



**The Samalayuca stratiform sediment-hosted  
copper mineralization  
Northern Chihuahua State, Mexico**

**VVC EXPLORATION CORP.**

**April 20, 2013**



*Sierra Samalayuca, Northern Chihuahua State, Mexico*

## DATE AND SIGNATURE

### CERTIFICATE OF QUALIFICATIONS

I, Michel Boily, Ph.D., P. Geo. HEREBY CERTIFY THAT:

I am a Canadian citizen residing at 2121 de Romagne, Laval, Québec, Canada.

I obtained a PhD. in geology from the Université de Montréal in 1988.

I am a registered Professional Geologist in good standing with l'Ordre des Géologues du Québec (OGQ; permit # 1097).

I had the following work experience:

From 1986 to 1987: Research Associate in Cosmochemistry at the **University of Chicago**, Chicago, Illinois, USA.

From 1988 to 1992: Researcher at **IREM-MERI/McGill University**, Montréal, Québec as a coordinator and scientific investigator in the high technology metals project undertaken in the Abitibi greenstone belt and Labrador.

From 1992 to present: Geology consultant with **Geon Ltée**, Montréal, Québec. Consultant for several mining companies. I participated, as a geochemist, in two of the most important geological and metallogenetic studies accomplished by the Ministère des Richesses naturelles du Québec (MRNQ) in the James Bay area and the Far North of Québec (1998-2005). I am a specialist of granitoid-hosted precious and rare metal deposits and of the stratigraphy and geochemistry of Archean greenstone belts.

I have gathered field experience in the following regions : James Bay, Quebec; Strange Lake, Labrador/Quebec; Val d'Or and Rouyn-Noranda, Quebec; Grenville (Saguenay and Gatineau area); Cadillac, Quebec; Otish Mountains, Quebec, Lower North Shore, Quebec, Sinaloa, Sonora and Chihuahua states, Mexico, Marrakech and Ouarzazate, Morocco.

I am the author of the 43-101F1 Technical Report entitled : "The Samalayuca stratiform sediment-hosted copper mineralization, Northern Chihuahua State, Mexico, VVC EXPLORATION CORP. with an effective date of April 20, 2012."

I consent to the filing of this report with any stock exchange and any other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

As of the date of the certificate, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

The Qualified Person, Michel Boily, has written this report in its entirety and is responsible for its content.

I read the National Instrument 43-101 Standards of Disclosure for Mineral Projects (the "Instrument") and the report fully complies with the Instrument.

I am an independent qualified person, QP, according to NI 43-101. I have no relation to VVC EXPLORATION CORP. according to section 1.5 of NI 43-101. I am not aware of any relevant fact which would interfere with my judgment regarding the preparation of this technical report.

As of the effective date of April 20, 2013, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the report not misleading.

I had no prior involvement with the Samalayuca property that is the subject of this report.

I have visited the Escondida property on February 14 and 15, 2012.



Michel Boily, PhD., P. Geo.  
Dated at Montréal, Qc  
April 20, 2013



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## ITEM 1 SUMMARY

The Samalayuca property is a stratabound sediment-hosted copper mineralization associated with Permian (?) chloritized sandstones exposed in the Sierra Samalayuca. Located in the Northern Chihuahua State about 35 km south of Juarez, the property consists of one Mining Concession covering 1622.6 ha accessible via Highway 45. The mineralized rocks form part of a plurikilometer-thick sedimentary assemblage deposited in the Chihuahua trough from the Paleozoic through Early Cretaceous eras. This vast sedimentary trough is a right-lateral pull-apart basin that underwent important deformation during the Late Cretaceous-Early Tertiary Laramide orogeny. The sedimentary formations containing the Cu mineralization consist of a cyclic sequence of fine- to coarse-grained sandstones (chloritized quartzites/arenites) with subordinate phyllitic and conglomeratic intervals which exhibit low grade regional metamorphism. The copper mineralization (1-10%) occurs as fine-grained primary and supergene copper sulphides, including digenite, chalcocite, covellite, bornite and chalcopyrite. Oxidized copper minerals such as malachite and azurite are common as coating and in fractures. Metallurgical tests on heap leach and vat leaching processes for Cu-ore beneficiation determined that the optimum procedure is a vat leaching using an ore granulometry of -3/8 ", a time of lixiviation of 30 days followed by a wash period of eight days, with industrial grade sulfuric acid concentrations of 3.0%. Exploration work conducted by VVC Exploration since 2010 consists of geological and structural mapping of the key Cu-mineralized areas including the open mined pits. Channel sampling was performed vertically and perpendicular to the strike of all sandstone layers exposed in the mining pits. The assay results from the collected samples served as a basis for calculating an Inferred Resources which was set at ***4,100,281 t grading 0.47 wt. % Cu and 5.8 g/t Ag.*** Phase I of a proposed exploration campaign, expected to cost \$462,500, relates to a diamond drilling campaign focused on the Gloria pit and the completion of the structural and geological mapping of the mining pits summarily evaluated during the last exploration campaign. Phase II will expand the drilling campaign to other mining pits notably Concha and Gloria Extension and is estimated at \$1,000,000.

## **ITEM 2 INTRODUCTION AND TERMS OF REFERENCE**

This Technical Report was commissioned by VVC Exploration to provide technical geological data relevant to the Samalayuca copper property. It has been prepared in accordance with the Form 43-101F1 Technical Report format outlined under NI-43-101. The purpose of this report is to present the status of current geological information generated from VVC Exploration's ongoing exploration program and to provide recommendations for future work. This report is based on information from reports available in the public record with the Servicio Geológico Mexicano (SGM), private reports and general geological reports and maps. Parts of these documents were prepared before the implementation of NI-43-101. Although many authors of such reports appear to be qualified and the information was prepared to standards acceptable to the exploration community at the time, the data does not fully meet present requirements. The author believes the information is verifiable in the field, and that it is a reasonable representation of the mineralization. VVC Exploration also provided the author with geological and geochemical data which form the basis of the current report. The author has visited the Samalayuca property on February 14 and 15, 2012. The visit included a thorough inspection of the historical open mined pits and trenches dug on the property, the review of the mineralization associated with the sedimentary rocks, wallrock alteration and a general tour of the property geology. Since there is no new technical or scientific information arising from the property since his last visit, the author believes that his personal inspection is still current as described under section 6.2 of Companion Policy 43-101CP. No exploration by VVC has been conducted since February 15, 2012.

The author has relied upon information provided by VVC Exploration that describes the purchase option agreement into which VVC Exploration entered into the project and on data that confirm the exploration rights, obligations and Mining Concession Permit. The author has seen documents alleging that the Mining Concession is in good standing and up to date with payments and work requirements under the Mining Law and Regulations of Mexico.

The office of VVC Exploration Corp is currently at Suite 501, 121 Richmond Street West Toronto, Ontario, Canada M5H 2K

## **ITEM 3 RELIANCE ON OTHER EXPERTS**

The author has read the VVC Exploration legal opinion concerning the legal status of the Samalayuca property produced by the DFK International law firm on February 8, 2012. The author has used some excerpts of the document upon writing the following item.

#### **ITEM 4 PROPERTY DESCRIPTION AND LOCATION**

The Samalayuca property is located in the Northern Chihuahua State, Mexico, 35 km south of the city of Juarez (pop. 1,321,004) (Figure 1). The property consists of one Exploration Mining Concession Permit named Kaity (title number 226924), covering an area of 1622.5675 ha or 1.62 km<sup>2</sup>. The Samalayuca property is centered on UTM coordinates 350360E and 3470949N (NAD27; Zone 13N; map 33\_H13-1\_2CJP\_GM, Ciudad Juarez-El Porvenir; 1:250,000) or latitude 31° 21'55" N and longitude 106° 34' 26". The boundaries of the property were calculated from the localization of the PPD (Punto de Control) which is fixed at UTM coordinates 3470208 N and 352029 E (NAD27; Zone 13) (Figure 2). The Permit is under the authorities of the Mexico Mining Law. It is administrated by the "Secretaría de Economía, Dirección General de Minas, Subdirección de Minería" and it is currently in good standing.

The permit was 100% owned by Minera Ches Mex, S de R.L. de C.V. (MCM) of Chihuahua, Chihuahua, Mexico. On October 11, 2010, amended on July 14, 2011; a cession promise "Promesa de cesión" between MCM (the Assignee) and Samalayuca del Cobre S.A. de C.V. (SC; the Assignor) was concluded. SC obtained the exclusive rights to evaluate, explore and exploit the concession in exchange for the price of \$US1,950,000.00. The Assignee will undertake the obligation to subscribe a final Mineral Rights Assignment Contract to the Assignor once the price of is fully paid. Before the exploitation and production of the mine lot begins, SC will pay \$US25,000 each July 15th and January 15th until it reaches the amount designated as total price per promise. When production begins, the price would be paid based on production, with payments made each July 15th and January 15th until it reaches the amount designated as total price. The contract is valid until full payment is reached, which has to be paid no later than February 15th, 2050.

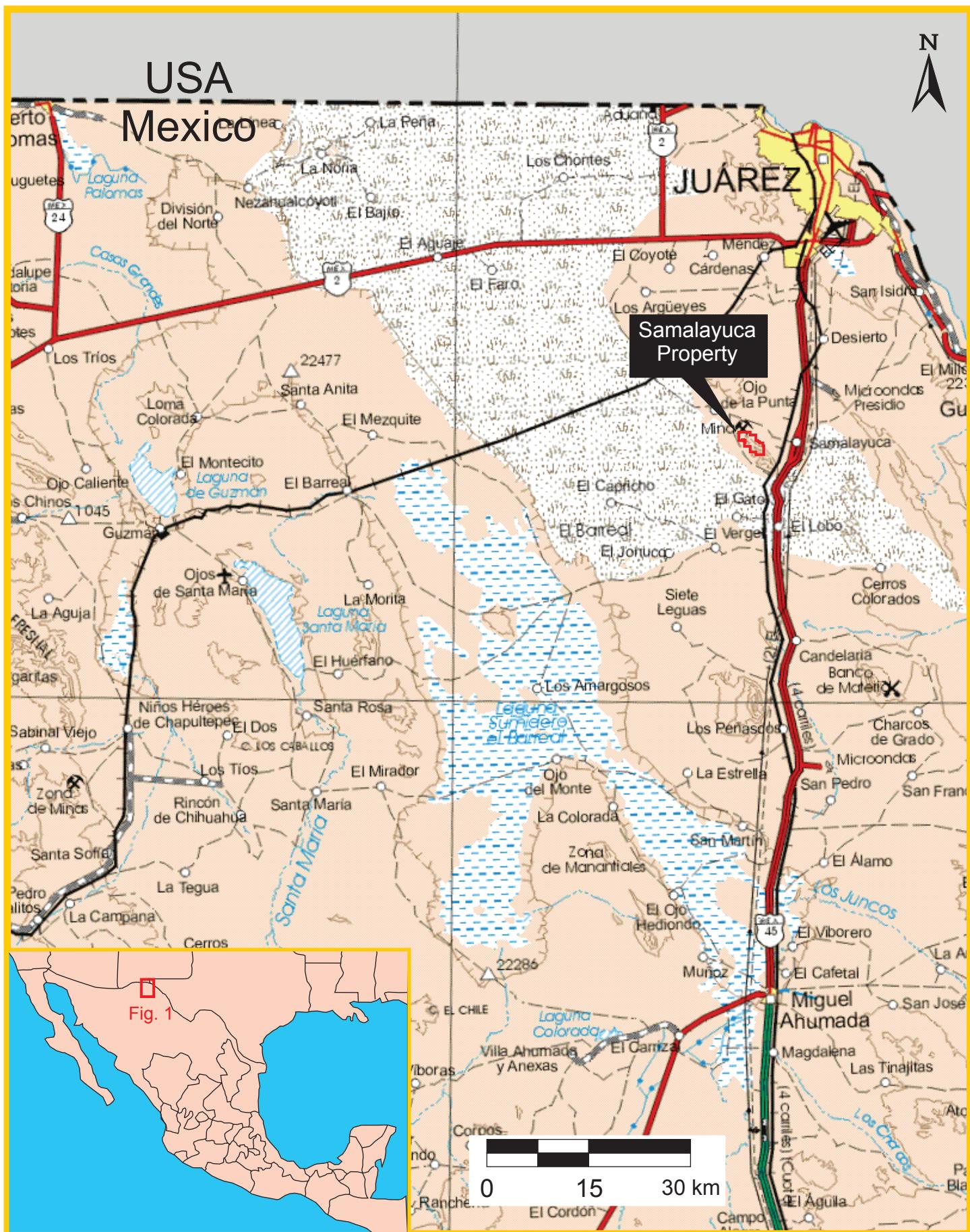


Figure 1. Localization of the Samalayuca property, Northern Chihuahua State, Mexico.

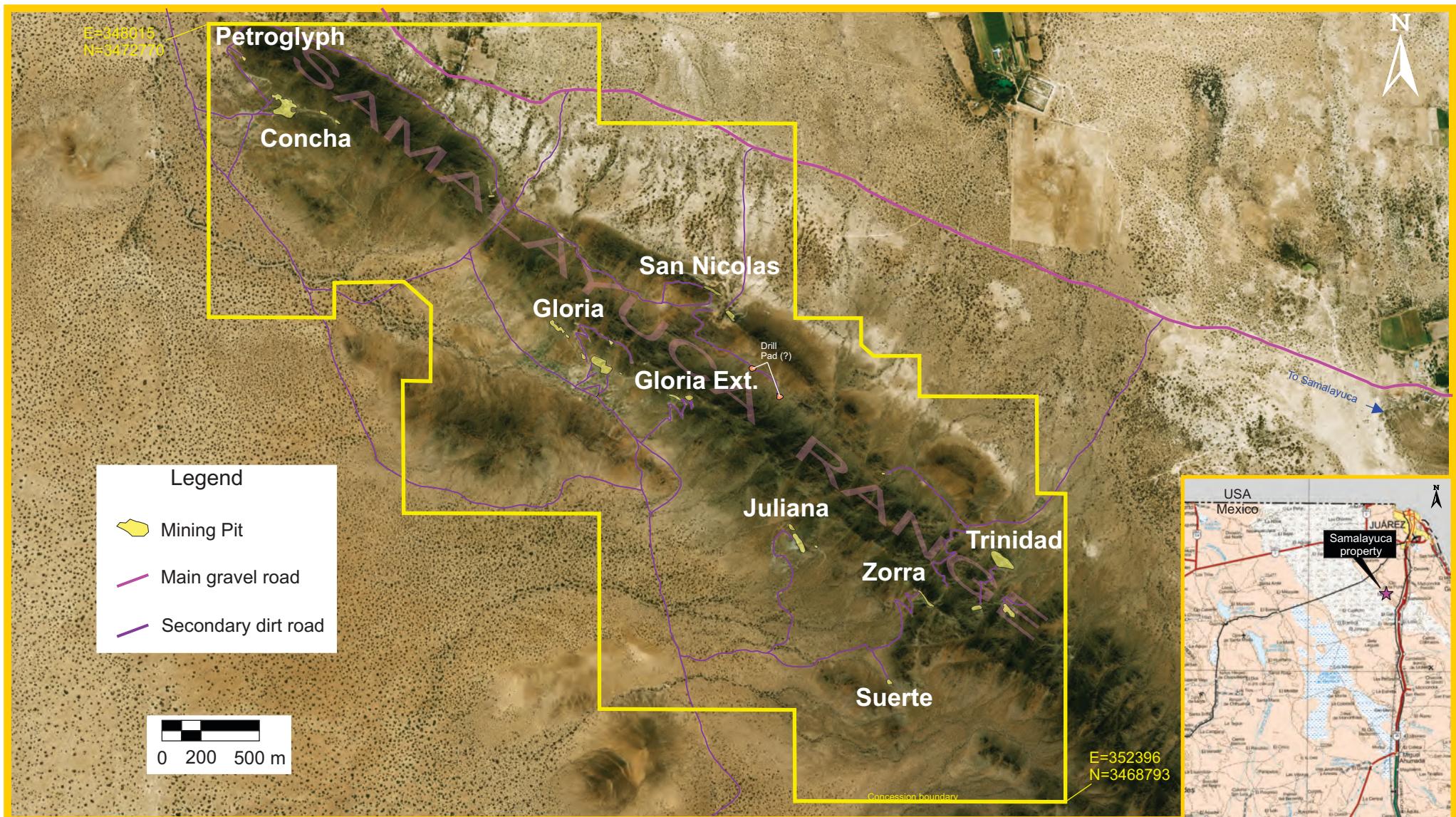


Figure 2. Samalayuca Mining concession contours. The open pit mines exploited in the 50's and 60's are reported on the map. UTM Coord.: E=Easting, N=Northing; NAD27; Zone 13 N.

In carrying out the exploration work, SC is obligated to: a) Run the exploration and exploitation works under the Mexican Mining Law, and other applicable legal provisions, b) Keep in good condition the concession, c) Pay punctually their legal obligations and other taxes and d), Prepare reports semi-annually in metallurgical balance of production, in order to allow calculation based on the head grade of copper (CU) and carry out the payment of price per promise. SC is obliged to maintain as a minimum a payment of \$US25,000. Once the price amount of promise contract and final are fully covered, SC grants a 1% royalty on production to MCM; such royalties will be covered every six months throughout the operational phase.

