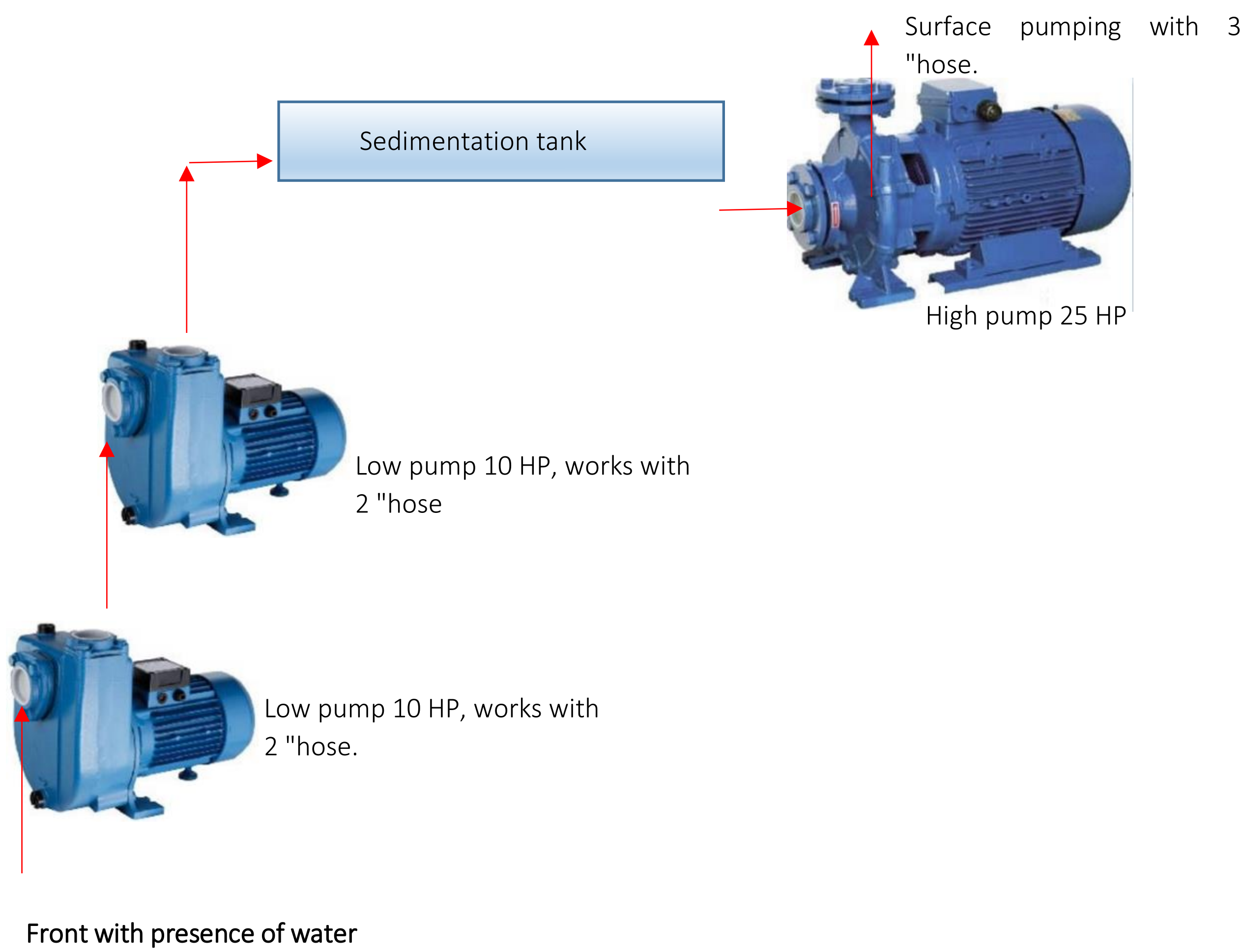

Illustration 2.4-29. Pumping scheme.

2.4.1.3.6.6 Un-pump.

In order to reduce the risks to personnel, it will be mechanically disengaged using the Scamec 2000 M diesel-powered equipment (Illustration 2.4-30). This activity is carried out after each blasting, before entering the mining front, it starts 15-20 meters backwards until reaching the front (also weekly there will be scheduled a campaign of decontamination in the mining activity zones). The objective is to detach those blocks that are loose in gables and roofs.

Illustration 2.4-30. Unburden.

2.4.1.1.1 Required equipment and machinery

The machinery and equipment used in the different stages of the project are shown below (Table 2-23, Illustration 2.4-31 to Illustration 2.4-39):

Table 2-23. Equipment and machinery.

Amount	Name	Reference
3	Air hammer	TY-280 L
2	Jumbo	DD210
1	Electric compressor	FB-620 C
3	Tipper	HT-10
3	LHD Charger	LH 204
3	Slusher	B2F-211
2	Locomotive	WR9
1	Unburden machine	Scamec 200
2	Winch	-

Illustration 2.4-31. Toyo 280 pneumatic hammer.

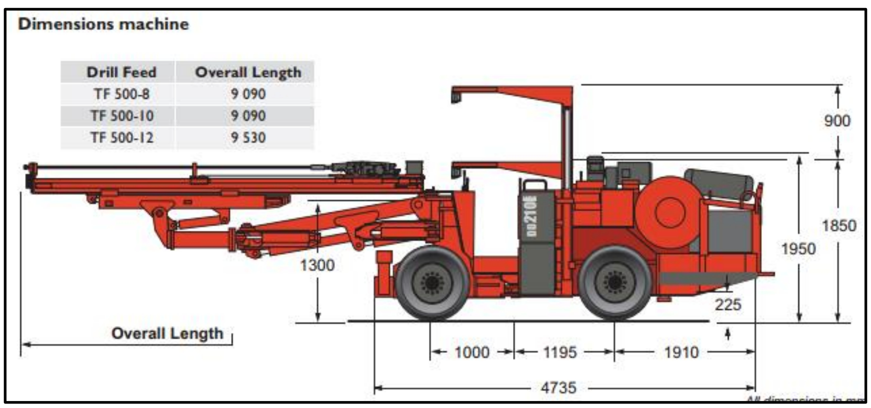

Illustration 2.4-32. Jumbo DD210.

Illustration 2.4-33. Electric compressor FB 620 C.

Illustration 2.4-34. Tipper under profile HT 10.

Illustration 2.4-35. Low profile charger LH 204.

Illustration 2.4-1. Slusher B2F-211-E.

Illustration 2.4-37. Battery-powered locomotive WR-9.

Illustration 2.4-38. Winch of 5 tons.

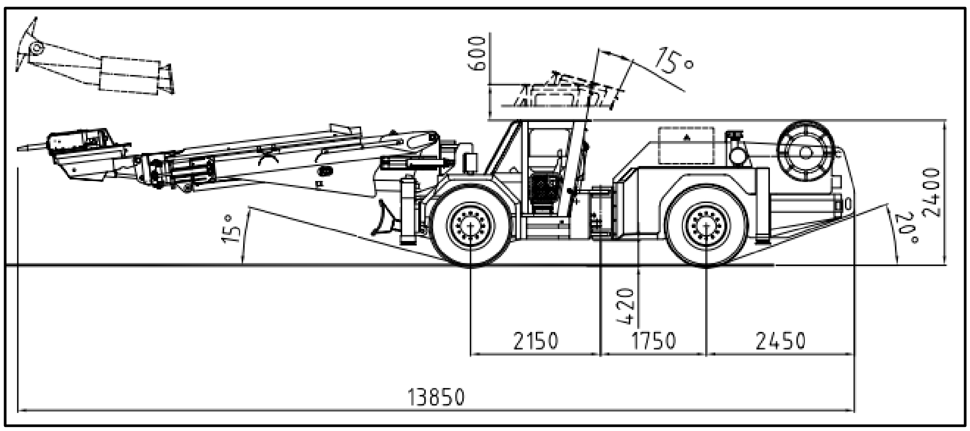

Illustration 2.4-39. Scamec 2000 M Unburden machine.

2.4.2 LABOUR ORGANISATION

The organization table of the mine consists of a project manager, who is in charge of the mine manager, plant manager, maintenance manager and the administration area (Illustration 2.4-40).

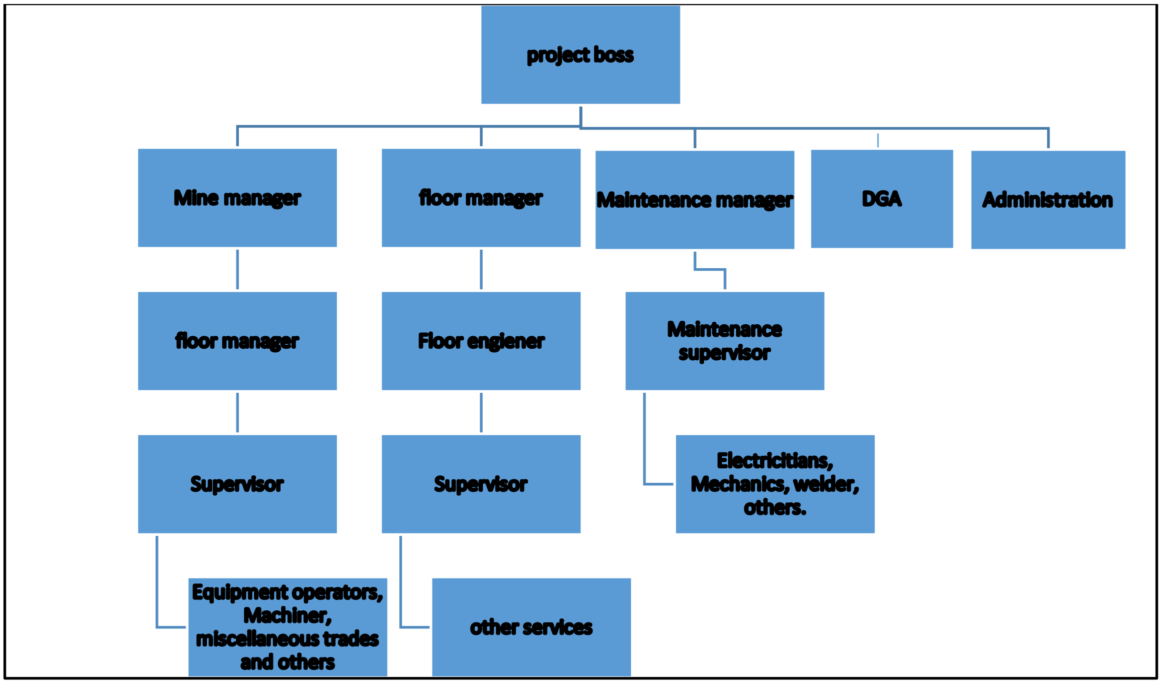

Illustration 2.4-40. Hierarchical diagram of the human resources needed in the mine.

The Mine, Plant and Maintenance Manager is in charge of one supervisor per shift.

2.4.2.1 REQUIRED STAFF

The personnel required at the mine will be (Table 2-24):

Table 2-24. Personnel necessary for mining work.

Area	Amount	Job title	Development	Preparation	Production
MINE	2	Winch operator	X	X	X
	2	Machinist		X	X
	2	Machine Assistant		X	X
	5	Other services	X	X	X
	2	Jumbo operator	X	X	
	2	Jumbo Assistant	X	X	
	2	Charger operator	X	X	
	2	Dump truck operator	X	X	
	2	miner	X	X	X
	2	Supervisor	X	X	X
	2	Slusher operator		X	X
	2	Locomotive operator		X	X

Area	Amount	Job title	Development	Preparation	Production
	1	Mine Engineer	X	X	X
	1	Mine Boss	X	X	X
MAINTENANCE	1	Welder	X	X	X
	1	Electricians	X	X	X
	3	Mechanics	X	X	X
	1	Maintenance boss	X	X	X
ADMIN	1	Logistics	X	X	X
	1	HR professional	X	X	X
	1	Administrators	X	X	X
ALL	1	Project Boss	X	X	X

This would be the personnel to be used at most; it would be in the first stage of the project which consists of widening the LPM0908 tunnel and carrying out the development work as vertical and crossed. The staff will not be used in the construction of a mineral processing plant or infrastructure, as this work will be carried out once the Mining Concession 5969 begins, i. e. all infrastructure will be part of this mining title and the 5969 will utilize this infrastructure.

2.4.3 ENERGY AND FUEL REQUIREMENTS

The installed power capacity for the project has been calculated in 1200 KVA; this was calculated according to the amount of equipment and specification of these (compressor, Jumbo, Slusher and others)

Estimated fuel consumption, used mainly for tippers and loaders will be 2,180 gallons/month.

2.4.3.1 PRODUCTION

According to the calculation of reserves in the license, an approximate analysis of the useful life of the deposit was carried out, achieving a fixed period of 5 years with a variable production; beginning the first year with 16 t/day (the first 8 months are for widening the tunnel and carrying out works of infrastructure development and readjustment), the second year a production of 33 t/day is expected and from the third year onwards a production of 45 t/day is expected.

The following is a graph of the annual time-dependent extraction scale (Illustration 2.4-41).

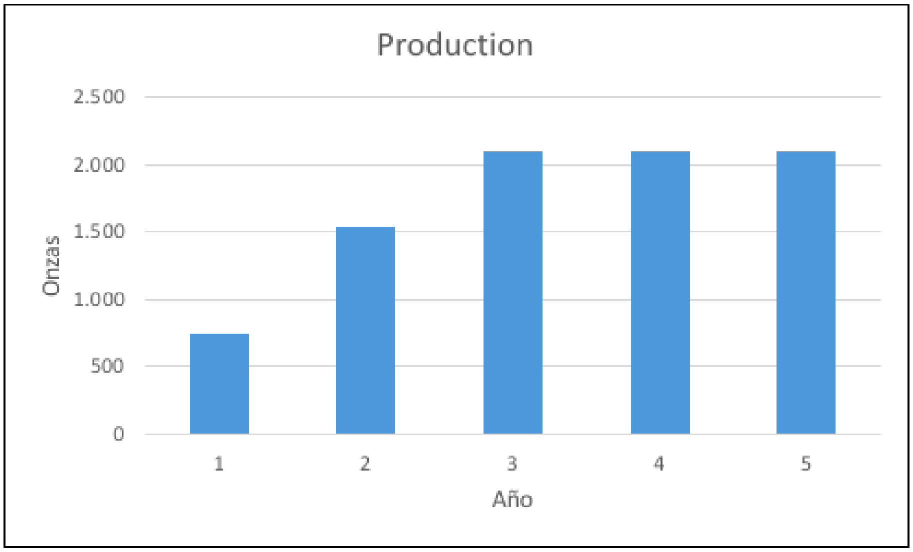

Illustration 2.4-41. Annual production.

2.4.3.1.1 Mine useful life

According to the calculation of resources and projected production a useful life of 5 years is initially obtained. As extraction proceeds, exploration will continue to increase the number of reserves.

2.4.3.1.2 Volumes of sterile to be removed

The amount of sterile to be removed in development, preparation and production is shown below (Table 2-25):

Table 2-25. Sterile.

WORK	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Development (ton)	7.150	3.125	0	0	0
Preparation (ton)	0	0	1.850	1.850	1.850
Exploitation (ton)	0	0	0	0	0

Year 1 and 2 generate the greatest amount of sterile, due to the development work that will be carried out (vertical and crossed) during this period.