A first Addendum to Mining Exploration, Exploitation and Rights Assignment Promise Contract was signed on July 14th, 2011. It was established that if the Samalayuca Concession cannot be placed in exploration and production, SC must pay for the amount of \$US25,000 to MCM each July 15th and January 15th during the term of the contract of pledge of assignment. The second Addendum signed on November 30th, 2011, provides for MCM, a 1% royalty over the Account Net Smelter Return (NSR). With this addendum MCM gives the exclusive option to purchase the 1% NSR royalty to SC. MCM gives, during a period of 5 years, the exclusive option to purchase such royalties, period to commence once these royalties become due. The purchase price of the Net Smelter Return is the amount of \$US1,500,000 which may be paid at any time at SC option.

On December 20th, 2010, SC has signed six individual Temporary Occupational Contracts with six different Ejidatarios of the Ojo de la Casa Ejido. The parties agree that the contracts have a 15 years period duration from the signing date. The Ejidatarios expressly granted to SC the rights to use and temporary occupy their individual parcels for any kind of mining activities SC may need, these rights are granted by the validity of the contract, that it is mandatory for the Ejidatarios, but optional for SC. The parties stipulated as remuneration for the rights granted, the amount of \$MEX6,000.00. Additionally to the remuneration indicated above for the right of occupancy, SC agrees to pay a one-time amount of \$MEX100,000.00 to three Ejidatarios. For three other contracts, instead of making the payment, SC has the obligation to drill a water well on each of the Ejidatario's parcel, with an investment of no more than \$MEX100,000.00. The Ejidatarios that had the clause on the Temporary Occupational Contracts that stipulated the

obligation to SC to drill a water well, has asked SC that instead of drilling the well, to make the payment in cash. Therefore, a Payment Agreement was made and a onetime amount of \$MEX100,000.00 was paid to each of them.

On December 2th, 2011, SC had signed eighteen individual Servitude of Passage Contracts with eighteen different Ejidatarios of the Ojo de la Casa Ejido. The parties agree duration of 15 years from the date of the contract. This situation doesn't cancel, stop or impede SC the full access to the Samalayuca location since there are various access roads in use. Each of Ejidatarios in exercise of the rights they have on their parcels grant authorization for the creation of the easement, giving an unlimited right of way to SC during the term of this contracts. In return for the rights granted by the Ejidatarios, SC has the obligation to pay the amount of \$MEX3,000.00 on an annual basis on the date which is the anniversary of the contract for each one.

On January 19th, 2011, SC signed an Agreements for Temporary Occupation with Ejido Ojo de la Casa. The parties agree that the contract has a duration period of 15 years mandatory to the Ejido, but optional for SC, which has the right to terminate early without liability. The Ejido expressly granted to SC the rights to use and temporary occupy some common land parcels that belong to the Ejido for any kind of mining activities SC may need, these rights are granted for a term of 15 years mandatory for the Ejido, but optional for SC. The right of occupancy granted by the common land parcels affects common and specific common use areas 2 (43-58-04.254 ha) and 3 (133-86-56.789 ha), and which are necessary for SC to carry out its activities. The parties stipulated that by obtaining these rights for SC, it must pay for the first 8 years between January 19th, 2011 and January 18th, 2019, the amount of \$MEX2,604, 000.00 in 16 semi-annual installments set at \$MEX162,750.00 which will be settled at the beginning of each semi-annual period. At the beginning of the 9th year, starting on January 19, 2019 to January 18, 2026, until the end of the fifteenth year of the contract life, SC shall pay for contract the total amount of \$MEX3,726, 002.00 distributed in 14 semi-annual installments set at \$MEX266,143.00 that will be liquidated at the beginning of each semester, which will be updated according to the National Consumer Prices Index. The Ejido made a request to SC in order to have an advance payment of its Agreement for Temporary Occupation regarding the payment due on January 2012 for \$MEX162,750.00. The payment was made on December 2011 to the Ejido.

On June 15, 2011, an agreement was made between the shareholders of Samalayuca del Cobre S.A. de C.V. (SC); CAMEX MGD (33,75%), Invesmin San Miguel S. de R.L. (ISM) (28,13%), Inversiones Agrofinancieras de Panama S.A. (INAPSA) (13,13%) and Firex S.A. de C.V. (Firex) (25%). The agreement stipulates that Firex shall provide an interest free loan to SC to develop the initial mining operation of the Project . Under conditions, ISM and Firex shall provide services to SC through December 31st, 2014.

On September 7th, 2011, SC (the Borrower) has requested that CAMEX MDG (Camex; the Lender) extends a credit up to \$US2,000,000.00 an interest at an annual rate of 12%. Camex has or will deliver the amount to SC as follows: The first \$US200,000.00 thirty days after the signing of the contract, the second and subsequent release of funds will be within 90 days from when notification of Camex receives each credit requirement by SC. These deliveries will be for a minimum amount of \$US50,000.00 and a maximum amount of \$US500,000. Up to present, SC has not requested any amount from this loan yet. The parties agree that the principal credit plus interest must be paid no later than December 31th, 2014.

The Samlayuca property is located within a conservation park ("Area de Protection e Flora y Fauna Médanos e Samalayuca"). This protected zone aims to protect sand dunes and archaeological artifacts such as petroglyphs. However, the dunes and the petroglyphs are found outside of the property.

On May 5th, 2011, SC presented a Juicio de Amparo before the XVII District Courts Circuit based in the city of Chihuahua asking for the federal protection of the Court against the document through which was resolved to deny the permit on environmental impact and land use change for the development of the mining project "Samalayuca Copper Mining Unit" by the Chihuahua Federal Delegate of the Ministry of Environment and Natural Resources (SEMARNAT) as well as against the validity of the Presidential Decree that declared a Protected Natural Area the Samalayuca Dunes areas. This petition was currently on course with the Eighth District Court under case number 434/2011. In this petition, twelve arguments were asserted questioning the constitutional and legality inconsistencies of the denied requests for

environmental impact and land use, and the decree itself that declared the Samalayuca Dunes areas as a Protected Natural Area where the project is located. Subsequently, on June 2nd, 2011 evidence was offered consisting of an Ocular Inspection and Judicial Expert for Surveys, to prove that the surface on which the mining project would take place corresponds to less than 0.21% of Natural Area Protected by the Act and previously referred to mine in the same venue.

On March 30 2012, the Judge rendered its Judgment in favor of SC declaring the invalidity of the document through which was resolved to deny the permit on environmental impact and land use change for the development of the mining project "Samalayuca Copper Mining Unit" by the Chihuahua Federal Delegate of the Ministry of Environment and Natural Resources (SEMARNAT) as well as against the validity of the Presidential Decree that declared a Protected Natural Area the Samalayuca Dunes areas. Among the effects of this judgment are the following: 1) Leave with no legal effect the resolution, in which was refused to grant permission on environmental impact that was submitted by SC and 2), Restart the respective administrative procedure for the permission on environmental impact and the land use change for the development of the mining unit.

Additionally, another very important consequence of this judgment is that no Authority in the future may try to impose or fund any resolution or request to SC on this Presidential Decree since it was declared not binding to SC activities. On August 9, 2011, the "Comisión Nacional de Áreas Naturales Protegidas" (CONANP) authorized the mining operation within two blocs covering 131 ha over Concha, Gloria and Juliana mining pits, after the revision of the "Área de Protección e Flora y Fauna Médanos e Samalayuca" boundary limit. On December 19 2011, the Natural Protected Areas National Commission, which depends of Ministry of Environment and Natural Resources (SEMARNAT) declared that a part of the Kaity Mining concession area would be contemplated within the Especial Use Subzone called Ojo de la Casa.

Camex MDG. owns 33.75% of SC. Subject to the terms and conditions of a non-binding letter of intent dated April 12, 2013 between VVC Exploration Corporation ("VVC") and Camex Mining Development Group Inc. ("Camex MDG."), VVC will acquire all of the issued and outstanding shares of Camex MDG., as well as all options, warrants and other securities convertible into shares of Camex MDG., in exchange for the issuance of 59,900,000 VVC common shares. Closing of the Transaction will be subject to, among other things, the satisfactory completion of VVC's due diligence investigations and the receipt of all necessary consents and approvals, including the approval of the shareholders of both VVC and Camex MDG. and the approval of the TSX Venture Exchange.

To the best of our knowledge the Samalayuca property has been staked and recorded according to the best practice of the industry. The property is devoid of royalties, back in rights, payments or other encumbrances. No permits are required for surface geochemistry or hand-dug trenching. **VVC** will need to obtain the necessary environmental permit from SEMARNAT (Secretary of Environment and Natural Resources of Mexico) to be able to conduct a drilling campaign. To the best knowledge of the author, there are no other significant factors and risks besides that may affect access, title, or the right or ability to perform work on the property.

## **ITEM 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES INFRASTRUCTURE AND PHYSIOGRAPHY**

The Samalayuca property is easily accessible from Ciudad Chihuahua by traveling northward on the Carretera Federal 45 for 315 km or due south from Ciudad Juarez for 35 km. The village of Samalayuca is located 10 km east from the centre of the property (Figure 2). A network of gravel/dirt/sand roads surrounds the Samalayuca range and several paths and trails provide access to the mining pits.

Physiographically, Northern Chihuahua is located in the Basin and Range Province which extends northward in New Mexico and Arizona. The regional geomorphologic features are thin-elongated ridges, which correspond to parallel structural segments oriented SE-NW, separated by wide basins named "bolsones" with elevations around 1200 m (Figure 3a). According to Soleto (1997), the evidence is lacking to support the concept that the topography was formed by block faulting. It is more likely that the basins and ranges are distributed according to the sub-parallel presence of anticline-syncline fold axes and/or the varied erosional competence of the stratigraphic units involved.

There are three geomorphologic units: ranges, pediments, and basins. The ranges are represented by the sierras of Juarez, Sapello, Presidio, Guadalupe, Rancherias, Candelaria, and Samalayuca. The Sierra Samalayuca is a 14 km long, 2.5-km wide ridge. It trends N55° W with the highest elevation at approximately 1760 m (Figure 3b). On the southwestern flank, there are wide ravines and moderate dip-slope while steep escarpments are developed to the northeast. The pediment is composed of talus deposits and alluvial fans. In the Sierra Samalayuca, the pediment is exposed along the northeastern and southwestern flanks (Soleto, 1997). The pediment surfaces show a smooth relief with dips commonly less than 15° and are dissected by numerous arroyos which terminate in well developed alluvial fans. The arroyos run parallel to fractures within the



Figure 3a. View toward the NW from the summit of the Samalayuca Range illustrating the Basin and Range and “bolson” physiography of Northern Chihuahua State, Mexico.



Figure 3b. Typical view of the southeastern Samlayuca Range.

bedrock. The majority of the area is occupied by basins. These basins are filled with alluvial and lacustrine sedimentary deposits, which in turn have been reworked to create eolian deposits. Eolian deposits occur as widely distributed dune fields which obscure the older geomorphic features (Figure 4a).

The region is characterized by a dry moderate climate, high temperatures, low precipitation in summer, high solar radiation, low humidity, and cold winters. The average annual precipitation is 255.94 mm, the lowest in the state of Chihuahua. The majority of the rain comes in the summer months (July to September). The average temperature is 17°C, the monthly maximum average is 31°C in July, and the monthly minimum is 6°C in January. The average annual pan evaporation is about 280 cm, and the relative humidity is less than 50 %. Snowfalls occur once or twice every winter. In this area of the Chihuahua desert, evapotranspiration is several times greater than the precipitation. The drainage consists of small internal systems, forming ephemeral playa lakes located at local base levels. Locally, the drainage consists of discontinuous, intermittent arroyos which form in response to the rather scarce and seasonal precipitation (Soleto, 1997). **The prevalent desertic weather implies a yearlong exploration period.**

The vegetation is typical of the desert biome exposing xerophytic plants and rough grass, known as desert pavement (Figure 4b). The dominant plant by far is the gobernadora or creosote bush. Other less abundant plants include: mesquite, wait-a-minute bush, tar-bush, ocotillo, cholla, pitalla, nopal, sotol, candelilla, lechuguilla, tasajillo, palmilla, yucca, and a few juniper trees. Commonly fluff grass is supported by a thin, deflated, rocky soil (Soleto, 1997).

The state of Chihuahua has an excellent infrastructure and transportation system with two international airports at Chihuahua and Juárez and a sea access via the Topolobampo Port. It has the largest multimodal rail infrastructure of Mexico spanning more than 2,560 km and a highway network of more than 4,800 km. Chihuahua has access to the North America market through 5 ports of entry with the United States. The communication services are adequate with an excellent internet and cell phone coverage. The Chihuahua State has a well-developed industrial real estate market with a world-class skilled, productive and stable workforce and is experiencing sustained industrial development. Ciudad Juárez lies on the Rio Grande. The city has a growing industrial



Figure 4a. Typical view of the desert vegetation and eolian deposits around the Samalayuca Range. The Samalayuca Dune Field is visible in the background.



Figure 4b. Typical vegetation surrounding the Samalayuca Range, Suerte open pit.

center which is made up in large part by more than 300 assembly plants located in and around the city. The city of Chihuahua (pop. 825,327) is the state capital of Chihuahua. The predominant activity is industrial, including domestic heavy, light industries, consumer goods production, and to a smaller extent assembly plants.

Water for farming and domestic needs near Samalayuca is primarily provided by reservoirs. Groundwater is not generally exploited. There are railroads, highways and an electrical power plant in Samalayuca. The Juarez-El Paso metropolitan area and Chihuahua are the economic centers of the Chihuahua State. Both possess all the amenities of a modern city: i.e. hospital, airport, commercial port, lodging, commerce and restaurants and provides all the technical expertise, manpower and resources necessary for the development of a mining property. There is sufficient unused land within the Samalayuca property for waste and tailing disposal and the construction of a mine and milling installations. The agreement of the landowners will need to be sought.

## **ITEM 6 HISTORY**

?-1965: According to mining reports (Wilson, 1964; Duarte, 1966), two open pit mines were first developed by a Canadian mining company with headquarters in Mexico; Cia. Minera Sentar, S.A., in 1956. A third, owned by a Sra. Solis de Cardoza, was operated in 1964 by a Sr. Quesada. The Compania Fresnillo operated two mines in the Sierra Samalayuca during 1964-1966.

Drilling activities included 5 drill holes totaling 854 m of core in the Gloria open pit area. The mining took place in the Concha, Gloria, Juliana, Zorra, Trinidad and Suerte open pits involving shallow excavations, access trails and ore pile stocking. Ore taken from the mines at Samalayuca was hand-sorted at the mine pits. The concentrate was trucked to Ciudad de Juarez or dumped at Estacion Samalayuca, where it was loaded on railroad cars when the amount justified the shipment (Berg, 1970). The cooper was smelted at El Paso, the iron ore at Juarez.

1967: Pemex conducted a standard exploration campaign that included detail mapping of the Sierra Samalayuca.

1970: Edgar Berg from the University of Texas at Austin wrote a MSc. thesis entitled: Geology of the Sierra Samalayuca, Chihuahua, Mexico. The work consisted of general mapping of the Sierra including the structural geology and the local stratigraphy (Berg, 1970). An evaluation of the economic potential for copper mineralization was also presented. The company Earth Resources also planted two rotary drill holes in the Sierra with geographical coordinates unknown.

1975: Artisanal mining (gambusinos) involved hand sorting and shipping of ore material to the Asarco Smelter in El Paso.

1992-1993: MXUS S.A. de C.V. completed surface sampling, geological mapping, followed by drilling of 51 air track, four reverse circulation holes in the la Concha pit area and core holes in the La Gloria pit area (Gorski, 1993). The salient results of the air track drilling campaign are given in Table 1. This was a shallow drill campaign; the depth varying from 9 to 30 m. Assay results greater than 0.4 wt. % Cu were obtained for 25 holes with intersections ranging from 2 to 30 m. Since the air track drilling process only produces rock chips and provides no information on the stratigraphy, strike, dip of the volcanoplutonic assemblages, the thickness of the mineralized intersections must be considered as apparent.

1995: Craig Benjamin Bruno wrote a Master's Thesis at Queen College, New York entitled: A mineralogical and geochemical study of the sandstone-hosted stratiform copper deposits at Sierra de Samalayuca, Chihuahua, Mexico (Bruno, 1995). The thesis contains a detailed description of the stratigraphy of the sedimentary rocks of the northwestern Sierra based on the core log descriptions provided by MXUS S.A. de C.V to the author. The petrography and paragenesis of the Cu-bearing sulphide/ oxides and principal minerals in the sandstones were presented. A study of trace element composition and variations in the mineralized sandstones based on the MXUS core data bank was completed.

1997- A MSc. thesis entitled: Stratigraphy and structure of the Sierra Samalayuca, Northern Chihuahua, Mexico was written by I.G. Castulo Molina Soleto at the University of Texas at El Paso (Soleto, 1997). The thesis focused on the stratigraphy of the sedimentary rocks of the entire range of the Sierra Samalayuca and investigated its structural framework in detail.