There will be no sterile generation in the exploitation panels, this is due to the mining design which adjusts to the thickness of the vein.

2.4.3.1.3 Mineral Planning

The objective of mining planning is to establish what volume of ore, with what location and at what time to extract it in order to maintain monthly production as planned in preliminary stages. This planning will be monthly in the short term, annual for the medium term and every 2 years for the long term.

Short-term program

Short-term planning has been estimated on a monthly basis, the objective of which is to achieve a sequence of ore extraction to meet monthly production and mining operating conditions. The calculations for this short-term program are as follows (Table 2-26):

Table 2-26. Short-term material.

MONTH	MINERAL	STERILE
1	0	650
2	0	650
3	0	650
4	0	650
5	0	650
6	0	650
7	0	650
8	0	650
9	416	78
10	416	78
11	416	78
12	416	78

Medium-term program

The programming will be carried out quarterly, the objective is to have a good development and preparation to have access to the areas to be extracted in order to comply with the projected ore production (Table 2-27).

Table 2-27. Medium-term material.

YEAR	MINERAL	STERILE
1	0	650
2	10296	936
3	14040	936
4	14040	936
5	14040	936

Long-term program

This will be carried out annually, it is the first plan to be carried out since the beginning of operations, its objective is to extract all the reserves (Table 2-28)

Table 2-28. Long term material.

YEAR	MINERAL	STERILE
3	24336	2522
5	52416	4394

Final Planning

The unified mining planning and extraction sequence is shown below (Illustration 2.4-42):

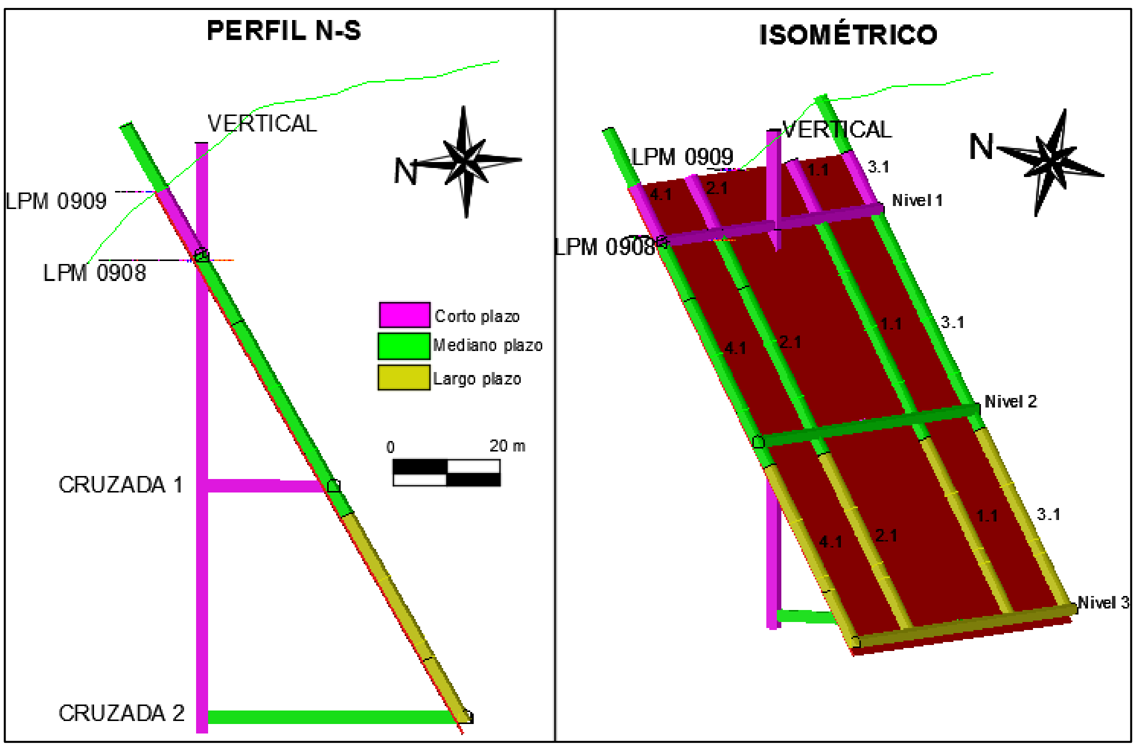

Illustration 2.4-42. Final planning.

2.5 MINERAL PROCESSING AND PROCESSING.

2.5.1 PROFIT OPERATIONS, METALLURGY AND MINERAL PROCESSING

The mineral processing plant has 3 crushing lines, 2 ball mills in parallel, a gravimetric concentration circuit consisting of a Nelson and a Gemmi 1000 table, a serious flotation circuit of circular cells, a cyanidation stage consisting of 3 stirrers and 2 thickeners and the Merrill Crowe process as a final stage of precious metal recovery. The equipment to be used and the flow table of the profit plant (Table 2-29 and Illustration 2.5-1) can be found below:

Table 2-29. List of equipment to be used in the mineral processing process.

No	EQUIPMENT LIST	STAGE
1	300 TON COARSE HOPPER	Shredding
2	RECIPROCATING FEEDER	
3	15" X 38" PRIMARY CRUSHER	
4	CONVEYOR BELT 1	
5	VIBRATING SCREEN 1	
6	SECONDARY CRUSHER	
7	CONVEYOR BELT 2	
8	CONVEYOR BELT 3	
9	300 TON TRANSITION HOPPER	
10	CONVEYOR BELT 4	
11	CONICAL CRUSHER 36"	
12	CONVEYOR BELT 5	
13	VIBRATING SCREEN 2	
14	CONVEYOR BELT 6	
15	FINE GOODS HOPPER 300 TON	Grinding
16	FEEDER	
17	BALL MILLS 6' X 8'	
18	CYCLONE BATTERY	
19	KNELSON CONCENTRATOR 30"	Gravimetric concentration
20	SOLIDS PUMP	
21	ACONDICIONER	

No	EQUIPMENT LIST	STAGE
22	CIRCULAR FLEET CELLS	Floating
23	THICKENER 1	Cyaniding
24	AGITATORS	
25	THICKENERS 1 AND 2	
26	CYANIDE DEGRADATION REACTOR	
27	RICH SOLUTION TANK	Merrill Crowe
28	CLARIFIER	
29	VACUUM TOWER	
30	VACUUM PUMP	
31	TRANSFER PUMP	
32	MIXER CONE	
33	ZINC DOSIFIER	
34	PRESS FILTER PUMP	
35	FILTER PRESS	
36	DRYING OVEN	
37	TILTING OVEN	
38	CONCENTRATES PUMP	
39	CONCENTRATES HOPPER	
40	TABLE GEMENI 1000	golden room
41	CRISOL OVEN	
42	POOR SOLUTION TANK	

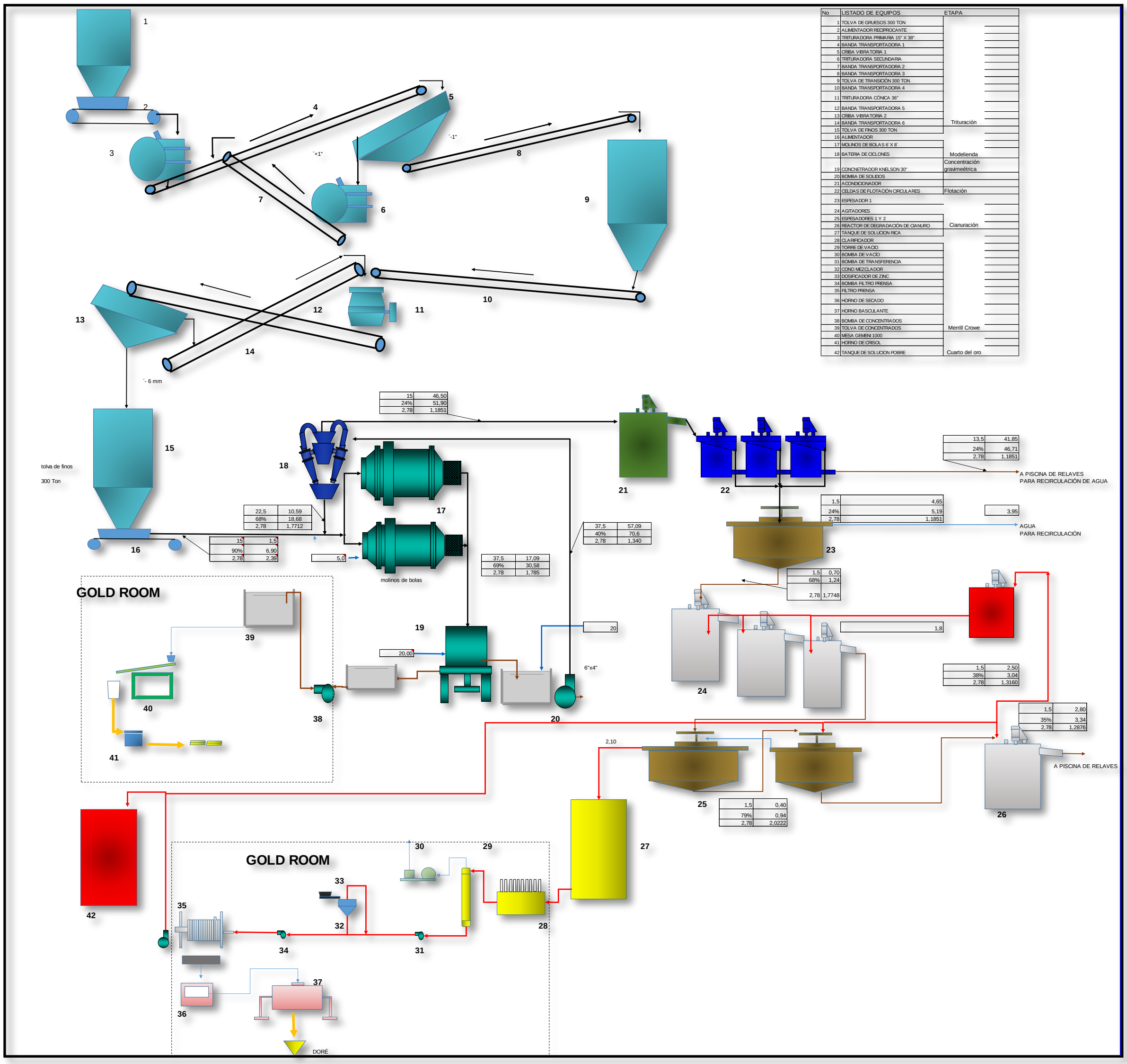

Illustration 2.5-1. Flow Table of the mineral processing plant.
Source: Ingex Group Miner S. A. S.

2.5.1.1 SHREDDING

The material extracted from the fronts of exploitation is transported to the Plant where it is received in a first hopper of thicknesses that has a storage capacity of 300 tons. This hopper must be equipped with a grizzly that does not allow rock fragments larger than 15 "to pass through. From this hopper the material is fed through a reciprocating feeder to the primary crusher, where the first reduction in size is made. After passing through the primary crusher, the material is transferred by a conveyor belt to screen No. 1, where the material is sorted to a 1 "particle size. The screen rejection is fed to a secondary jaw crusher which is closed looped with screen No. 1. The 1 "pass through screen is stored in a transition hopper which is used for the temporary storage of material with 100% pass through granulomere to 1". Oversized returns to the crusher are made by conveyor belts.

The material stored in the transition hopper is fed by a conveyor belt to the tertiary conical crusher which performs the size reduction work until a granulomere of 100% 1/4 "(6 mm) throughput is obtained. A second vibratory screen fed by another conveyor belt will be installed to transport the conical crusher discharge material. This screen will be used to control the granulometric control of the material to be fed into the milling circuit. Vibratory screen rejection, i. e. particles larger than 6 mm will be returned by another conveyor belt to the conical crusher to ensure that all material obtains the desired particle size. The sorted material is stored in the fines hopper with a storage capacity of 300 tons.

The list of equipment to be used in the crushing stage is presented below (Table 2-30 and Illustration 2.5-2).

Table 2-30. Equipment to be used in the crushing stage.

No	EQUIPMENT LIST	STAGE
1	300 TON COARSE HOPPER	Shredding
2	RECIPROCATING FEEDER	
3	15" X 38" PRIMARY CRUSHER	
4	CONVEYOR BELT 1	
5	VIBRATING SCREEN 1	
6	SECONDARY CRUSHER	
7	CONVEYOR BELT 2	
8	CONVEYOR BELT 3	
9	300 TON TRANSITION HOPPER	
10	CONVEYOR BELT 4	
11	CONICAL CRUSHER 36"	
12	CONVEYOR BELT 5	
13	VIBRATING SCREEN 2	
14	CONVEYOR BELT 6	

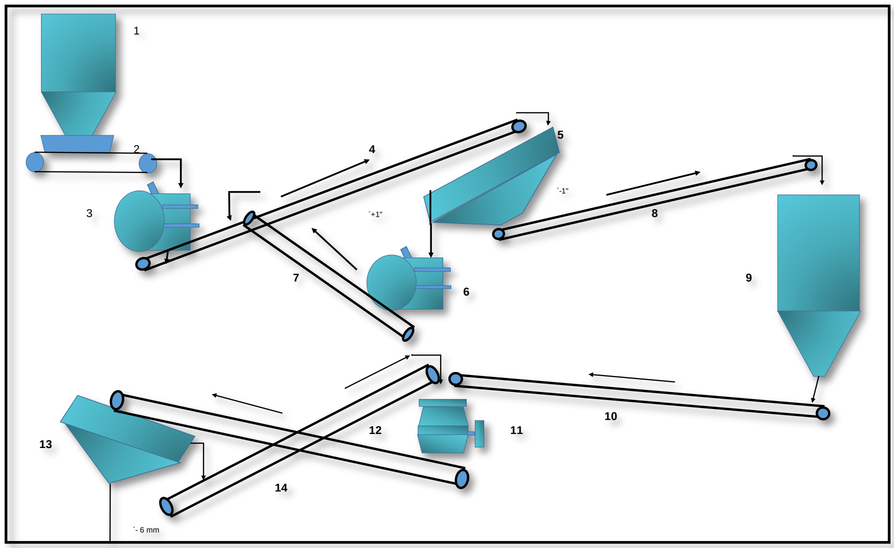

Illustration 2.5-2. Flow diagram crushing stage.
Source: Ingex Group Miner S. A. S.

2.5.1.2 GRINDING

The fines hopper is equipped with two outlets to feed the two 6? X 8 mills that are installed in parallel. Each mill is fed by a belt dispenser.

A water valve adds the amount of fluid needed to obtain a 65% slurry of solids inside the mills. The discharge from the mills is fed to a 30 "Nelson centrifugal concentrator. This device has an independent control system to automatically schedule concentrate discharges after each concentration cycle. The periodically discharged Nelson concentrate is received in a tank designed for this type of material and is automatically pumped to another safety tank in the gold room, where the concentrates will be cleaned. The discharge of the Nelson concentrator falls into a tank equipped with a solids pump that raises the pulp to the cyclone battery which performs the granulometric classification of the grinding. The low cyclone flow returns to the ball mills to close the milling circuit, while the overflow with the 80% granulomere passing through the 200 mesh (75 microns) feeds directly into a conditioning tank where flotation reagents are added.

The following is a list of equipment to be used in the milling stage (Table 2-31 and Illustration 2.5-3).