**Table 1.** Air track drilling, Samalayuca range, MXUS S.A. de C.V, 1992

Hole no.	Azimuth (°)	Plunge (°)	Depth (m)	From (m)	To (m)	Length (m)	Cu (wt.%)
1	----	-90	30	0	30	30	0.42
2	200	-45	18	0	14	14	0.57
3	21	0	21	0	8	8	0.52
4	----	-90	23	0	17	17	0.25
5	304	-45	23				
6	205	-45	20	0	13	13	0.28
7	20	-45	30	0	16	16	0.39
8	20	0	30	0	4	4	0.31
				26	30	4	0.45
9	18	-45	30	0	21	21	0.40
10	----	-90	24	0	4	4	0.52
				17	24	7	0.53
11	20	-45	24				
12	22	-45	24	0	24	24	0.62
13	21	0	21	0	5	5	0.56
14	----	-90	21				
15	202	-46	21				
16	----	-90	21	0	13	13	0.49
17	30	-47	12				
18	208	-45	21	0	4	4	0.50
19	----	-90	21	0	4	4	0.50
20	200	-46	21	0	2	2	0.62
21	200	-70	20	0	7	7	0.23
				13	18	5	0.69
22	20	0	21	16	21	5	0.25
23	23	-9	20	0	2	2	0.20
				5	10	5	0.22
				15	20	5	0.27
24	20	-45	21	6	21	15	0.83
25	----	-90	12	0	4	4	0.25
26	20	0	21	0	6	6	0.46
27	----	-90	9				
28	15	-3	21	3	6	3	0.32
29	----	-90	12	0	5	5	1.02
30	30	-2	18				
31	29	-40	21	0	4	4	0.38
				11	15	4	0.27
32	30	0	12	0	2	2	0.49
33	35	0	21	0	6	6	0.64

**Table 1.** Air track drilling, Samalayuca range, MXUS S.A. de C.V, 1992

Hole no.	Azimuth (°)	Plunge (°)	Depth (m)	From (m)	To (m)	Length (m)	Cu (wt.%)
34	35	-44	21	0	5	5	0.77
35	----	-90	9				
36	----	-90	9	0	4	4	0.84
37	30	0	21				
38	29	-40	21	0	2	2	0.53
				10	14	4	0.62
39	----	-90	12				
40	30	0	21				
41	30	-45	21				
42	----	-90	9				
43	35	-7	21	2	11	9	0.41
44	20	-8	21				
45	----	-90	21	15	19	4	0.86
46	215	-72	18				
47	----	-90	19	11	16	5	0.17
48	----	-90	18	6	9	3	0.39
49	----	-90	18				
50	35	-60	18				
51	26	-60	11	3	6	3	0.23

Minera Phelps Dodge Mexico S. de R.L. de C.V. also carried out an Induced Polarization (IP)/Resistivity survey through the Gloria, The Pass and Concha pits (Shenk, 1997). The observed IP values were low, generally not much higher than background, indicating very low sulphide values over significant thickness. The high IP zones (sulphides) corresponded well with the high-resistivity values (quartzites). The resistivity maps and sections showed a close correspondence to mapped lithology and structure. The conductive, lacustrine, clay-rich gypsiferous beds were clearly visible lapping onto the strongly resistive steeply-dipping quartzite. A regional aerial magnetic survey was flown over the Samalayuca Range. The Sierra is characterized by a NW-trending magnetic low surrounded by magnetic highs at the NW end. A strong NW-striking magnetic high in the north-central portion was interpreted to be the result of a normal Basin and Range high-angle fault. Some magnetic highs are correlated to diabase dykes. A topographic break at the Pass related to a NE-oriented magnetic low was suggestive of a major offset along a high angle fault. Furthermore, a total of 245 rock chips and shallow trench grab samples were collected in and around excavated pits on outcrop and sub-outcrop.

Eight DDH holes were sunk on the property for a total of 3,540 m. These holes investigated the mineralized areas around the Concha, Gloria, Angelica, Trinidad and Zorra pits. The UTM coordinates, azimuth, plunge, depth and elevation are presented in Table 2. Near the Concha open pit (holes SA-96-07 and 08), the drill cut through 160-170 m of moderately to strongly chloritized sandstone, hosting two copper zones separated by an average of 65 m. The upper zone ranges from 2 to 30 m and averages 0.17 wt. % Cu. The lower zone occurs in 3 beds separated by 3 to 10 m. The upper bed range from 1.5 to 6.7 m and averages 0.47 wt. % Cu; the middle bed ranges from 1.5 to 9 m and averages 0.44 wt. % Cu and the lower bed is 3 m thick and averages 0.36 wt. % Cu. The two copper zones were interpreted as the down-dip extensions of the mineralization expressed on the surface of the Concha pit (lower zone) and scattered outcrops of oxide Cu found stratigraphically above the pit (upper zone). At the Gloria pit, hole SA-96-04 intersected 109 m of moderately to strongly chloritized sandstones hosting two copper zones separated by 67 m. The upper zone is 3m-thick and averages 0.15 wt. % Cu. The lower zone is 9m-thick and averages 0.43 wt. % Cu. The projected intercepts are approximately 650 m NW of the La Gloria pit. The lower zone is assumed to be a thin down-dip extension of the zone found in the pit. Holes SA-96-05 and 06 failed to intercept significant chloritic alteration or Cu

**Table 2.** UTM Coordinates (approximate), azimuth, plunge and depth of the eight drillholes collared by Minera Phelps Dodge Mexico in 1997.

Hole no.	Easting*	Northing	Azimuth (°)	Plunge (°)	Depth (m)
SA-96-1	352080	3470085	220	-45	478.5
SA-96-2	351640	3470430	220	-45	450.2
SA-96-3	351910	3470195	230	-45	450.1
SA-96-4	349775	3471705	225	-45	450.8
SA-96-5	350860	3470980	240	-45	451.1
SA-96-6	350990	3470845	240	-45	451.1
SA-96-7	348345	3472775	200	-45	451.1
SA-96-8	348755	3472655	200	-45	356.6

\* NAD27; Zone 13N

mineralization. The three drill holes in Angelica-Trinidad-Zorra (SA-96-01, 02, 03) did not intersect significant chloritic alteration or copper mineralization. Thick sections of conglomeratic sandstone intercepted in SA-96-01 and SA-96-03 were interpreted as occurring in the lower plate of an inferred low-angle fault.

## **ITEM 7 GEOLOGICAL SETTING AND MINERALIZATION**

### *7.1-Geology and Structure of the Northern Chihuahua State*

#### *7.1.1-Introduction*

The oldest rocks of the State of Chihuahua are Neoproterozoic to Mesoproterozoic in age (1327 to 880 Ma). The Phanerozoic sedimentary rocks are Paleozoic, Late Mesozoic and Cenozoic. The oldest sedimentary sequence which is primarily constituted of Ordovician to Permian marine rocks was deposited within the Pedregosa basin which is the precursor of the Chihuahua trough. Following a Late Permian to Late Jurassic unconformity, a thick assemblage of limestone was laid in the Chihuahua trough which was developed during the Late Jurassic (Soleto, 1997). The Chihuahua trough acted as an active sedimentary basin almost without interruption until the Late Cretaceous. During the Cenozoic, a thick sequence of volcanic rocks was generated as subduction took place to the west. This volcanic episode was followed by the deposition of continental sediments in a series of small, discontinuous basins.

#### *7.1.2-Precambrian Rocks*

The nearest Precambrian outcrops to the Sierra Samalayuca are located in the Franklin Mountains, Texas and consist of a sequence of 917 Ma to 1.15 Ga limestone, basaltic breccia, quartzite, conglomerate and volcanic rock (including ignimbrite).

#### *7.1.3- Paleozoic Rocks*

In northern Chihuahua, Paleozoic marine sedimentary rocks ranging in age from Ordovician to Permian overly discordantly the crystalline Precambrian rocks. In the Franklin Mountains of West Texas, a 3 km-thick sedimentary sequence of shallow marine carbonates are exposed. They range in age from Early Ordovician to Early Permian (LeMone, 1982; LeMone and Cornell, 1984).

The oldest Ordovician rocks are represented by siliceous and calcareous sandstones deposited upon a shallow shelf during a marine transgression. A series of limestone with minor clastic sediments was concordantly deposited over the sandstone beds followed by sandstone and shale (Swazinger, 1990). This formation represents a marine regression and interrupts the carbonate deposition (Swazinger, 1990). Limestone, dolomite with minor shale are in erosional contact with the above sequence. A Devonian sequence of limy black shale and shaly black limestone was deposited in an open sea environment (Garcia Esparza, 1990; Swazinger, 1990). The Upper Paleozoic is defined by a major unconformity that extends from the Late Devonian to the Late Mississippian. The sedimentary sequence deposited during the Late Mississippian to the Late Permian is 2400 m-thick (Diaz and Navarro, 1964).

The Late Mississippian rocks consist of limestone with abundant crinoids and chert nodules overlain by a shale and siltstone transgressive sequence (Garcia Esparza, 1990; Swazinger, 1990). There is a sedimentary hiatus from the Late Pennsylvanian to the Early Permian. The Permian formations are formed by limestone and dolomite, with a few interbeds of shale, sandy limestone, sandstone, dolomite, and conglomerate followed by sequence of dolomite with subordinate shale and sandstone (Diaz and Navarro, 1964). The youngest Permian unit exposed at Sierra de Palomas is composed of limestone and dolomite (Diaz and Navarro, 1964).

#### *7.1.4-Mesozoic Rocks*

Paleozoic to Early Cretaceous sedimentary rocks were deposited in the Chihuahua trough. The Chihuahua trough covers the area of northeastern Chihuahua and adjacent parts of Texas, New Mexico and Sonora that later became sites of a pre-Albian Mesozoic basin (Ortega and Craciumaru, 2010) (Figure 5). It is a right-lateral pull-apart basin that began to form ca. 159-156

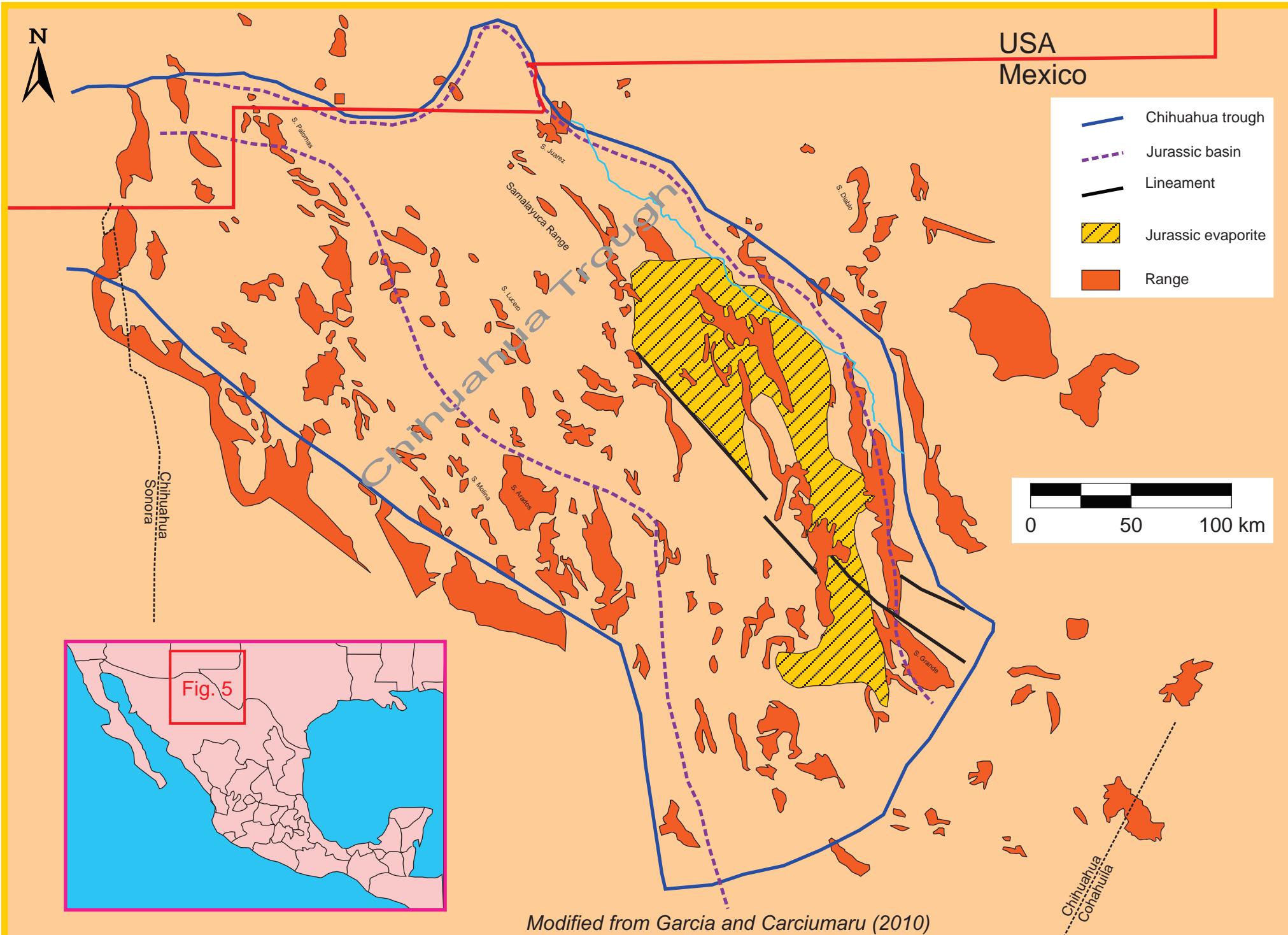


Figure 5. Localization and definition of the Chihuahua trough; a right-lateral pull-apart basin that began to form ca. 159-156 Ma during a period of relative counterclockwise rotation of the North American plate.

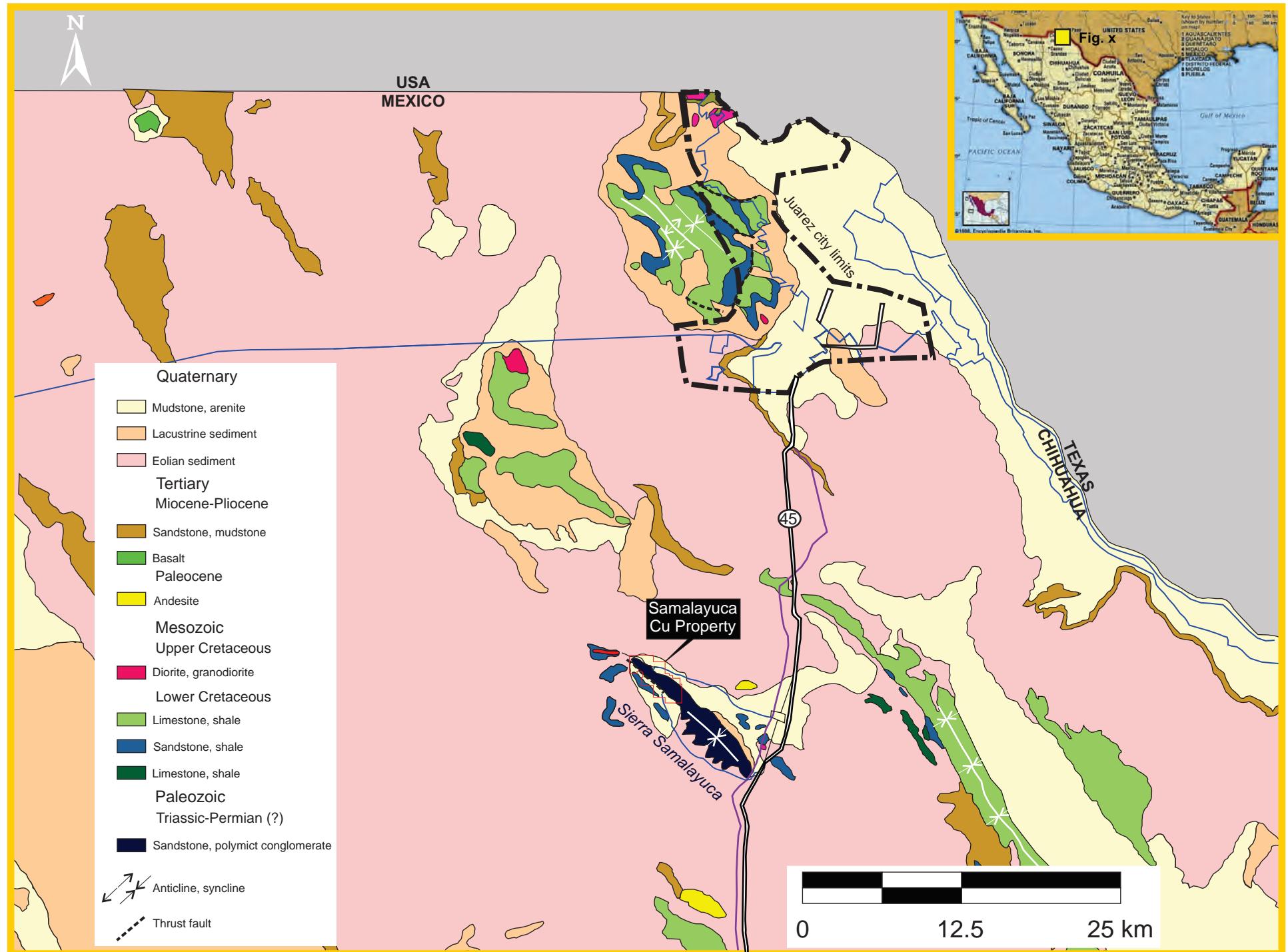


Figure 6. General geology and structure of the area surrounding the Samalayuca property, Northern Chihuahua State, Mexico..

Ma (Oxfordian) during a period of relative counterclockwise rotation of the North American plate (Haenggi and Muehlberger, 2005). The basin underwent important deformation during the Late Cretaceous-Early Tertiary Laramide orogeny. The Chihuahua trough developed as a right step between two right-lateral fault systems—the Texas “zone” and the San Marcos fault zone, which has been interpreted as an element of the Mojave-Sonora megashear.