Table 2-31. Equipment to be used in the grinding stage.

No	EQUIPMENT LIST	STAGE
15	FINE GOODS HOPPER 300 TON	Grinding
16	FEEDER	
17	BALL MILLS 6' X 8'	
18	CYCLONE BATTERY	

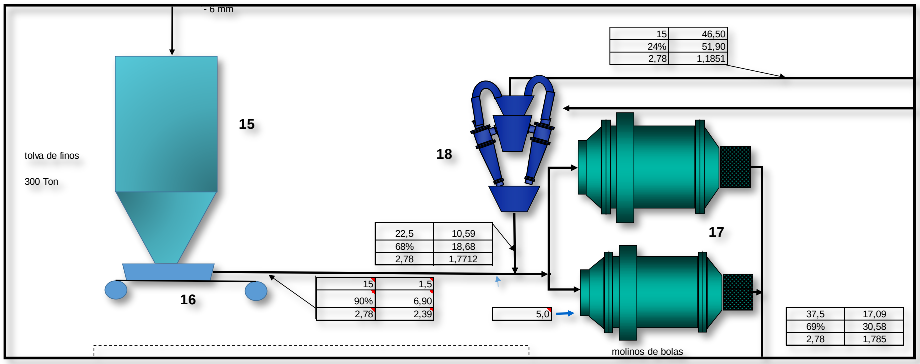

Illustration 2.5-3. Grinding stage flow diagram.
Source: Ingex Group Miner S. A. S.

2.5.1.3 GRAVIMETRIC CONCENTRATION

As the results of metallurgical studies indicate that the ore contains approximately 50 % gold which can be recovered by gravity, a Nelson centrifugal concentrator with automated central discharge and variable speed drive for gravimetric concentration was installed. This equipment is installed in the closed milling circuit, so that the particles released have a greater chance of being recovered in each step of the equipment. The cleaning of the gravimetric concentrates will be done with the use of a Gemeni 1000 table, which will be installed in a room specially designed for this task. The table concentrate will be dried and melted directly to obtain the ingots, inside the same room. The table tails will be stored and then processed separately for the recovery of gold present in them (Table 2-32 and Illustration 2.5-4).

Table 2-32. Equipment to be used in the gravimetric concentration stage.

No	EQUIPMENT LIST	STAGE
19	KNELSON CONCENTRATOR 30"	Gravimetric concentration
40	GEMENI TABLE 1000	Gold Quarter

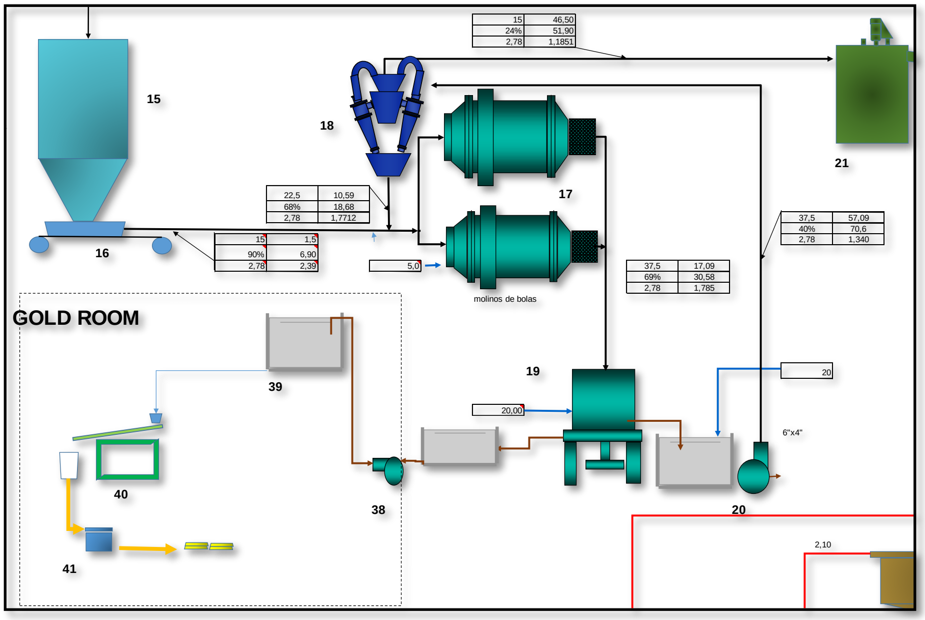

Illustration 2.5-4. Grinding stage flow diagram and gravimetric concentration.
Source: Ingex Group Miner S. A. S.

2.5.1.4 FLOTATION

The conditioned pulp will be fed into a flotation circuit consisting of circular cells in series. Tails from the last cell will be pumped into the tailings dam. There, there is a sufficient area for the sedimentation of solids and make it possible to recirculate water back into the circuit. The pulp of flotation concentrates is transported to a thickener designed for this purpose. The thickened and pH-conditioned pulp is fed into a stirring circuit consisting of three agitators in series (Table 2-33 and Illustration 2.5-5).

Table 2-33. Equipment to be used in the flotation stage.

No	EQIPMENT LIST	STAGE
20	SOLIDS PUMP	Flotation
21	ACONDITIONER	
22	CIRCULAR FLEET CELLS	

Source: Ingex Group Miner SAS.

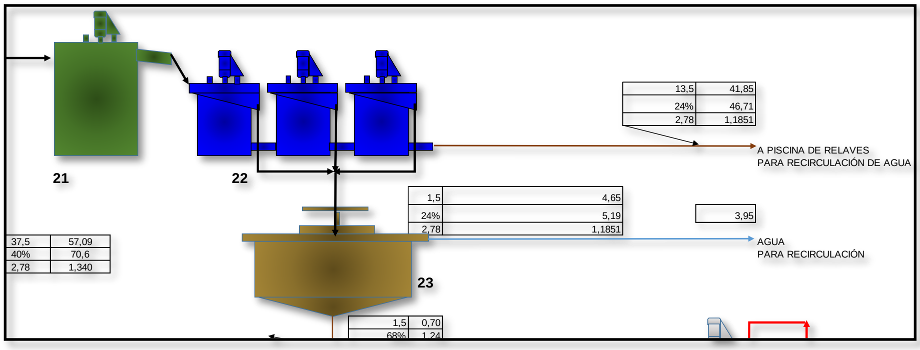

Illustration 2.5-5. Flotation stage flow diagram.
Source: Ingex Group Miner S. A. S.

2.5.1.5 CYANIDATION

The dissolution process of valuable metals will be carried out in the three agitators where sodium cyanide solution previously prepared in a special tank is added, following the International Cyanide Management Institute Standards. The residence time calculated for this circuit is 48 hours.

After cyanidation, the pulp is transferred to a countercurrent decantation system consisting of two thickeners in series. The rich solution obtained in this circuit is stored in a rich solution tank and then passed through the Merrill Crowe precipitation system.

The pulp leaving the settling circuit in countercurrent is transferred to a final reactor where the cyanide neutralization process of the solids and solutions will be carried out. After the neutralization process, the pulp is stored in a separate tailings dam, where UV rays complete the cyanide decomposition process. The solution recovered in this dam will also be recirculated to the process (Table 2-34 and Illustration 2.5-6)

Table 2-34. Equipment to be used in the blending stage.

No	EQUIPMENT LIST	STAGE
23	Thicker 1	Cyanidation
24	Mixers	
25	Thicker 1 Y 2	
26	CYANIDE DEGRADATION REACTOR	

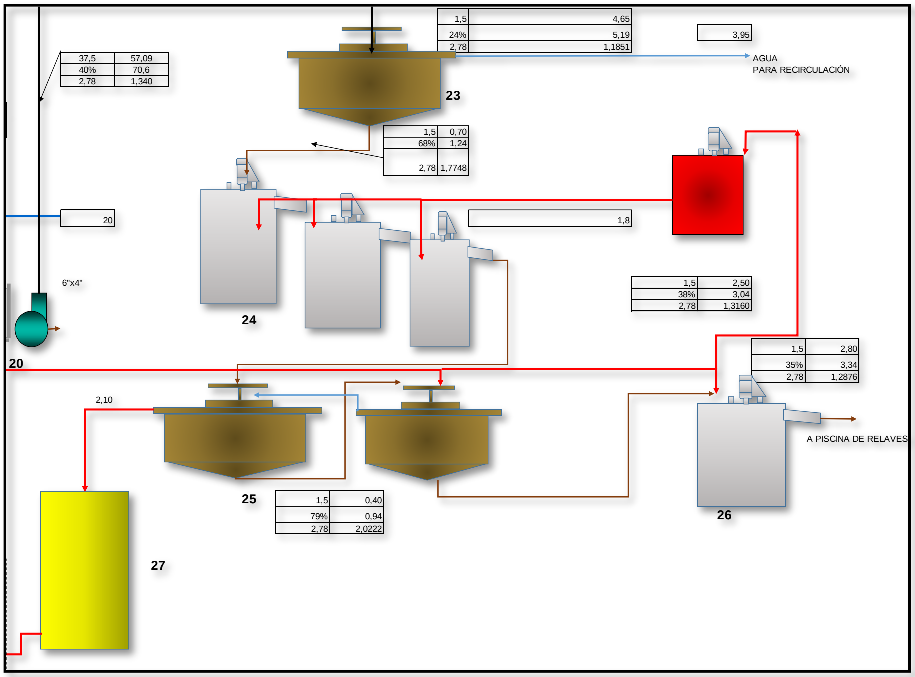

Illustration 2.5-6. Cyanidation stage flow Table.
Source: Ingex Group Miner S. A. S.

2.5.1.6 MERRIL CROWE

The rich solution is first filtered in a clarifier composed of filter frames. The filtered solution is then dosed to a vacuum tower, where oxygen is extracted prior to the addition of zinc powder. In a mixing cone the rich solution is brought into contact with zinc powder. Zinc addition is controlled by a special feeder. Finally, the solution is filtered in a hydraulic filter press where all the zinc precipitate loaded with values is collected. Periodically, the precipitate is removed from the filter press, received in trays conditioned for this purpose. The pellet trays are loaded into a drying oven and finally melted in a tilting furnace with the appropriate flux mixture to obtain production (Table 2-35 and Illustration 2.5-7).

Table 2-35. Equipment to be used in the Merrill Crowe process and the gold quarter.

No	EQUIPMENT LIST	STAGE
27	RICH SOLUTION TANK	Merrill Crowe
28	CLARIFIER	
29	VACUUM TOWER	
30	VACUUM PUMP	
31	TRANSFER PUMP	
32	MIXER CONE	

No	EQUIPMENT LIST	STAGE
33	ZINC DOSIFIER	
34	PRESS FILTER PUMP	
35	FILTER PRESS	
36	DRYING OVEN	
37	TILTING OVEN	
38	CONCENTRATES PUMP	
39	CONCENTRATES HOPPER	
40	TABLE GEMENI 1000	GOLD ROOM
41	CRISOL OVEN	
42	POOR SOLUTION TANK	

Source: Ingex Group Miner S.A.S.

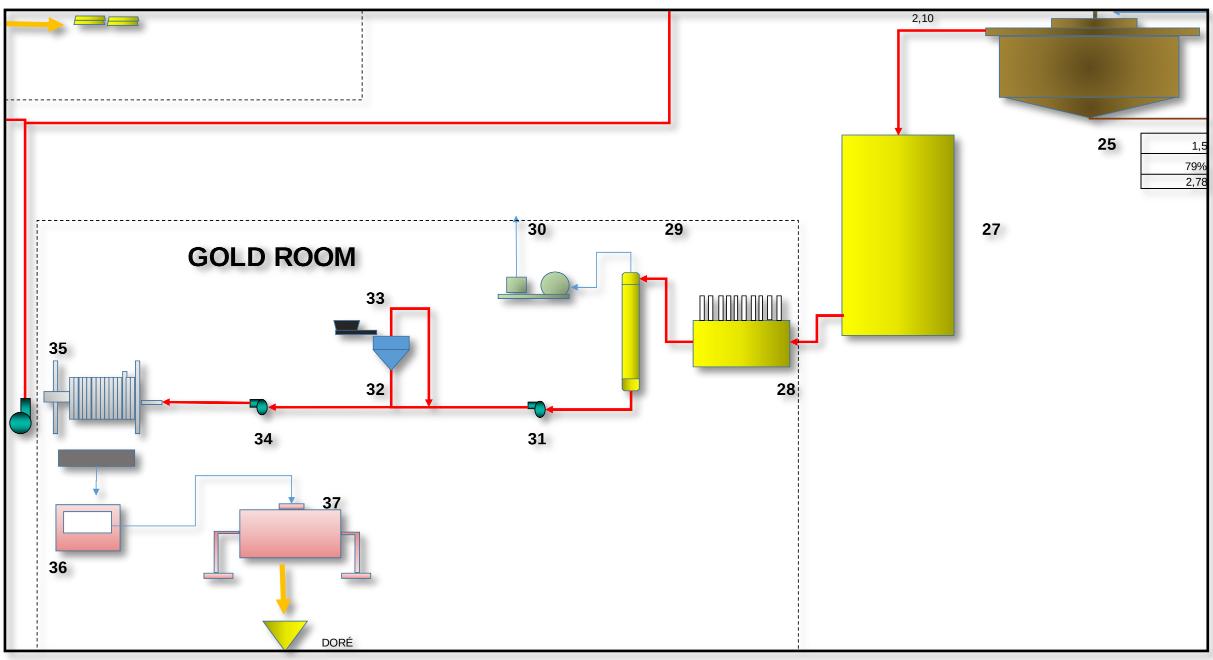

Illustration 2.5-7. Merrill Crowe stage flow Table.
Source: Ingex Group Miner S. A. S.

2.5.1.7 LABORATORY

In support of process control and mine operation operations, a laboratory consisting of the following equipment will be installed on site (Table 2-36):

Table 2-36. Laboratory equipment.

Amount	Preparation
2	Scale
1	Drying oven
1	Shredder
1	Sprayer
1	Dust collector
2	Ro-tap
2	Series of sieves
Foundry and Fire assay	
1	balance
2	Foundry Furnace
2	Fire assay furnace
Digestion	
1	extraction booth
1	heating plate
4	Stirrer
1	Muffle
Absorption and gravity	
1	Spectrophotometer
2	Balance
1	Ultrasound
1	Chemical trolley

Source: Ingex Group Miner S.A.S.