There is a major Phanerozoic unconformity observed in northern Chihuahua that extends from the Late Permian to the Late Jurassic. During the Late Jurassic, the Chihuahua trough formed and deepened allowing the deposition of up to 7000 m of sedimentary rocks (Navarro and Tovar, 1974) (Figure 6). The Mesozoic rocks were deposited in three megacycles. The oldest is the Oxfordian to Neocomian sequence which is composed of evaporite, carbonate and clastic rock. Outcrops of Late Jurassic (Kimmeridgian) to Early Cretaceous (Neocomian) age in northern Chihuahua defined a sequence of massive limestone interbedded with siltstone and sandstone (Sierra del Aquila). In Sierra the Sapello, Chavez Quirarte (1986) describes a sequence of micritic mudstone with a few interbeds of greywacke. There are Late Jurassic diapirs of gypsum outcropping at Sierra La Alcaparra (Cordoba et al., 1970) overlain by an Early Cretaceous thick calcareous section that contains gypsum interbeds.

The second megacycle (Aptian to Albian) consists of a thick carbonate sequence. The deposition of Aptian sediment was widespread in the Chihuahua trough and is typically represented by thick-bedded limestone with sandstone, gypsum, and shale interbeds. During the Albian period, sediments deposited in the Chihuahua trough are primarily transgressive and consist of a thick to massive bedded limestone overlying by thin- to medium-bedded limestone intercalated with shale at Sierra de Juarez (Wacker, 1972). Overlying this sequence is a thick to massive bedded limestone and a sequence of shale and limestone. Late Cretaceous rocks in the Chihuahua trough are composed of a sequence of shale overlain by limestone and shale (Figure 6). A carbonate - clastic succession of Cenomanian to Maastrichtian age constitute the third megacycle. This deposition represents the end of the sedimentation in the Chihuahua trough.

#### *7.1.5-Cenozoic Rocks*

Tertiary volcanic rocks commonly rest on an eroded, often deformed, sequence of Cretaceous sediments. These volcanic suites range in age from 54 to 3 Ma (Clark and Ponce, 1983).

The oldest rocks are Early Paleocene to Mid Eocene and primarily constituted of andesite. The next sequence is dominated by Eocene to Oligocene rhyolitic (ignimbrite) rocks (Clark and Ponce, 1983). The two volcanic assemblages are related to the subduction of the Farallon plate under the American plate. The third volcanic event, associated with the development of the Basin and Range, occurred at 30 Ma and is characterized by bimodal volcanism in northern and central Chihuahua (Mauger, 1981; Bautista and Goodell, 1983). The youngest volcanic rocks are dated between 5 and 3 Ma and include alkaline basalts related to the opening of the Rio Grande Rift (Hoffer and Sheffield, 1981; Frantes, 1981). Intrusive rocks are represented by diorite to granodioritic rocks (Royo and Reyes, 1983). Dykes of rhyolitic and intermediate composition are reported everywhere in the area and could be the feeder dykes of the extrusive facies. The igneous activity in the area apparently took place during the Middle Eocene.

The Laramide orogeny and the subsequent Rio Grande Rift block faulting have created a chain of discontinuous basins (Stuart and Willingham, 1984). These basins were partially filled by lava flow, volcanic debris, detritus from the surrounding mountains and fine sediment from more distant sources (Strain, 1970). Quaternary unconsolidated sediments are constituted of gravel, sandstone, shale of alluvial origin, and of fine-grained eolian sandstone.

#### *7.1.6-Tectonics*

The area went through several tectonic regimes and orogenies extending from the Precambrian to the present, with most common structures related to the Laramide orogeny. There were three principal extensional tectonic episodes from the Proterozoic to the Eocambrian (Marshak and Paulsen, 1996). The first occurred at 1.5 - 1.3 Ga and is represented by a series of west to northwest trending inter-continental rifts. The second epeirogenic movement occurred around 1.1 Ga and was dominated by north to northeast trending rifts and related faults. The third period (0.7 - 0.6 Ga) is postulated to have reactivated the rifts through north to northeast trending faults and lead to the breakup of Laurentia (Marshak and Paulsen, 1996).

At the start of the Paleozoic, northern Chihuahua was part of the American craton and the predominant tectonism of the area was epeirogenic, with possible lateral displacement taking place along the Texas Lineament (Swazinger, 1990). Regional uplift occurred during the middle Ordovician. The Early Permian to Late Jurassic unconformity is the result of a poorly understood tectonic event, probably compressional in nature (Drewes, 1978). This activity interrupted sedimentation, formed orogenic belts, and metamorphosed portions of the ssedimentary sequence. The Permian compressional event uplifted the Paleozoic basin and exposed it to erosion until the Jurassic era. The Chihuahua trough was downwarped during the Late Jurassic - Early Cretaceous interval, allowing for the sedimentation of about 3000 m of evaporite, shale, limestone, and sandstone.

The Late Cretaceous-Early Paleocene Laramide orogeny is a compressional tectonic event affecting all the sierras which commonly form anticlinal flexures sometimes bounded by thrust faults. Drewes (1991) associated the deformation to a Fold-and-Thrust domain. After the Laramide event ended, two extensional phases took place. The first (30 - 15 Ma) was directed toward the NE-SW, whereas the second (10 - 3 Ma) was directed E -W. (Keller et al., 1990) associated the latter with the Rio Grande Rift which in this area overlaps in time and space the Basin and Range Province. These phases reactivated north-trending faults and caused the subsequent down dropping of blocks and producing a structural configuration of horst and graben. The opening of the Rio Grande Rift is accompanied by Late Pliocene and Pleistocene basaltic volcanism.

## *7.2-Geology and Structure of the Samalayuca Property*

### *7.2.1-Lithostratigraphy*

The Samalayuca range consists of a cyclic sequence of fine- to coarse-grained sandstone with subordinate phyllitic and conglomeratic intervals which exhibit low grade regional metamorphism. The lack of fossil in the Samalayuca Range sedimentary rocks renders the age determination difficult (Berg, 1970). However, Bridges (1962) mentioned that the lithology of



Figure 7a. Ripple marks due to wave action in a Samaluyuca sandstone bed.



Figure 7b. Mudcracks in a Samalayuca shale bed.



Figure 8a. Typical green (chloritized) sandstone beds interlayered with shale. Concha open pit.



Figure 8b. Supergene (?) halo in a Samalayuca sandstone bed composed of Fe-Cu-Mn oxides.

the Samalayuca rocks is very similar to that of Permian rocks of the Mina Polomosa in Aldana, Chihuahua State. If correct, the Permian age would allow associating the Samaluyuca stratiform Cu deposit with those of the Permian cupriferous province of the southwestern United States (Gauthier, 2012).

There are eight sedimentary facies that are typical of the southern two-thirds of the main Samalayuca ridge, whereas one facies is typical of the northern third of the ridge where most of the copper open pits are exposed (Soleto, 1997). The latter exposes a sequence of medium-bedded fine-grained sandstone that is intercalated with thin-bedded shale. Bioturbation and the abundant mudcracks indicate that this facies was deposited in a very shallow water environment. The most common sedimentary structures recorded are mudcracks (Figure 7a), trace fossils, cross bedding, lamination, shaly partings and current and wave ripples (Figure 7b) (Soleto, 1997; this study). Sudden changes in the sandstone granulometry and in bed thickness testify of the turbulent conditions during their deposition. The sandstone beds show a normal polarity (Pelletier, 2011).

Bruno (1995) further refined the stratigraphy of the northwestern Samalayuca ridge by subdividing the sedimentary assemblages into six units. Bruno's description is based on core materiel provided by MXUS S.A. de C.V and may not essentially reflect the surface lithologies, especially regarding the actual oxidation and leaching. The most important and most abundant unit is a green sandstone which makes about 70% of the assemblage (Figure 8a). The sandstones vary in thickness from 100 to 250 m and are locally very chloritic. There is a manganese-oxide speckle type (50%) (Figure 8b) and a non-speckled types (20%). Both types are spatially associated with copper mineralization. There is little variation between these sandstones in term of their grain size and mineralogy. In some cases they do differ in oxidized vs. reduced characteristics. The next abundant type is a brown-red rusty sandstone (15%), and less abundant are the relatively thin grey-white sandstone (6%). There is also a dark purplish-grey sandstone (4%). Two other types are of minor abundance. These are green argillite (2%) and a dark-purplish gray shale (3%). No organic matter was observed. Small exposures of mafic intrusive rocks are present in the Sierra and are of probable Cenozoic age (Berg, 1970; Bruno, 1997; this study).

Thin section analyses show that the four main mineral constituents of the Sierra rocks are quartz, calcite, muscovite (sericite), and chlorite (Bruno, 1995). Opaque minerals, green oxidized copper minerals, and rusty iron oxides are found in lesser amounts (2-8%). These are bornite, chalcopyrite, digenite, chalcocite (Figure 9a), covellite, pyrite, magnetite/ilmenite, hematite, goethite and rutile. The oxidized copper minerals are chrysocolla (Figure 9b) and malachite (Figure 10a), with lesser amount of, azurite, brocanthite (Figure 10b) and volborthite (Figure 11) (Gorski, 1993; this study). Accessory minerals included zircon, sphene, tourmaline, apatite, rutile, barite, gypsum and dolomite. The sandstones have near-zero porosity, little or no direct fabric, and are completely lacking plagioclase or potassium feldspar (Bruno, 1995).

#### *7.2.2-Green Sandstone Mineralogy*

The quartz in the sandstone is sub-rounded, moderately spherical, and very abundant. Quartz makes up about 50-60% of the total volume of the sandstones. Chert is also abundant (20%) appears as diagenetic cement and a pore filler between grains. Chert also replaced the authigenic feldspar. Chert-like quartz was also formed from detrital quartz itself. Calcite is quite abundant typically making up 10% or more in volume. It is fine-grained and formed in at least two different episodes. The first is a coarse-grained pore-filler cement; the second is a finer-grained euhedral rhombs and veinlets. Muscovite occurs as fine-grained sericite replacing the original feldspars (Bruno, 1995). Most sandstones contain 2-7% chlorite. The chlorite is very fine to medium-grained and seems to have only formed late in the sedimentary diagenetic sequence. It commonly shows pore-filling textures. Goethite occurs as irregular clots and in some cases, is pseudomorph of calcite and pyrite. Goethite is very abundant in all oxidized sandstones and replaces magnetite, pyrite and copper sulphides but can also be gradually replaced by hematite. Oxidized copper minerals are common and include malachite, chrysocolla and azurite. Quartz veins are mostly thin (2-3 mm), rarely reach 30 cm, and appear in clusters. They are associated with the most competent sandstones. The veins are made up of quartz with some copper minerals and locally contain chlorite and calcite. Copper minerals associated with quartz veins are typically oxidized, but rarely, bornite (hypogene) and covellite (supergene?) are found adjacent to the veins as well.



Figure 9a. Grains of supergene (?) calcocite ( $\text{Cu}_2\text{S}$ ) in a Samalayuca sandstone bed.



Figure 9b. Chrysocolla ( $(\text{Cu}, \text{Al})_2\text{H}_2\text{Si}_2\text{O}_5(\text{OH})_4 \cdot n\text{H}_2\text{O}$ ) with various Mn-Cu oxides in a Samalayuca sandstone bed.

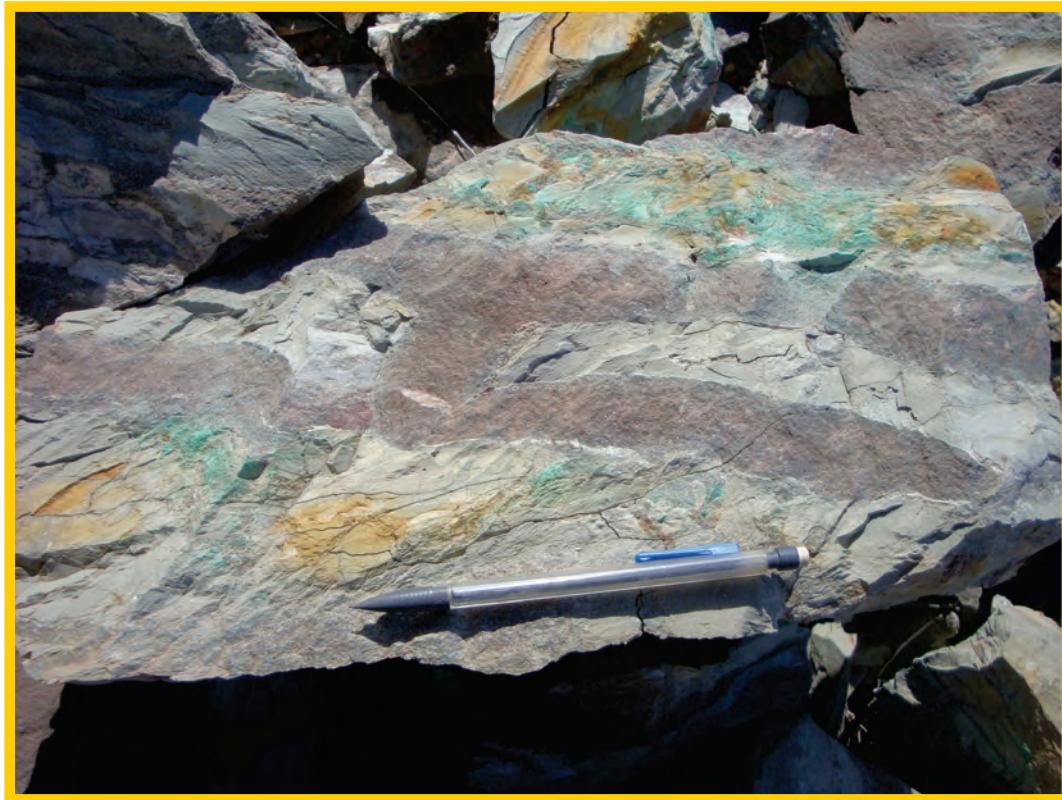


Figure 10a. Malachite ( $\text{Cu}_2\text{CO}_3(\text{OH})_2$ ) coating in reddish-oxidized Samalayuca sandstone and grey shale beds.



Figure 10b. Malachite ( $\text{Cu}_2\text{CO}_3(\text{OH})_2$ ) and brocanthite ( $\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$ ) mineralization in a Samalayuca sandstone bed.



Figure 11a. Volborthite ( $\text{Cu}_3\text{V}_2\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ ) a brownish green V-Cu-bearing mineral accompanied by chrysocolla ( $\text{Cu},\text{Al})_2\text{H}_2\text{Si}_2\text{O}_5(\text{OH})_4 \cdot n\text{H}_2\text{O}$ ).



Figure 11b. Volborthite ( $\text{Cu}_3\text{V}_2\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ ) a brownish green V-Cu-bearing mineral accompanied by Mn-Fe-Cu oxides (brownish red color).

### *7.2.3-Copper-Bearing Sulphides and Iron Oxides in Green Sandstones*

Bornite is the most abundant copper sulphide. It is frequently rimmed and/or intergrown with digenite, chalcopyrite, covellite and chalcocite. The bornite is fine to very fine-grained and locally surrounded by a green oxidized-copper mineral which is then in turn surrounded by goethite. It is never associated with pyrite. Bornite occurs as irregularly-shaped grains both as pore-filler and replacement of magnetite (Bruno, 1995). Chalcopyrite is the next most abundant hypogene copper sulphide. It is commonly intergrown with bornite, rimming and cutting bornite, suggesting that it formed later, but just as frequently bornite rims chalcopyrite. Chalcopyrite also replaces pyrite but never occurs with chalcocite, digenite or hematite. Chalcopyrite, like bornite, also occurs as pore filler and is frequently associated with chlorite. Digenite is rare and commonly rims or replaces bornite. Chalcocite is even rarer and in some cases rims bornite and is intergrown with covellite. The latter is an abundant replacement mineral which occurs with all of the other copper sulphides and is commonly associated with oxidized copper minerals and goethite. This suggests a supergene origin. Magnetite consists of intergrown magnetite/ilmenite detrital grains (Bruno, 1995). It is abundant in many rocks but always absent in all the copper-sulphide zones. Fine-grained hematite is not typically associated with the copper sulphides but occurs with goethite and magnetite/ilmenite. Hematite and goethite both seems to replace magnetite.

### *7.2.4-Other Sedimentary Units*

Grey-white, rusty-brown, and dark-purplish-grey sandstones, dark purplish-grey shales and green argillites contain similar mineral percentages as the green sandstones. However, the non-green sandstones frequently contain abundant opaque or semi-opaque minerals, although only the grey-white sandstone typically contains unaltered sulphides. The rusty brown-red sandstone lacks chlorite, contains about 10% goethite and rarely displays magnetite/ilmenite. Locally remnant bornite and covellite are found to be partially to totally replaced by goethite and/or oxidized copper minerals, suggesting that these beds once contained abundant copper sulphides (Bruno, 1995). The dark purplish grey sandstone is rich in calcite, magnetite and sericite. The grey-white

sandstones contain large pyrite crystals (1-5 %), sometimes replaced by goethite, calcite, no chlorite and abundant sericite. Only chalcopyrite is present, but bornite and covellite are absent.

The green argillite is very fine-grained and composed of clay-sized sericite grains. It contains only minor amounts of magnetite/ilmenite and contain little to no calcite and chert. The dark purplish grey shale is similar in many ways to the green argillite but contain 1-6% magnetite, some fine-grained hematite platelets and goethite (Bruno, 1995).

#### *7.2.5-Structure*

The Sierra Samalayuca forms an asymmetrical anticline whose axial plane strikes N50°W, and dips 50° to 70°SW (Berg, 1970) (Figure 12). The southwestern 2 km of the Sierra plunge 15° SE. The hinge line of the plunging part appears to be along a left lateral wrench fault with small vertical separation. The northwestern end of the Sierra stops abruptly along a NS linear feature visible on aerial photographs, which may be a fault. Both limbs of the anticline are exposed in the southeastern two-thirds of the Sierra, but in the northwestern third, all beds dip toward the NE (Figure 13a). If these beds are part of the anticline, the southwestern limb must be buried beneath the bolson. A second explanation is that the large anticline in the southwestern part of the Sierra breaks up into a series of smaller folds, all plunging gently to the NW (Berg, 1970).

Deformation in the Sierra is typical of competent rocks; folds are open and concentric rather than disharmonic (Figure 13b). Faults in the Sierra are usually high-angle, with strike-slip displacement (Figure 14a). There are three tear faults that cut most of the anticline. In several places throughout the Sierra, there are fracture zones with no observable displacement and no drag on adjacent beds. These may have originated as joints, faults, or gash-fracture zones (Shenk, 1997; Soleto, 1997). After solution opened these fractures, calcite and quartz precipitated in the voids; in many places they surround clasts of the country rocks.

The structural fabric in the Samalayuca Sierra consists of NW-trending compressional structures. Extensional tectonics were overprinted later on northwest open symmetric, asymmetric and overturned folds and thrust faults. In the study area, three different structural domains have

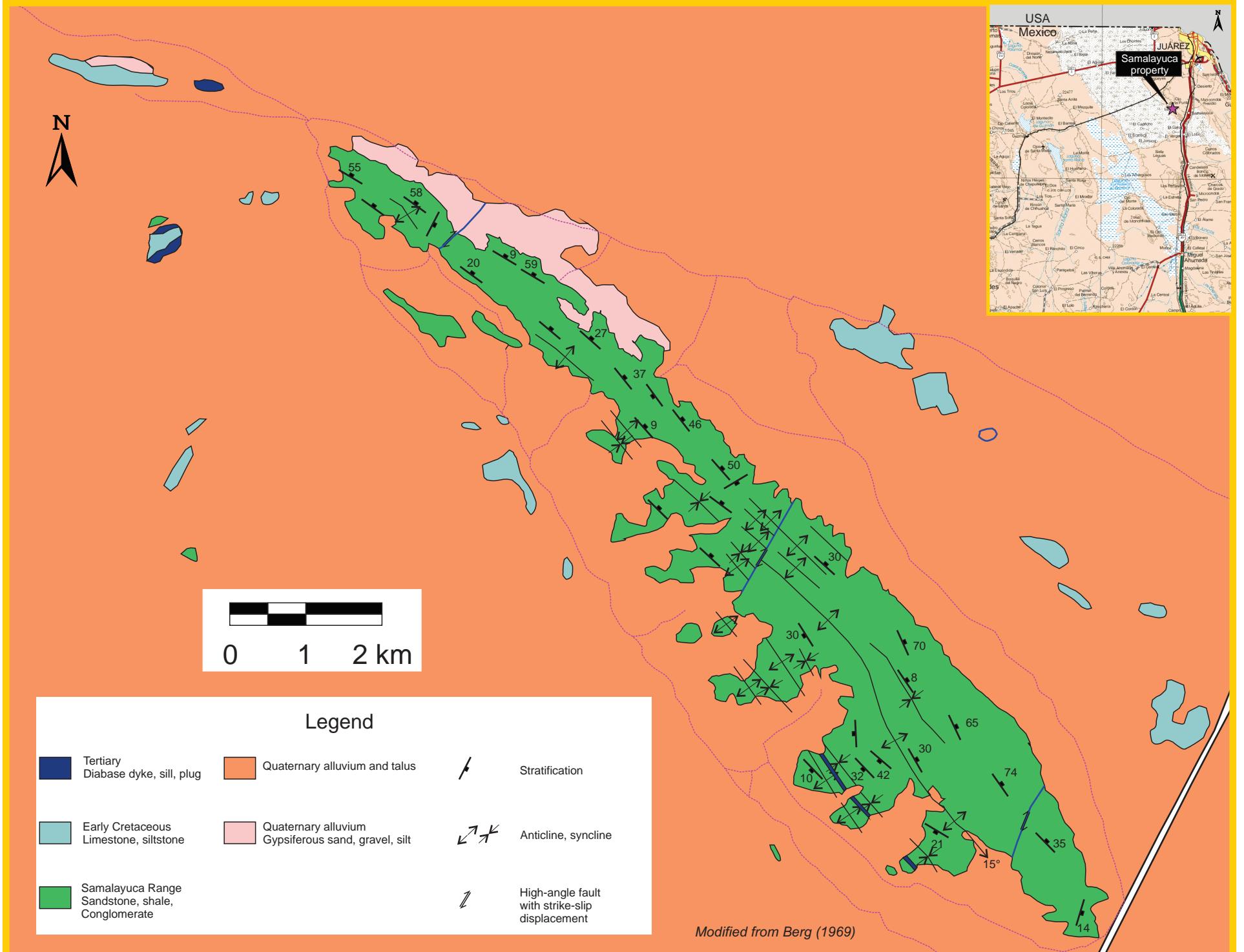


Figure 12. Structural make-up of the Samalayuca Range.



Figure 13a. View of the Zorra open pit showing the systematic NE-dip of the Samalayuca sandstone and shale beds.



Figure 13b. Fold axis in the Gloria open pit striking NW-SE.

been distinguished (Soleto, 1977). Two domains are represented in the main ridge and the third one is documented in a series of low hills located on the northeastern side of the range. The main ridge of the range is a major anticline flexure. This structure presents two different attitudes along its ridge. In the southeastern two-thirds of the ridge; it is an asymmetrical anticline. In the northwest portion of the ridge, only the northeast limb of the anticline is exposed (Figure 12).

Despite the fact that all the rocks in the sierra are intensely fractured, it is evident that the joint frequency in the northwestern third of the ridge is higher (Soleto, 1997). The difference between the two domains is only evidenced by the number of discontinuities in the area. Soleto argues that this difference is due to lithological differences along the ridge. In the southeastern two-thirds of the ridge, the rocks are a mixture of massive to thin-bedded sandstone, conglomerate, and shale. In the northwestern third, the lithology is a more uniform sequence of thin- to thick-bedded sandstone and shale. The resultant lithology makes the second group of strata more brittle in character.

In the study area, the faulting displays two preferential orientations. The dominant orientation is N30°W to N50°W and is referred to as the northwest-trending system. This fault system controls, to a large extent, the topographic shape of the ridge. It is composed largely of thrust and normal faults (Figure 14b). The second system is subordinate and perpendicular to the former one. It is referred to as the northeast-trending system. This fault system is composed largely of tear and normal faults.

The NE-SW faults are mostly vertical and show vertical fault striation suggesting that they are related to extension. These faults are commonly brecciated (cataclastite), up to 2m in width, with quartz-carbonate-specularite veins (Figure 14a). The cataclastite is surrounded by a pinkish hematization halo and composed of strongly hematised cm-to dm- sub-angular fragments with sub-parallel quartz-calcite-siderite veinlets next to these faults. Gorski (1997) interpreted these structures as tear faults. NW-SE normal faults are present along the main ridge. They usually follow the same orientation as the compressional structures (folds and thrusts) and, very often, are reactivated thrusts. These normal faults are the equivalent to the transverse joints, but with sufficient displacement to qualify as faults. Like the rest of the large structural



Figure 14a. High angle fault breccia (cataclastite) with some quartz-carbonate veins.



Figure 14b. Sub-vertical normal fault displacing shale and sandstone beds. Gloria open pit.

discontinuities, these normal faults are hard to identify in the field. Normal faulting is most evident along the northwestern end of the main ridge. The NW-SE normal faults are related to an extensional event, probably an early phase of the Rio Grande Rift.

#### *7.2.6-Mineralization*

The copper deposits of Sierra Samalayuca are mainly contained within three green sandstone beds of the Sierra. They are stratiform and homogeneous. In the drillcore, the copper occurs as fine-grained primary and supergene copper sulphides, including digenite, chalcocite, covellite, bornite and chalcopyrite (Bruno, 1995). Oxidized copper minerals such as malachite and azurite are common as well. The copper sulphides range from 0.01-8 % volume in the ore zones. The oxidized copper minerals occur within weathered rocks of all type, frequently occurring as fracture fillings and along joint surfaces. They range from 1-10 % in volume in the oxidized copper zones. Manganese oxide speckles the copper zones where oxidized (see Figure 8b). The mineralized zones are thought to be about 10-12 m thick within each of the three sandstone beds.

The original sandstone appears to have been made up mainly of quartz, feldspar, magnetite, clays and accessory minerals with porosity of 15-20%. Montmorillonite has been converted to montmorillonite-illite and then to muscovite. Calcite, chert and muscovite appear to have acted as early cements and pore fillers as the feldspars and unstable minerals were destroyed. Latest in the sandstone's hypogene history, copper sulphides began to form as a replacement of magnetite. Chlorite formed as a final pore filler along with pore-filling copper sulphides. Chlorite also formed as a late replacement of sericite (Bruno, 1995).

Magnetite is detrital and was part of the original sandstone. It was replaced by copper sulphides, then later by oxidized copper minerals, goethite, and hematite. Evidence for magnetite being replaced by sulphides includes the absence of magnetite (except for remnants) where sulphides are present along with its wide distribution and abundance when not associated with sulphides (Bruno, 1995).

Primary minerals show textures characteristic of unobstructed growth in fluid-filled voids. Textures typical of this type of growth include well-developed crystal faces, growth zoning, and horizontal and vertical mineralization zoning. Some sulphides replace other minerals as well. For instance, magnetite is surrounded by oxidized copper minerals which were copper minerals before oxidation. Typical supergene textures included gossans, irregular bands of iron oxides (with or without remnants of original minerals), radiating and/or fibrous textures. The presence of covellite rimming bornite combined with zonation evidence is however the most important criteria (Bruno, 1995).

The most common copper mineral assemblage is bornite-covellite-chalcocite-chalcopyrite, with the covellite acting as a supergene copper sulphide. The next most abundant assemblages are bornite-covellite-chalcocite and bornite-magnetite-covellite, covellite; the latter being important assemblage because it suggests that magnetite is replaced by bornite (Bruno, 1995).

An examination of the core log of the UMSX reverse-circulation drill holes (Gorski, 1993; Bruno, 1995) revealed a systematic zoning patterns of copper-iron minerals observed within and between the mineralized zones. A zonation sequence is repeated three times, and appears to be bounded by quartz veins above and below. From bottom-up, a typical zonation profile starts with a magnetite±hematite-rich dark purplish-grey sandstone. Just above the magnetite-hematite zone, a bornite±digenite zone occurs followed upward by chalcopyrite and then pyrite. This is followed by a 10 m fractured zone that contains magnetite and quartz veins but no Cu minerals. The summit of the lower ore zone contains chalcopyrite and pyrite followed-up by pyrite which exists alone. Above is another series of fractured quartz veins. The combined zonation pattern seen in the three drill holes from deepest to shallowest is: quartz veins+magnetite±hematite; bornite±digenite; bornite; bornite+chalcopyrite; chalcopyrite ± pyrite and pyrite. Covellite and chalcocite occurs randomly and frequently throughout the zonation.

Zoning suggests a roll-front type of geometry (Figure 15b). This indicates a vertical and a lateral zonation from a barren hematitic zone, to a digenite+bornite zone, to a bornite zone, to a bornite+chalcopyrite zone, to a chalcopyrite zone, to a chalcopyrite+pyrite zone, to a pyrite zone, then to a barren magnetite-bearing zone (Bruno, 1995).

Wherever copper sulphides are present, they exist within a greenish-grey chloritic reduced sandstone. Oxidized zones are present in the dark purplish-grey sandstone and shale. They are found below and above each of the copper-mineralized zones. The oxidized zones have apparently only been partially oxidized, however, resulting in the relatively low abundance of hematite found within them. Pyrite exists only in grey-white sandstone, which is always found above the copper-rich zones and has a bleached appearance. Speckling appears near the onset of copper mineralization, continues through the copper zones, and disappears shortly after the end of the copper mineralization zones. It is usually most abundant in the richest parts of the copper zones, and roughly coincides with manganese highs.

Pyrite appears to be the first sulphide to form at the expense of magnetite. This was followed by a period of pyrite-chalcopyrite formation. Bornite and chalcopyrite coexisted next, pyrite was no longer present. Zoning suggests that bornite replaced chalcopyrite. Late in the paragenetic sequence, bornite and digenite coexisted, forming after bornite. Latest in the sequence, hematite formed, though not with the sulphides (Figure 15a).

## **ITEM 8 DEPOSIT TYPE**

### *8.1-Sediment-Hosted Copper Deposits*

Sediment-hosted copper deposits are stratabound and are restricted to a narrow range of layers within a sedimentary sequence. They are epigenetic and diagenetic, since they are formed after the host sediment is deposited, but in most cases, prior to lithification of the host rocks.

Typical host rocks are low-energy calcareous or dolomitic siltstone, shale and carbonate rock of marine or lacustrine origin and high-energy sandstone, arkose and conglomerate of continental origin. Two distinct deposit types are: reduced facies Cu and redbed Cu. They occur principally in Neoproterozoic rocks. The low energy rocks are thin-bedded to finely laminated and exhibit bacterial mat structures, stromatolites, reef-building coral structures, mudcracks, crossbedding and other features of tidal environments. High-energy host



Figure 15a. Mineral paragenesis sequence in the Cu-mineralized Samalayuca sandstone beds. Modified from Bruno (1995).

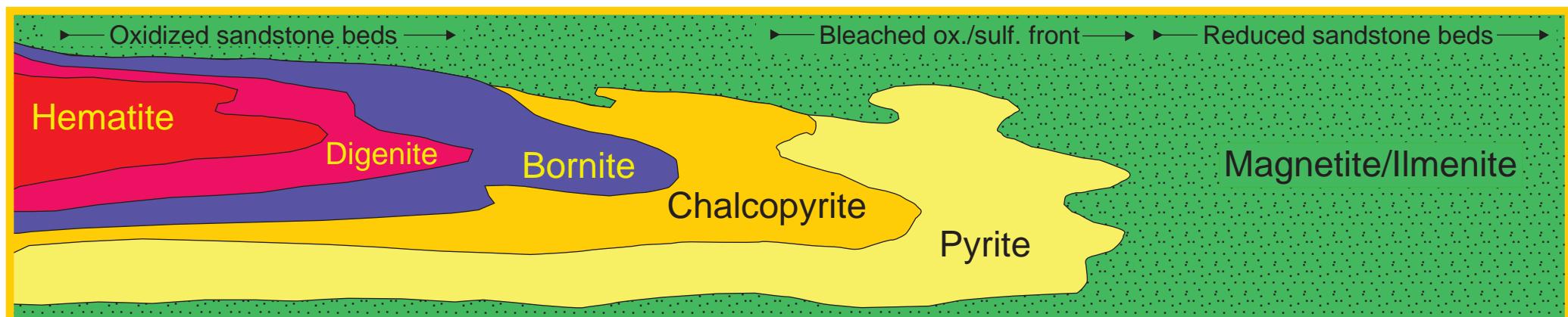


Figure 15b. Mineral paragenesis and distribution of Cu-bearing and oxide minerals the Samalayuca Cu-mineralized sandstone beds. Modified from Bruno (1995).

rocks exhibit conglomerate- and sandstone-filled channels contain scour-and-fill, cross bedding, parallel lamination, and ripple marks. They constitute the host rocks of the Samalayuca Cu deposit. Their depositional environment consists of shallow-marine basins near the paleoequator and sabkhas in areas of high evaporation rate and within highly permeable sediments. Stratiform Cu deposits are formed in intracontinental rifts, aulacogens and passive continental margins (Cox et al., 1997).

Most deposits contain one or several of these sulphide minerals: chalcocite, bornite, chalcopyrite, pyrite, and subordinate galena and sphalerite. The mineralization is finely disseminated, stratabound, locally stratiform. Reaction of reducing fluids with red beds generates green, white, or gray rocks rich in Fe-calcite and chlorite, whereas oxidizing fluids produce albitic, hematite rocks depleted in base metals, calcium and potassium.

Sediment-hosted copper deposits are formed by fluid mixing in permeable sedimentary rocks. Two fluids are involved: an oxidized brine carrying copper as a chloride complex, and a reduced fluid, commonly formed in the presence of anaerobic sulfate-reducing bacteria. For a sediment-hosted copper deposit to form, some conditions are required: 1) There must be an oxidized source rock in which hematite is stable and ferromagnesian minerals or mafic rock fragments provides copper by leaching and 2), A source of brine is required to mobilize copper. Evaporites are commonly interbedded with red beds and act as brine sources, but any sedimentary environment in which evaporation exceeds rainfall will produce brines 3), The precipitation of copper necessitates a source of reduced fluid that can be derived from organic-rich shales, carbonate rocks, from any sedimentary fluid in equilibrium with pyrite or from reduction of sulfate by carbonaceous material and 4), There must be conditions favorable for fluid mixing (Cox et al., 1997). Permeability in shale provides sites for fluid mixing, whereas faulting or folding may produce a hydraulic head that causes one fluid to invade the site of another. A permeable host rock or other open space must be present in which the fluids can circulate in intergranular space in fine-grained sediments prior to compaction and lithification.