The laboratory has an approximate area of 13m x 17.5m and within it will be located: 1 office area, 1 reception and sample preparation area, 1 foundry and fire assay area, 1 atomic absorption area and a warehouse (see Illustration 2.5-8 and Illustration 2.5-9). The location of the equipment and the design of the laboratory is presented below:

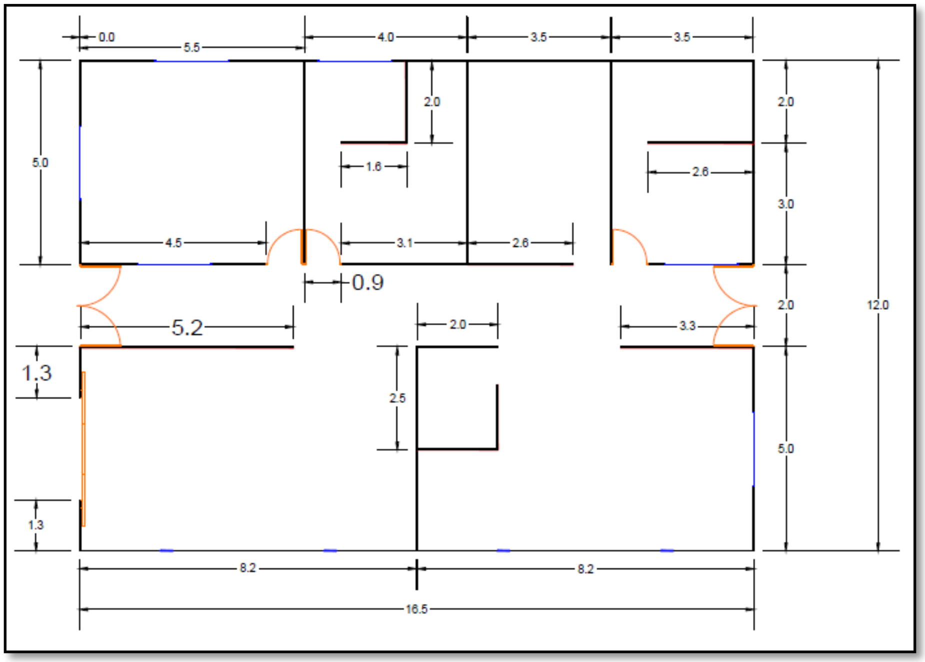

Illustration 2.5-8 Map of laboratory dimensions.
Source: Ingex Group Miner S. A. S.

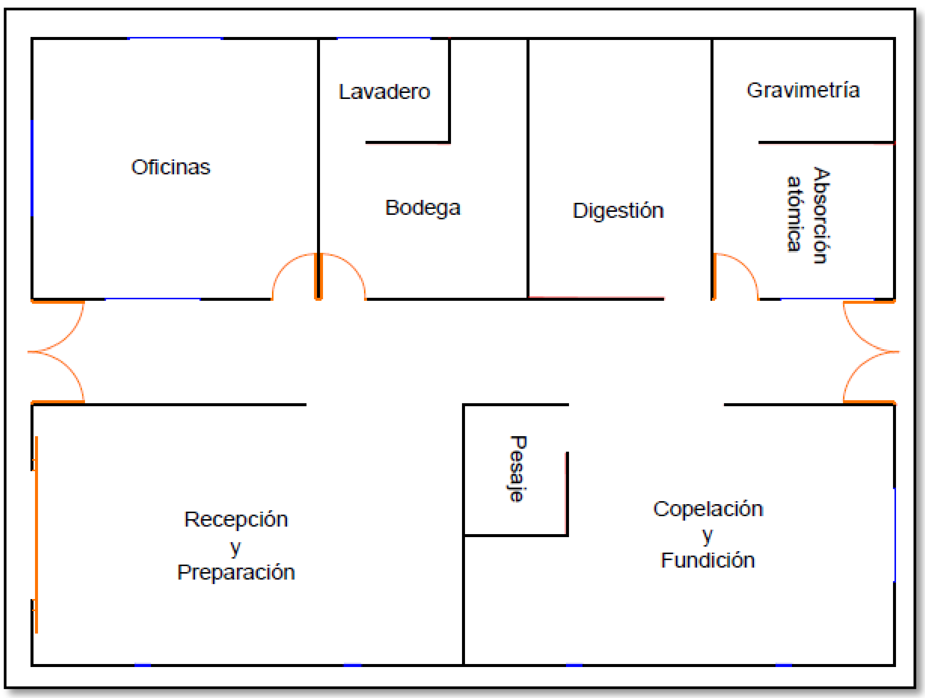

Illustration 2.5-9. Distribution map of the laboratory.
Source: Ingex Group Miner S. A. S.

2.5.2 SCOPE OF EXPLANATION

The recovery of the metals of interest in the El Pescado project is planned in the assembly of a mining-metallurgical benefit plant where valuable metals from material from the different mining fronts will be recovered. The ore processing benefit plant to be installed for the Mining Concession 5969 will have a capacity of 300 tons per day. It is important to remember that the material from license 5969 will be processed in this same plant, with the difference that not all equipment will be used due to the decrease in production compared to 5969 (Illustration 2.5-10)

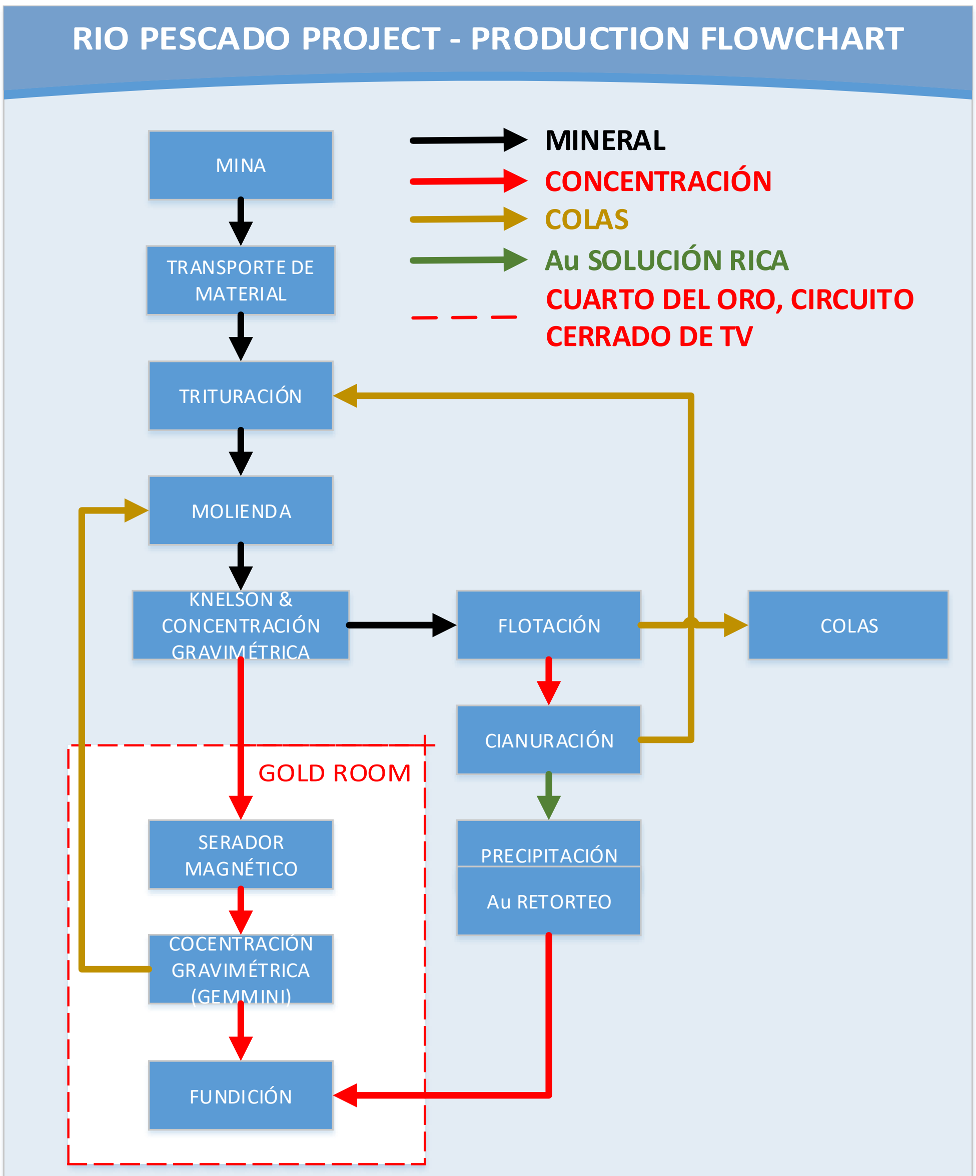

Illustration 2.5-10. Flow Table of the mineral processing plant.