Berg (1970), Bruno (1995), Schenk (1997) and Gauthier (2012) refer to the Cu mineralization at Samalayuca as a sedimentary stratiform deposit. Their assertion rests on several key arguments:

1) When it is not transported by a flux schistosity, the copper mineralization is stratiform, 2) There is little evidence of coeval magmatism with the mineralization events, except for some late emplacement of diabase dykes, 3) The sedimentary rocks are not affected by a deep-seated metasomatic events , 4) The sediments were metamorphosed to a greenschist facies not related to contact metamorphism near a pluton and 5), The copper mineralization is in close spatial association with oxidized and reduced sedimentary rocks, a typical characteristic of diagenetic Cu deposits.

At Samalayuca, brines were Cl-rich (Bruno, 1995). Cl combined with Cu, thus increasing the solubility of copper minerals. The fluids picked up oxygen from the atmosphere, and then they produce red beds by oxidizing the iron-bearing minerals. Green barren sandstones with magnetite/ilmenite, muscovite, chlorite, calcite, chert lack feldspar, suggesting that feldspar destruction had taken place before the copper-bearing solutions arrived. Once the copper-bearing fluids permeated the reduced sandstone beds, they reacted with the original minerals and pore-fluids contained in sandstones. The stratiform nature of the Samalayuca mineralization suggests that the mineralizing fluids were guided by permeability.

Detrital heavy minerals, feldspars, and original clays are destroyed by diagenetic events generated by the introduction of mineralizing fluids that transformed some of these minerals into chert, calcite, sericite, chlorite, rutile, sulphides and hematite. For instance, K-feldspar produced sericite and chert, plagioclase (+  $K^+$  +  $CO_2$ ) produced muscovite, calcite and chert; magnetite produced iron and copper sulphides + rutile, and hematite + rutile, and hornblende generated chlorite (Bruno, 1995).

The original sandstone probably had a porosity of 15-20%. Calcite, chert and muscovite may have acted as early cements and pore fillers as the feldspars and unstable minerals were destroyed. Copper sulphides began to form as a replacement of magnetite with chlorite formed as a final pore filler along with copper sulphides. Chlorite also formed as a late replacement of sericite (Bruno, 1995). Magnetite is detrital and was part of the original sandstone. It was replaced by copper sulphides, then later by oxidized copper minerals, goethite, and hematite.

Primary minerals show textures characteristic of unimpeded growth in fluid-filled voids. Textures typical of this type of growth include well-developed crystal faces, growth zoning, and horizontal and vertical mineralization zoning.

### *8.2-Supergene Enrichment*

Supergene enrichment, although not common in sediment-hosted copper deposits, may well be present in the desert environment prevalent at Samalayuca since the Tertiary period.

Supergene enrichment deposits starts when typically low-grade (0.05-0.35 wt. % Cu) primary pyrite and chalcopyrite mineralization is exposed to oxygenated groundwaters (Anderson 1982; Titley and Marozas, 1995). Oxidation of pyrite above the water table forms sulfuric acid and ferric sulfate that react completely with chalcopyrite to form soluble cupric sulfate and ferrous sulfate. This process leaves behind a leached body that is typically devoid of copper and contains a mixture of the iron oxide, sulfate mineral, hematite, goethite, and jarosite (Blanchard, 1968; Anderson, 1982). The copper in solution migrates downward to a redox (reduction/oxidation) boundary at or below the water table where it reacts with the reduced sulfur in chalcopyrite and pyrite and forms secondary copper sulphides forming an enriched zone. Downward zoning of secondary copper sulphides reflects changing Eh-pH conditions and solution chemistry that yields a suite of secondary copper minerals with variable copper to sulfur ratios. This mineral suite can typically include: chalcocite, digenite, covellite and bornite as a series of replacements of each other and of chalcopyrite and pyrite (Sikka et al., 1991). Figure 16 illustrates a possible supergene enrichment zone at relatively moderate depth below the Concha open pit where leaching and oxide zones are observed.

Replacement textures range from complete volume-for-volume replacement to thin coatings on grain boundaries. Early cycle leaching and enrichment processes typically result in an enrichment of copper grade by a factor of at least 2. This process is cyclical and reflects episodic vertical changes in the position of the redox boundary as a result of tectonic, physiographic, and climatic changes. Where there is insufficient pyrite to oxidize and mobilize copper from either secondary or primary minerals or in the presence of acid consuming wall rocks such as limestones, skarns, or feldspar and biotite-bearing intrusive rocks, the minerals are oxidized *in-*

N210°

N30°

# LN1975W-Concha

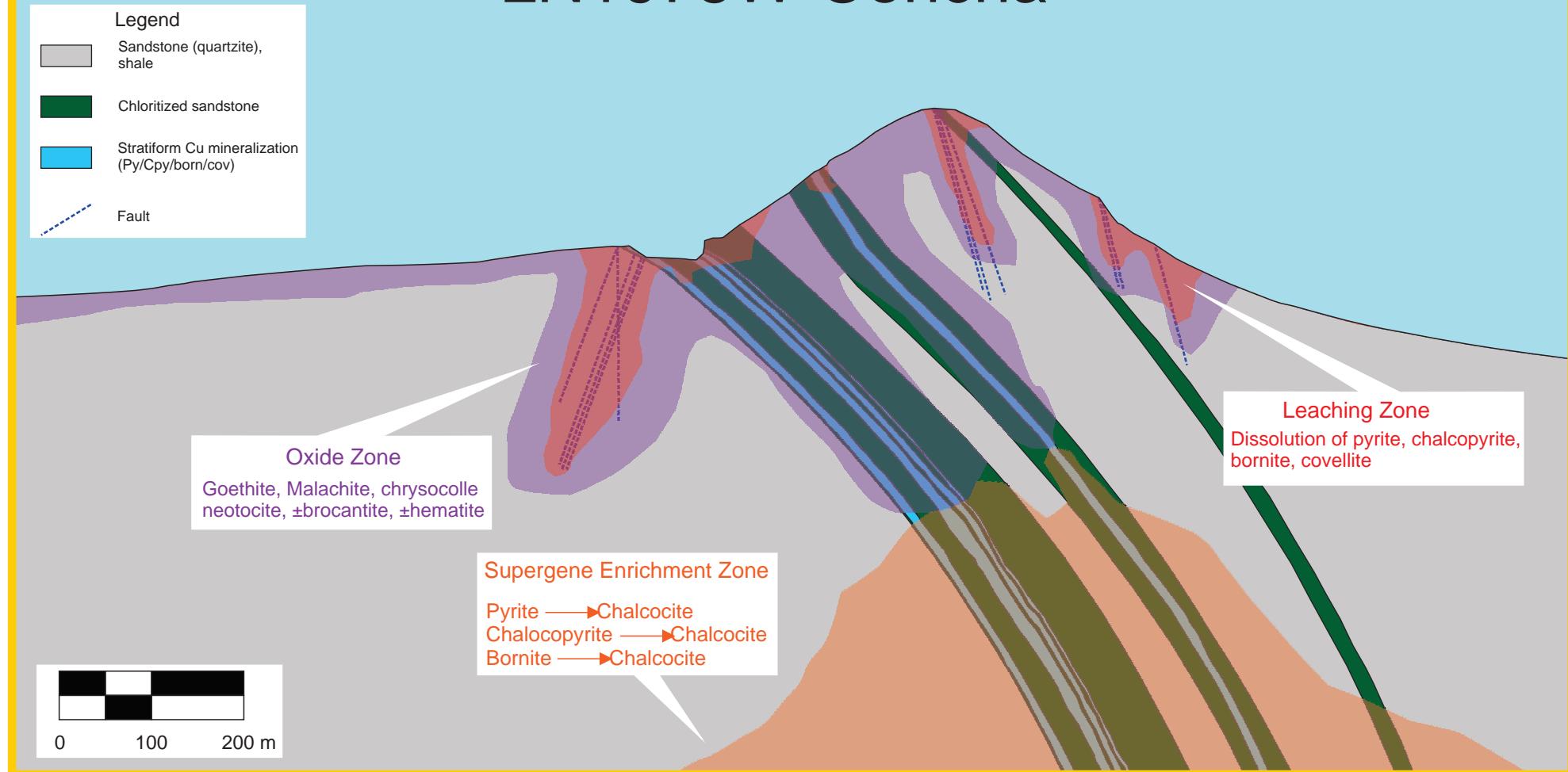


Figure 16. Possible supergene enrichment zone present at depth below the Concha open pit. The leaching zone is mainly associated with fracturation and faulting. Geological mapping performed by Jocelyn Pelletier.

*situ* with only minor transportation of copper. This results in a complex assemblage of copper oxide minerals including chalcanthite, brocanthite, tenorite, cuprite, native copper, malachite, azurite, chrysocolla and a number of other secondary oxide minerals depending on Eh, pH, P<sub>CO<sub>2</sub></sub>, P<sub>O<sub>2</sub></sub>, SO<sub>4<sup>2-</sup></sub> and a variety of other environmental and geochemical conditions.

Alteration of K-Al silicate minerals in the host rocks typically accompanies supergene enrichment. The reactions during supergene enrichment are the same as typical acid weathering (Titley and Marozas, 1995). This involves the conversion of feldspar to muscovite or muscovite to kaolinite. Acids formed by the dissolution of pyrite also react with K-Al silicate host rocks to produce alunite and jarosite under high acid and sulfate conditions.

## **ITEM 9 EXPLORATION**

### *9.1-Mapping and Rock Sampling of the Samalayuca Property*

The first investigation consisted of a reconnaissance geological evaluation of the property conducted by André St-Michel, MSc., P. Geo; the owner of Samalayuca Cobre SA de CV. Chip and grab samples, were collected from historically mined zones. In April 2010, a sampling campaign of the principal historical mined pits, leading to the gathering of 136 rock and grab samples, was carried out by Eduardo Palacios Castro, geologist, under the supervision of Luis Medrano, senior geologist. In January 2011, Jocelyn Pelletier, P.Geo, with the help of three technicians, mapped the geology and structure of the principal mineralized areas of the Samalayuca property. Geological and structural cross-sections were established following N030°-N210° -oriented grid lines spaced by 100m. A total of 180 samples were collected, mostly chip samples. Geological maps of the main pits (i.e. Concha, Gloria, Gloria Extension, Juliana and Zorra) were drafted at a 1:2000 scale and later digitalized and georeferenced

In March 2011, a compilation of geological data and maps (1:10000 scale) of the three principal mineralized zones (Concha, Gloria, Gloria Extension) were made. Following the recommendations of André St-Michel, a revision and digitalization of geological sections

(1:2000 scale) were constructed for the Gloria and Gloria Extension open pits. A more detailed mapping of the Concha, Gloria and Gloria Extension pits was performed in order to create a second set of geological sections (1:500 scale). During this campaign, 91 samples were taken, mostly chip samples.

In mid-April 2011, Julio Pintado, PhD, P.Geo, specialist of Mexican deposits, came to visit the property and evaluate the potential of the previously mined zones (Gloria Extension, Gloria and Concha). In May 2011, Michel Gauthier, PhD, P.Geo., a stratiform copper deposit specialist, came to visit of the property. Following the recommendations of Dr. Gauthier, a series of geological sections (1:500) were generated for every 25m along the Concha, Gloria, Gloria Extension pits.

Geological and structural mapping performed by Jocelyn Pelletier included the careful study of lithological types, the alteration indicative of copper mineralization, type of faulting and degree of fracturation and folding. The geologist also identified and described the Cu-mineralized zones. The mapping was systematically achieved along the gridlines.

## *9.2-Exploration of the Open Mined Pits*

### *9.2.1-The Concha Pit*

The Concha pit is located at the northwestern end of the Sierra and consists of four EW-aligned smaller openings exposing sandstone and shale beds for 450 m, some of which are mineralized in copper (Figure 17). It is most likely that the mineralization extends outside the Concha pit which would bring the along-strike length of the mineralized zones to 800 m. There are three mineralized horizons (upper, mid, lower); with the latter showing more copper mineralization and tonnage. No sulphide is visible to the naked eye but malachite, azurite and chrysocolla are abundant in fractured zones. The Concha sandstones are dark-green in color possibly due to the presence of iron oxides and chlorite. Evidence of the deposition of the sandstone-shale beds in an intertidal zone is manifested in ripple waves on a stratification planes in the cupriferous strata (see Figure 7). An NW-plunging anticlinal fold can be observed (Figure 17b). The Concha area



Figure 17a. Concha open pit. View to the NW.



Figure 17b. SE face of Concha open pit. General view of a NW-plunging anticline.

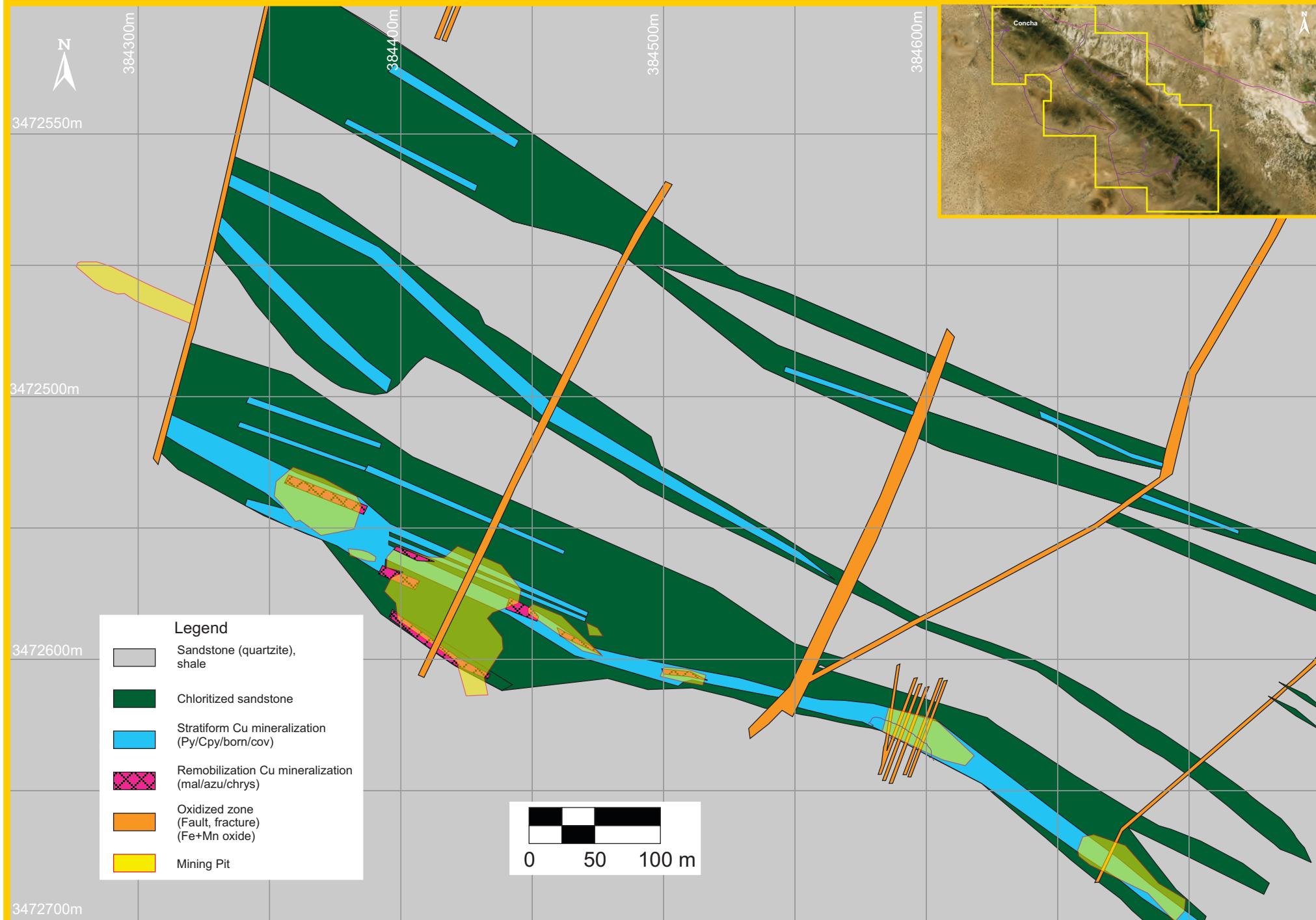


Figure 18. Geology and structure of the Concha open pit. Mapping was performed by Jocelyn Pelletier. UTM coordinates: NAD27; Zone 13 N.



Figure 19a. Eastern segment of the Gloria pit.



Figure 19b. Close-up view of the Gloria pit illustrating the plane a NW-SE-oriented normal (?) fault. Note the tension gash.

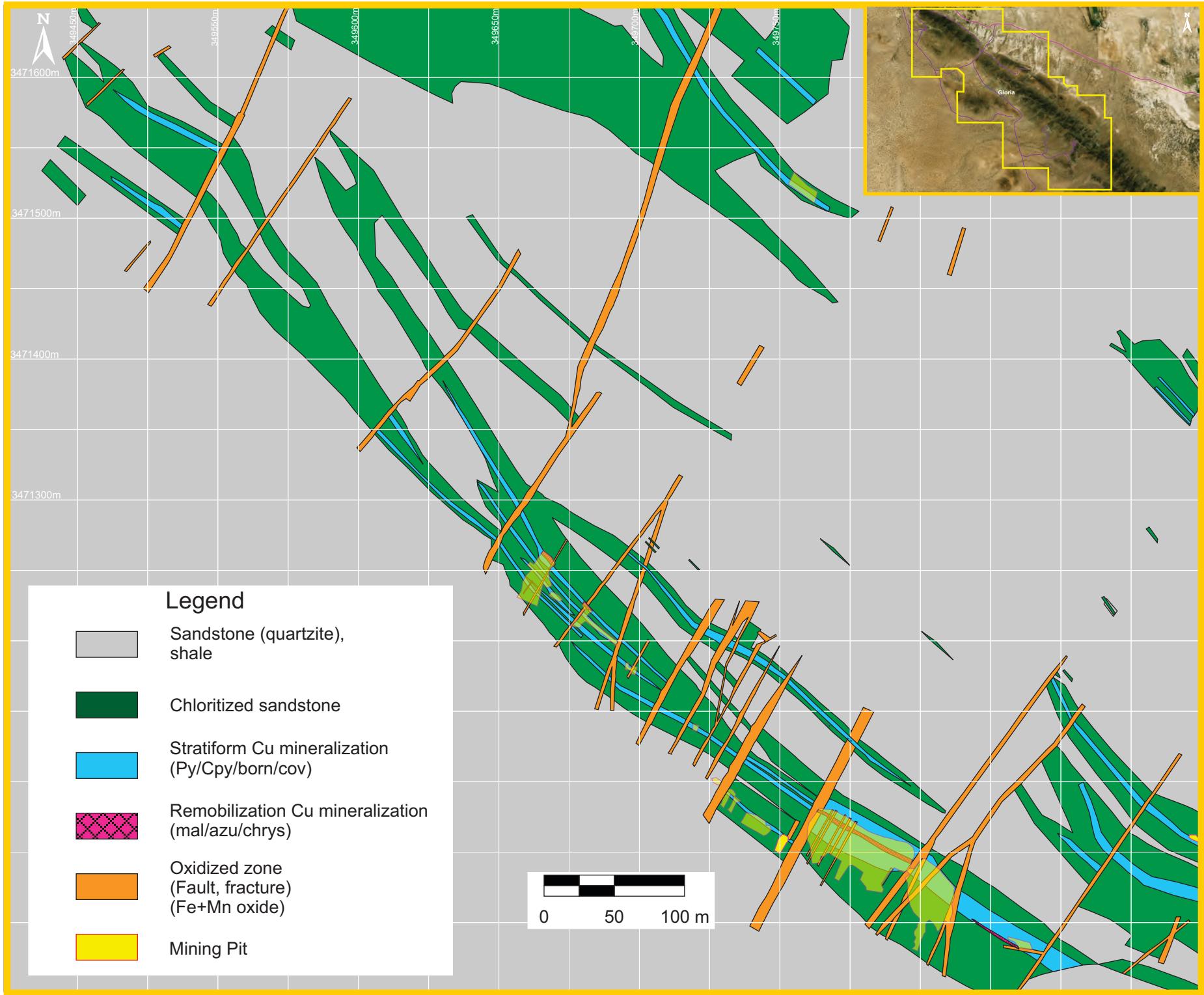


Figure 20. Geology and structure of the Gloria open pit. Mapping was performed by Jocelyn Pelletier. UTM coordinates: NAD27; Zone 13 N.

provided a total of 68 rock samples, of which 50 were taken in the open mined pits. Vertical sampling perpendicular to the strike of the sandstone beds were carried out to evaluate the weighted average grade of the Cu-mineralized zones. A stratigraphic superposition of these samples allows the visualization of the mineralized zones grade and width. It is estimated to be 450 m long, partially leached, 2-13m in width, averaging 0.48 wt. % Cu. The geological map of the Concha open pit is presented in Figure 18.

#### *9.2.2- The Gloria Pit*

The Gloria open pit is the most important mining site in term of tonnage. There are seven EW-aligned openings (Figure 19). No sulphide mineralization is evident on the surface, but malachite, azurite and chrysocolla are abundant in fractured zones. Gloria is characterized by thick green-bluish massive layers of sandstone, with subordinate shale. The schistosity ( $S_1$  and  $S_2$ ) is particularly well-developed in shale layers. The sandstone beds are affected by a conjugated network of fractures. A quartz-vein stockwork can be injected in these fractures particularly in the fold saddle. The primary mineralization can then be remobilized and result in an increase of copper values in a zone parallel to the axial plane (Gauthier, 2012). The geological map of the Gloria pit is presented in Figure 20

A total of 96 samples were collected, 73 of which were taken along the open mined pits. The copper mineralization is concentrated into three layers (upper, mid, lower); with the latter showing more copper mineralization and tonnage. It is possible that the Gloria mineralization laterally continues for another 320 m perhaps connecting with station SA11-JP387 (sample 378235 (0.3 wt. % Cu)) at Line 0700W). The Gloria main pit displays extensive leaching and remobilization of copper along vertical fractures and faults and possess a strong potential of discovering a supergene enriched zone at depth. Shenk (1997) noticed that the most intense oxidation and leaching occurs in and adjacent to the tear faults that strike across the Samalayuca range pit where the rock acquires a tan to red color probably due to the oxidation of Fe in chlorite.

Vertical sampling perpendicular to the strike of the sandstone beds was carried out to evaluate the weighted average grade of the mineralized zone. A stratigraphic superposition of these samples allows the visualization of the mineralized zone grade and width. It is estimated to be at least 620 m long, 2-25m in width, averaging 0.41 wt. % Cu.

#### *9.2.3- The Gloria Extension Pit*

The Gloria Extension pit is located 400m SE of Gloria, and was excavated almost 70 m higher in the Samalayuca range (Figure 21). However, based on the surface geology alone, we cannot conclude that the Gloria Extension and Gloria digs unearthed the same mineralized layers separated by a fault reject. The Gloria Extension is made of only two pits (upper and lower), where the lower pit shows clearly the stratiform nature of the mineralization and in which chalcopyrite and pyrite can be clearly identified in the rock. Malachite is especially abundant at the contact with shale units. The lower Gloria pit is characterized by fine cm-thick beds of greenish-brown sandstone with abundant layers of greenish shale beds. The upper pit shows similarities to the stratigraphy and mineralization present in the Gloria pits, where the sandstone beds appear more bluish-green color and where no sulphide was identified directly on the rock surface. The Gloria Extension pit displays strong fracturation dipping south associated with a fold axial plan. In the upper pit, sub-vertical NE-SW-oriented faults with pinkish alteration haloes are crosscutting the mineralized horizons (Figure 22b). The Gloria Extension pit illustrates well the interlayering of shale and sandstone beds with the later injecting into the overlying shale due to the primary compaction of the sediments (Figure 22a). There are three mineralized horizons (upper, mid, lower), where the lower shows the most economic Cu values and tonnage. A total of 99 samples were taken, 72 of which were collected in the open mined pits. Vertical sampling perpendicular to the strike of the sandstone beds was carried out to evaluate the weighted average grade of the mineralized zone. A stratigraphic superposition of these samples allows the visualization of the mineralized zone grade and width. It is estimated to be at least 630 m long, 2-25 m in width, averaging 0.29 wt. % Cu.

#### *9.2.4- The Juliana Pit*



Figure 21a. View of the Gloria Extension open pit. Note the interlayering of shale and sandstone beds and the malachite coating.



Figure 21b. View toward the east of the Gloria Extension open pit at the base of the Samalayuca range.



Figure 22a. Interlayering of shale (siltsone-mudstone) beds with sandstone beds, Gloria Extension open pit. Note the injection of the sandstone upward in the shale in relation to the primary compaction of the Samalayuca sediments.

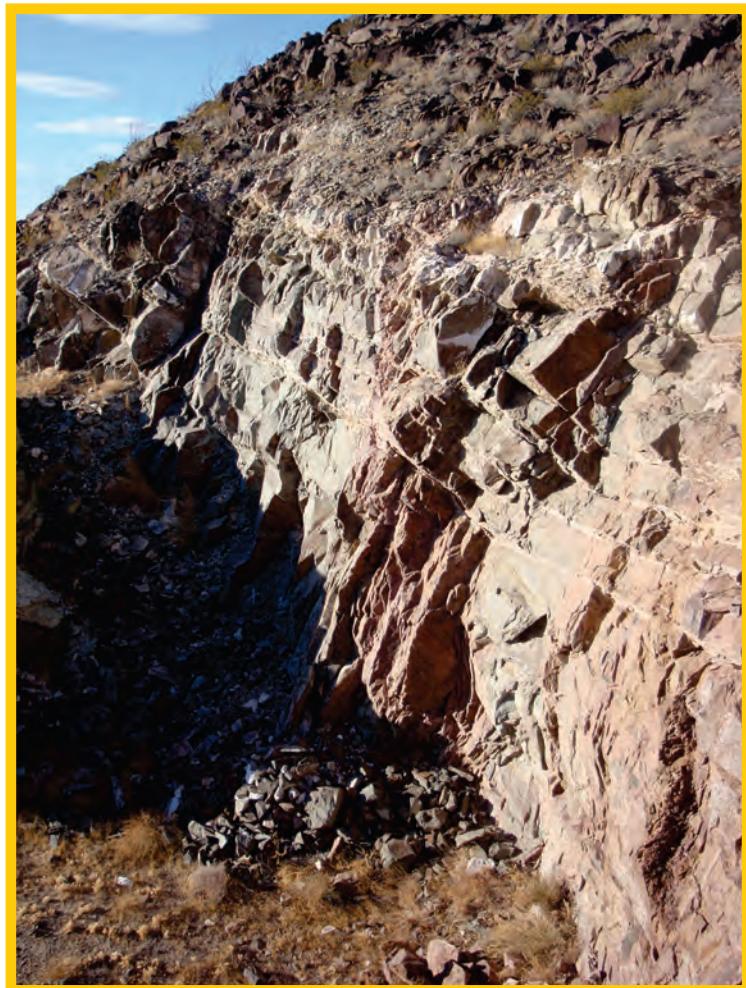


Figure 22b. Sub-vertical NE-SW-oriented faults with surrounding pinkish alteration crosscutting the Cu-mineralized sandstones. Gloria Extension open pit.

Juliana is situated 800 m east of the Gloria Extension, and sits at the bottom of the range. There are three openings that exposed stratiform Cu-mineralization in sandstone. No sulphide was identified on the rock surface, but malachite-chrysocolla coatings are abundant in fractured zones.

Juliana exposes thick green-bluish layers of sandstone, with abundant slate (shale) beds. Surface sampling shows the lowest copper grade of all the mining pits, perhaps due to the strong leaching associated with the intense fracturation. Shale beds display a well-developed flux schistosity (Figure 23b). The flux schistosity can penetrate the fracture clivage in the sandstone and isolate the latter in metric-size blocs (microlithons) (Figure 23a). The refraction of the schistosity can be so pronounced that you can observe retro-thrusting schistosity leading to the development of mushroom-type folds. The geology of the Juliana open pit is detailed in Figure 24.

A total of 31 samples were taken, 22 of which were taken along the old mining pits. Along the series of pits, vertical sampling along stratification was carried out to evaluate the average grade of the principal mineralized layer. A stratigraphic superposition of these samples allows the visualization of the mineralized zone grade and width. It is estimated to be at least 150 m long, with two mineralized bands of 2-9 m-thick showing approximately 0.2 wt. % copper. Note that Cu-oxide mineralization in fractured zones (axis cleavage) shows values up to 0.9 wt. % Cu.

### 9.3- *Cu Assays*

The main purpose of the Samalayuca sampling campaign was to take the chemical assay results to perform an Inferred Resources calculation using vertical channel samples collected from mineralized sandstone layers exposed in various open pits. However, other grab and channel rock samples were gathered from rock exposures located outside the mining pits. Figure 25 illustrates the localization of “within pit” and “outside pit” samples accompanied by color-coded Cu concentrations. Immediately apparent is the restriction of high copper concentrations ( $> 3000$  ppm) to a 4.5 km x 300 m mineralizing corridor that ties most open pits along a NW-SE orientation. Most copper assay values form samples collected outside this corridor carry less

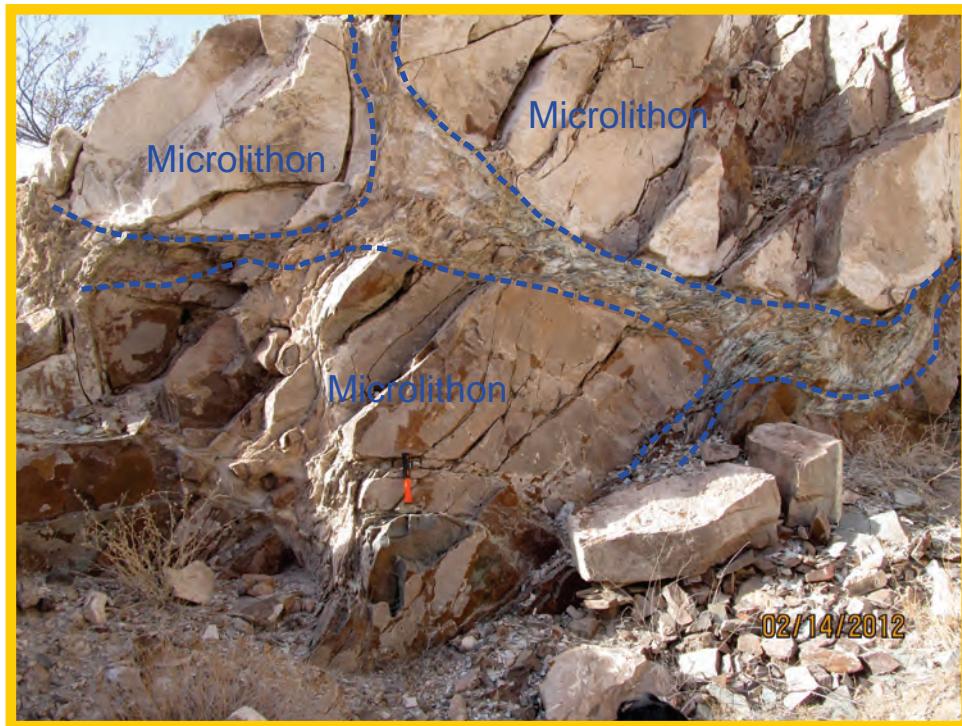


Figure 23a. Axial plane schistosity refraction related to the change of competent (shale) and incompetent (sandstone) lithologies. The schistosity flux lead to the development of sandstone microlithons. Juliana open pit.



Figure 23b. View of the two main schistosities ( $S_1$  and  $S_2$ ) with  $S_0$  (bedding) in Samalayuca shales. Juliana open pit. Note the flux schistosity in the shale beds.

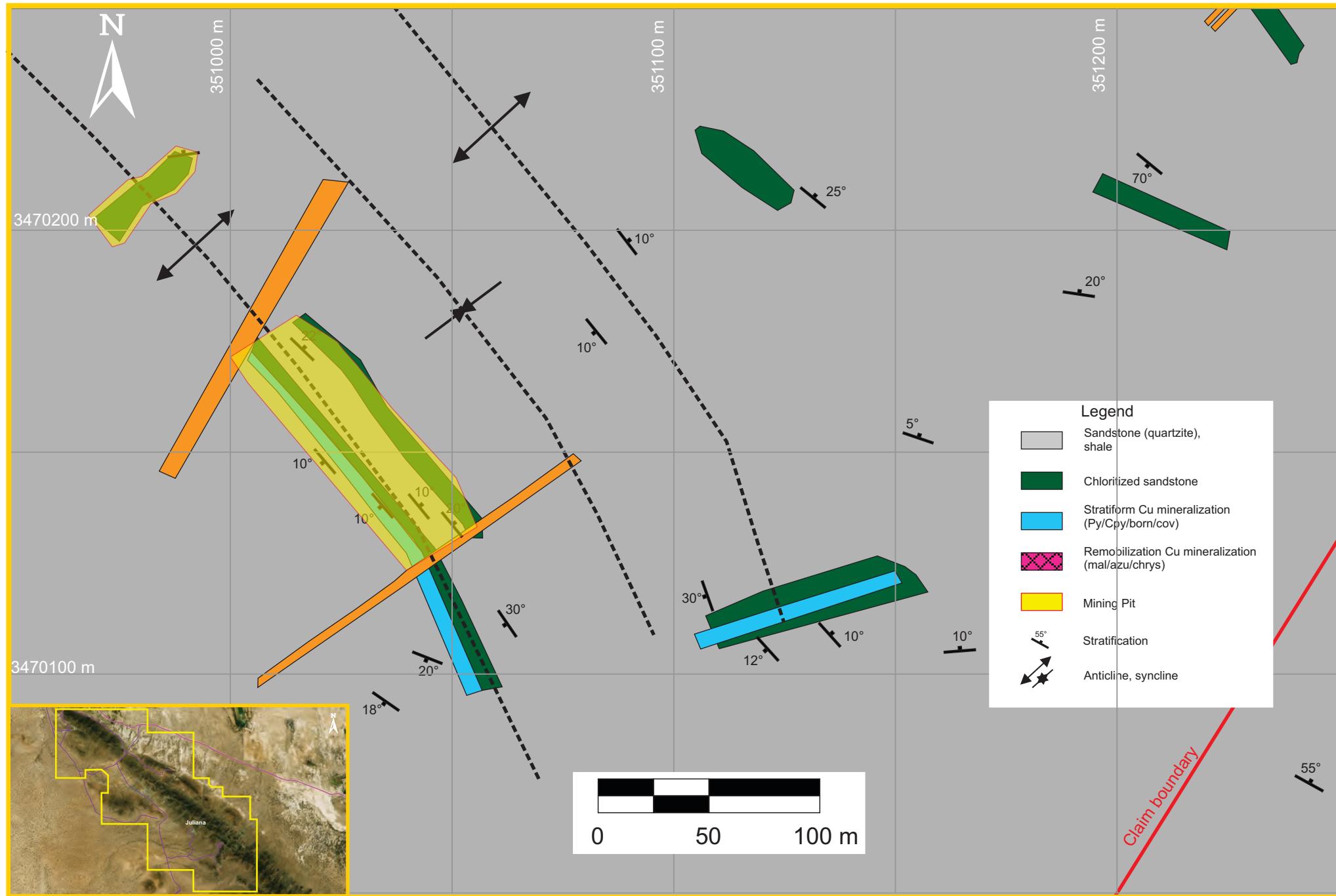


Figure 24. Geology and structure of the Juliana open pit. Mapping was performed by Jocelyn Pelletier. UTM coordinates: NAD27; Zone 13 N.

than 1000 ppm, the exception being those from Juliana and Nicolas open pits excavated at the SE sector of the property.