Tails generated in the profit process

The quantification of solid waste generated in the concentration and cyanidation stages is based on estimates of solid waste generated during the day, taking into account that the percentage of sulphides in the vein is close to 10% (Table 2-37).

Table 2-37. Solid waste generated per day.

Stage	Solid waste (ton/day)
Concentration and flotation tails (ton/day)	40
Cyanide tails (ton/day)	2,7
Cast iron tails (ton/day)	0,1

2.6 PRODUCTION AND COSTS

The following summarizes production and estimated costs, focused on mineral extraction and benefit.

2.6.1 OUNCE PRODUCTION PER YEAR

The mining operation will be underground and will run from year 1 to year 5; in the first of these, production will be the lowest, due to the expansion, readjustment and development works necessary to start the extraction. From year 3 onwards, production stabilizes until year 5.

The average estimated production in the process is 45 t/day, with a tenor of 4.69 g/t, for an average of $2,100 ounces per year.

2.6.2 MINERAL RATIO/M3 OF MATERIAL REMOVED

This relationship is shown in mining planning, as such to raise a relationship is complex, because this depends on the work in which it is being developed; however, the great thickness of the vein (greater than 2m), as well as the system of selected exploitation results in very little sterile removed (mineral/0.14 m3 of sterile).

2.6.3 EXTRACTION COST

In order to calculate the estimated extraction costs, the number of personnel needed to extract one tone, as well as equipment and performance, energy, supplies and accessories (perforation, explosives, fuel, oil, among others) was analyzed; according to the projection, a cost of US$ 427 has been estimated.

2.6.4 BENEFIT COST

To calculate the estimated benefit costs, the number of personnel needed to extract one tone, energy consumption, reagent, accessory and spare parts was analyzed. It was estimated at US$67 per ton.

2.7 PROJECT ORGANISATION

The following is the organizational structure of the project, which will be flexible and adjust to the needs and development of the project.

2.7.1 CONSTRUCTION AND ASSEMBLY

During this stage, the different departments will be used, all focused on equipment and infrastructure tuning, in order to comply with all specifications and regulations, before starting the extraction. All construction activities are included in this stage before the start of the productive stage; some of the activities include (Table 2-38):

Table 2-38. Responsibilities and tasks to be performed at the construction and assembly stage of the mine.

Activity	Definition	Responsible of execution
Recruitment and services	Hire personnel and services necessary for the construction and assembly stage	Head of Human Resources
Transportation	Loading and transport of aggregates used to secure access roads. Load and transport vegetable cover and organic soil. Loading and transport of equipment and machinery	Logistics Manager
Adaptation of landfill areas	Construction of containment barriers, drainage systems, foundation construction	Mine Manager
Construction, operation and maintenance of civil works	Construction of all the necessary infrastructure such as camp, laboratories, workshops, bases for plant equipment, among others.	Mine Manager
Track maintenance	Base and sub-base installation, asphalt or concrete pavement	Mine Manager
Equipment Installation	Installation of equipment for mineral processing plant	Mine Manager
Hydraulic works	Construction of drainage works, dams for sediments	Mine Manager

It is important to mention that all these activities will be led by the project manager.

2.7.2 PRODUCTION

At this stage, the extraction of ore, as well as the development and preparation of production fronts, will be carried out in the areas of interest of the mineral deposit.

The project manager will be primarily responsible for the project manager, who will be headed by the Mine Manager, Plant Manager, Head of Geology, Head of Mineral Processing, Head of Occupational Safety and Health.

The activities during this stage will be (Table 2-39):

Table 2-39. Responsibilities and tasks to be performed at the production stage.

Activity	Definition	Responsible of execution
Recruitment and services	Hire personnel and services necessary for the construction and assembly stage	Head of Human Resources
Purchase, storage and receipt of supplies and machinery	Purchases of inputs, machinery and other necessary for the development and operation of the project	Logistics Manager
Restaurant, camp and facility operation	In charge of administration and supply all needs	Logistics Manager
Disassembly	Removal of vegetation cover in the different mining infrastructure areas	Mine Manager
Drilling and blasting	Drilling and loading mine fronts with explosives	Mine Manager
Operation of heavy machinery and loading and transport equipment	Loader, dump truck and other operation, used in the operation, for loading and transporting ore and blasting fragmented sterile ore.	Mine Manager
Auxiliary operations	In the underground mining stage, such as ventilation, support, pumping, among others.	Mine Manager
road maintenance	Base and sub-base installation, asphalt or concrete pavement	Mine Manager
Maintenance of machinery and equipment	Repair, preventive maintenance and support in part mechanical metal	Maintenance Manager
Operation of tailings yards and landfills	Construction of drainage works, dams for sediments	Plant Manager and Mine Manager

Profit and transformation

In this process it begins with the fragmented material from blasting, this mineral enters a process of size reduction (crushing and milling stage), then enters a stage of gravimetric separation, followed by a physical-chemical separation, to proceed to the melting stage.

During this process one has (Table 2-40):

Table 2-40. Responsibilities and tasks to be performed at the profit and transformation stage.

Activity	Definition	Execution responsible
Shredding	Mineral size reduction from mining ore	Plant manager
Grinding	Mineral size reduction from crushing ore until it is as fine as possible (microns), with the aim of obtaining the gold libration, in order to proceed to the gravimetric concentration stage.	Plant manager
Gravimetric concentration	Mineral separation by dense medium, with the aim of separating the heaviest from the lightest material.	Plant manager
Flotation	Physical-chemical separation process where sulphides are separated from the rest of minerals.	Plant manager
Cyanidation	Leaching process that consists in the extraction of gold by means of a solution (enriched solution) with the presence of cyanide.	Plant manager

Activity	Definition	Execution responsible
Merrill Crowe	Gold precipitation in enriched solution with zinc powder	Plant manager
Foundry	Recovery of gold and silver metals through the use of heat through pyro-metallurgical processes, in this process is obtained doré.	Plant manager
Tails treatment	Queues will be generated in the flotation and cyanidation processes: **Flotation:** Corresponding to more than 90% of the total industrial wastewater generated in the profit process, it is composed of silicates and feldspars that do not require any special chemical treatment prior to transport and disposal in the tailings dam. This activity involves the operation of cyclones that classify the fine and coarse material before it is disposed of in the tailings dam. **Cyanidation:** Corresponds to more than 3% of the wastewater generated in the benefit process. These tails are neutralized with nitrogen peroxide and sodium hypochlorite before being poured into the tailings yard.	Plant Manager

Abandonment and closure

This refers to the activities that will be developed to recover the intervened area, with the objective of giving environmental protection and/or other use to the area. The activities developed during this stage are (Table 2-41):

Table 2-41. Responsibilities and tasks to be performed at the production stage.

Activity	Definition	Execution responsible
Decommissioning	Dismantling of mining infrastructure such as a processing plant, hoppers, winch room, workshops, powder keg and other infrastructure used for the development of the project.	Project Manager
Adequacy of constructions	Adequacy of infrastructure to be delivered (camping, casino, offices, common areas, among others)	Project Manager
Recovery of queues yard	Restructure of the land to give it a new use with the construction of a park.	Project Manager
Transport	Transport of soils for the rehabilitation of intervened areas. Carrying supplies and materials needed for the closing stage	Project Manager
Rehabilitation of intervened watercourses	Restructure of channels to restore natural drainage	Project Manager
Personal disconnection	Termination of staff contracts	Head of Human Resources

Staff Required

According to the needs of the operation in each phase of the project, the maximum number of personnel in each of these phases has been estimated (Table 2-42).

Table 2-42. Staff required.

Phase	Maximum quantity of people
Infrastructure and equipment assembly	330
Production	276
Closure and abandonment	10