## **ITEM 10 DRILLING**

No drilling took place during the course of this study.

## **ITEM 11 SAMPLE PREPARATION, ANALYSES AND SECURITY**

A total of 395 samples were collected during the various sampling campaigns, most of them chip/channel samples. Each of these samples was taken perpendicular to the stratification with equal sample size approximating a drillcore intersection. Where a chip sample came from a mineralized zone thicker than 4 m, it was subdivided into subsets. Sample size and weight ( 0.90 to 10.54 kg ) were adequate and the sampling covered most of the copper mineralization present within the explored mining pits. The sheer number of rock samples collected in 2011-2012 in a relatively small area ensures an adequate representation of the copper values associated with the mineralization. Great care was taken to avoid high grade Cu fragments related to malachite coating or low grade samples representing lixiviated surfaces. The localization of each sample was given in UTM; NAD27 (Mexico) coordinates using a Garmin GPS-60CSX having a  $\pm 2$  m precision. Each sample was bagged in sturdy plastic bags and labeled. No splitting or further manipulation was performed in the field. After transporting the samples to the field camp, each sample was retrieved from the bag and photographed with the identifying tag. The samples bags were placed into large canvas sacks containing generally 20 plastic sample bags. These sacks were secured and then transported by truck to the Hermosillo ALS Chemex laboratories. The samples were securely handled at each stage from the field to the laboratory and their integrity is unquestioned.

The Hermosillo ALS Chemex laboratory initially processed each sample. The rocks (<3 kg) were dried, crushed to 75% passing a 2 mm sieve, split to 250 g and pulverized to 85% passing a 75  $\mu\text{m}$  sieve. The powder samples were then shipped to the Vancouver ALS Chemex laboratories for analyses. All samples were digested in a mixture of  $\text{HNO}_3$ - $\text{HCl}$ - $\text{HF}$ - $\text{HClO}_4$  (four

acids digestion) to be analyzed by ICP-AES methods for the following elements: Ag, Al, As, Be, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Th, Ti, Tl, U, V, W and Zn. Samples containing ore grade Cu (> 10000 ppm) concentrations were re-analyzed by the Cu-OG62 (4 acid near-total digestion and ICP finish, 0.01-40%) methods.

All samples selected for exploration were analyzed for their Au content by Fire Assay method. with gravimetric finish. In the Fire Assay method, a 30 grams fraction of a prepared sample is thoroughly mixed with 75-80 grams of a flux containing silica flour, borax anhydrous, sodium carbonate, litharge (lead oxide) and pure silver that serves as a collector. The sample and flux are transferred into a clay crucible and fused at 1050 ° C. When the content is melted, it is poured into a conical mould. The lead button and slag produced are separated by hammering. The button is placed into a preheated bone ash cupel at a temperature ranging from 820° and 880°C. The lead liquefies and is absorbed into the cupel leaving only a tiny metal which contains gold. Au is separated from the Ag in the doré bead by parting with nitric acid. The resulting gold flake is annealed using a torch. The gold flake remaining is weighed gravimetrically on a microbalance. The certificates of analyses are presented in Appendix 1. The ALS Chemex laboratories in Vancouver and Hermosillo are accredited to ISO 17025 by Standards Council of Canada for a number of specific test procedures including fire assay Au by AA, ICP and gravimetric finish, multi-element ICP and AA Assays for Ag, Cu, Pb, and Zn. The ALS Chemex laboratories participate in a number of international proficiency tests, such as those managed by CANMET (Proficiency Testing Program-Mineral Analysis Laboratories) and Geostats. ALS Chemex standard operating procedures require the analysis of quality control samples (reference materials, duplicates and blanks) with all sample batches. As part of the assessment of every data set, results from the control samples are evaluated to ensure they meet set standards determined by the precision and accuracy requirements of the method. Both analytical laboratories use barren wash material between sample preparation batches. This cleaning material is tested before use to ensure no contaminants are present and results are retained for reference. The data from the quality control checks did not indicate any significant bias or quality control issues. The author has not visited the ALS Chemex laboratories to see the operation firsthand, nor is he familiar with the general historical performance of the facility. There is no relation between the Hermosillo ALS Chemex laboratory and the issuer. In conclusion, the author is thus of the opinion that the sample preparation, security and analytical procedures are adequate and satisfy the requirements of the NI-43-101 norms (see first paragraph in ITEM 11).

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378001	Gloria Extension	350379	3470790	AR chl+	C	4.0	0.2	44	0.01
378002	Gloria Extension	350385	3470796	AR chl+ hm- ox	C	3.0	0.2	35	0.01
378003	Gloria Extension	350389	3470801	AR chl+	C	5.0	0.2	51	0.01
378004	Gloria Extension	350406	3470813	AR hm+ chl+	C	1.0	0.2	66	0.01
378005	Gloria Extension	350461	3470906	AR chl+ hm- ox	C	4.0	3.5	2040	0.02
378006	Gloria Extension	350460	3470760	AR chl+ ox	C	3.0	0.2	54	0.04
378007	Gloria Extension	350476	3470772	AR chl+ ox	C	3.0	0.2	55	0.01
378008	Gloria Extension	350476	3470784	AR chl+ (mal-)	C	3.0	0.2	19	0.01
378009	Gloria Extension	350492	3470790	AR Si+ ox	C	3.0	0.2	81	0.03
378010	Gloria Extension	350524	3470823	AR ch+ hm- ox	C	2.0	5.5	4260	0.03
378011	Gloria Extension	350534	3470836	AR ch+ hm- ox	C	2.0	8.4	5790	0.07
378012	Gloria Extension	350413	3471036	AR ch+ ox	C	2.0	0.2	28	0.02
378013	Gloria Extension	350395	3470995	AR ch+ hm-	C	2.0	0.2	31	0.01
378014	Gloria Extension	350371	3470975	AR ch+ hm- ox	C	3.0	0.2	1115	0.005
378015	Gloria Extension	350371	3470957	AR ch+ Si-/Si+ ox	C	4.0	0.2	1485	0.04
378016	Gloria Extension	350368	3470936	AR ch+ Si+ ox	C	2.0	0.2	1550	0.01
378017	Gloria Extension	350365	3470933	AR/SH	C	3.0	0.2	293	0.03
378018	Gloria Extension	350346	3470914	AR ch+ Si+ ox	C	3.0	0.2	108	0.01
378019	Gloria Extension	350333	3470907	AR ch+ SH cong	C	2.0	0.2	17	0.01
378020	Gloria Extension	350404	3470887	AR chl Si+ 1% py-cpy	G	-	0.9	6820	0.54
378021	Gloria Extension	350405	3470888	AR chl Si+ ox+	G	-	0.2	37	0.005
378022	Gloria Extension	350406	3470889	AR chl fx cco-mal	G	-	19.9	31400	0.02
378023	Gloria Extension	350407	3470890	AR/SH chl (mal)	G	-	0.6	6590	0.61
378024	Gloria Extension	350408	3470891	AR chl+ ox+	G	-	1.7	792	0.01
378025	Gloria Extension	350345	3471100	AR chl+	C	2.0	0.2	61	0.005
378026	Gloria Extension	350314	3471061	AR chl+	C	2.0	0.2	30	0.005
378027	Gloria Extension	350296	3471033	AR ch+ Si+ fx (mal+ox)	C	4.0	2.8	1465	0.01
378028	Gloria Extension	350287	3471013	AR Si- vt qtz	C	2.0	1.4	1035	0.01
378029	Gloria Extension	350282	3471002	AR ch+ Si-	C	3.0	0.2	204	0.03
378030	Gloria Extension	350268	3470971	AR hm- chl+ (mal)	C	5.0	0.2	63	0.01
378031	Gloria Extension	350181	3471054	AR chl+ Si- Si+ ox	C	3.0	0.2	24	0.005
378032	Gloria Extension	350212	3471081	AR Si- Si+ ox	C	3.0	0.2	2140	0.01
378033	Gloria Extension	350224	3471110	AR ox	C	2.0	0.2	18	0.01
378034	Gloria	350200	3471248	AR chl+ Si-	C	3.0	0.2	10	0.01
378035	Gloria	350185	3471227	AR chl+ ( mal) Si+ Si-	C	3.0	0.2	5	0.01
378036	Gloria	350154	3471180	AR/SH chl+ Si-	C	2.0	0.2	5	0.01
378037	Gloria	350144	3471171	AR chl+ Si+ Si-	C	3.0	0.2	4	0.02
378038	Gloria	350157	3471142	Ftl	C	2.0	0.7	22	0.03
378039	Gloria	350142	3471148	AR chl+ fx++ Si- Si+	C	2.0	0.2	5	0.01
378040	Gloria	350127	3471161	Ftl fx++ bx hm vt qtz cal (sid)	C	2.0	0.2	27	0.05
378041	Gloria	350121	3470983	AR Si+ fx mal chl+ ( mal)	C	2.0	0.2	13	0.02
378042	Gloria	350016	3471113	AR/SH chl+	C	10.0	1.1	2290	0.01
378043	San Nicolas	350226	3471368	AR chl+ Si+ ox+ fx mal	C	6.0	2.5	1025	0.01

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378044	San Nicolas	350236	3471382	AR chl+ Si+ Si- ox	C	4.0	0.2	21	0.01
378045	San Nicolas	350252	3471416	AR chl+ Si+ Si- fx++	C	10.0	0.5	87	0.05
378046	San Nicolas	350205	3471393	AR chl+ ox	C	3.0	1.0	1950	0.02
378047	Gloria	349949	3471211	AR/SH chl+ hm- ox	C	2.0	0.2	19	0.01
378048	Gloria	349920	3471195	AR chl+ (mal) Si+	C	2.0	0.2	17	0.01
378049	Gloria	349920	3471162	AR hm- fx+ vt qtz cal	C	2.0	0.2	17	0.02
378050	Gloria	349890	3471137	AR chl+ ( mal)	C	2.0	2.8	1610	0.02
378051	Gloria	349811	3471191	AR chl+ ( mal) Si+ Si	C	2.0	0.2	169	0.01
378052	Gloria	349829	3471203	AR chl+ ( mal) Si+ ox+ fx mal	C	2.0	1.6	2550	0.03
378053	Gloria	349811	3471217	AR/SH chl+ ( mal) Si+ Si-	C	2.0	8.8	7920	0.02
378054	GloriaW Ln02W	349775	3471252	AR chl+ hm-	C	2.0	3.2	175	0.01
378055	Gloria	349833	3471231	AR chl+ Si+ Si-	C	5.0	0.2	22	0.01
378056	Gloria	349850	3471255	AR chl+ Si- hm-	C	5.0	0.2	16	0.01
378057	Gloria	349962	3471459	AR chl+ Si- hm-	C	2.0	0.2	8	0.02
378058	Gloria	349999	3471509	AR chl+ Si-	C	2.0	0.2	21	0.005
378059	Gloria	349961	3471520	AR chl+ ( mal) Si+ ox+ fx mal	C	2.0	12.7	9870	0.03
378060	Gloria	349935	3471589	AR chl+	C	2.0	0.2	12	0.02
378061	Gloria	349943	3471613	AR chl+ ox hm-	C	2.0	0.8	1460	0.02
378062	Gloria	349980	3471643	AR chl+ ox (Si+)	C	5.0	0.2	10	0.02
378063	Gloria	349986	3471654	AR chl+ hm- ox-	C	8.0	0.2	5	0.01
378064	Gloria	349922	3471565	AR chl+ ( mal) hm- Si+ Si-	C	10.0	0.2	13	0.01
378065	Gloria	349897	3471538	AR chl+ ( mal)	C	2.0	0.2	4	0.01
378066	Gloria	349877	3471491	AR chl+ hm-	C	2.0	0.2	10	0.02
378067	Gloria	349833	3471428	AR chl+ Si+	C	8.0	0.2	5	0.01
378068	Gloria	349805	3471374	AR	C	2.0	0.2	6	0.02
378069	Gloria	349796	3471363	AR chl- ox hm-	C	4.0	0.2	9	0.01
378070	Gloria	349767	3471306	AR hm- ox+ Si+	C	5.0	0.2	5	0.01
378071	Gloria	349759	3471303	AR/cong chl+ ( mal) Si- ox-	C	2.0	0.2	4	0.01
378072	Gloria	349747	3471290	AR chl+ Si+	C	2.0	0.2	10	0.02
378073	Gloria	349674	3471337	AR chl+ ( mal) Si+ ox+	C	6.0	4.4	2800	0.02
378074	Gloria	349681	3471348	AR chl+ ox+ Si-	C	2.0	0.2	1410	0.01
378075	Gloria	349683	3471369	AR chl+ ox+ Si-	C	2.0	0.2	30	0.02
378076	Gloria	349701	3471396	AR chl+ ( mal) Si+ (cal) ox+	C	5.0	0.2	27	0.01
378077	Gloria	349709	3471410	AR chl+ Si- ox+	C	5.0	0.2	522	0.03
378078	Gloria	349844	3471633	AR chl+	C	2.0	0.2	8	0.01
378079	Gloria	349865	3471652	AR chl+ ox+	C	1.0	0.2	683	0.01
378080	Concha	348433	3472552	AR chl+ Si- ox+	C	8.0	0.2	54	0.02
378081	Concha	348404	3472570	AR chl+ (mal) Si+ ox-	C	2.0	10.5	2630	0.01
378082	Concha	348419	3472540	AR chl+ Si+ ox+	C	2.0	0.2	18	0.01
378083	Concha	348414	3472534	AR chl+ ox-	C	4.0	0.2	737	0.02
378084	Concha	348389	3472507	AR chl+ ox+	C	2.0	2.6	2670	0.01
378085	Concha	348386	3472496	AR chl+ ox+	C	5.0	0.2	32	0.02
378086	Concha	348371	3472476	AR chl+ ox++ Si+ mal	C	10.0	11.0	4310	0.02

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378087	Concha	348306	3472488	AR chl+ ox+ fx++	C	2.0	0.2	29	0.02
378088	Concha	348458	3472446	AR chl+ ox+ Si+	C	2.0	12.3	3620	0.03
378089	Concha	348493	3472518	AR hm- fx++	C	2.0	0.2	128	0.34
378090	Concha	348594	3472477	AR chl+ ox-	C	5.0	0.2	21	0.02
378091	Concha	348577	3472451	AR chl+ ox+	C	6.0	4.1	1140	0.01
378092	Concha	348575	3472435	AR chl+ ox-	C	6.0	1.1	477	0.04
378093	Concha	348554	3472409	AR chl+ ox-	C	2.0	0.2	78	0.02
378094	Concha	348550	3472389	AR chl+ ox+ fx mal	C	4.0	6.1	2140	0.07
378095	Concha	348506	3472343	AR chl+ ( mal) ox+ fx mal cco	C	2.0	8.1	5040	0.01
378096	Concha	348563	3472330	AR chl+ ( mal) ox+ fx mal cco	C	2.0	11.1	14850	0.02
378097	Concha	348552	3472326	AR chl+ hm-	C	2.0	0.6	99	0.01
378098	Concha	348497	3472167	AR chl+ ox+	C	2.0	0.2	146	0.005
378099	Concha	348594	3472318	AR chl+ ox+ fx mal	C	2.5	19.3	7370	0.005
378100	Concha	348689	3472400	AR chl+ ox+ ox-	C	6.0	0.2	177	0.01
378101	Concha	348701	3472406	AR chl+ ox+	C	3.0	6.7	1870	0.03
378102	Concha	348678	3472428	Ftl qtz chl+ ox+	C	2.0	5.9	1380	0.02
378103	Juliana	351462	3470480	AR chl+ ox+ fx- mal	C	3.5	7.0	3900	0.01
378104	Juliana	351470	3470482	AR chl+ ox+	C	6.0	0.8	226	0.01
378105	Juliana	351484	3470484	AR chl+ ox+ fx ox+	C	4.5	2.1	1190	0.02
378106	Juliana	351404	3470328	Ftl fx++ vt qtz sid	C	10.0	0.2	1000	0.12
378107	Juliana	351327	3470181	AR chl- ox- cong	C	2.0	0.2	9	0.01
378108	Juliana	351028	3470146	AR chl+ ox+	C	2.0	3.6	1110	0.01
378109	Juliana	351030	3470148	AR chl+ ox+	C	1.5	2.9	1900	0.01
378110	Juliana	351026	3470158	AR/SH chl+ ox fx mal	C	3.0	2.8	4280	0.01
378111	Juliana	351042	3470150	AR chl+ ox-	C	2.5	0.2	38	0.01
378112	Juliana	350988	3470212	AR chl+ 0x+ hm-	C	2.0	0.2	32	0.02
378113	Juliana	350982	3470214	AR chl+ 0x+ hm-	C	2.0	0.2	16	0.01
378114	Juliana	350978	3470208	AR chl+ 0x+ hm-	C	2.0	0.2	184	0.02
378115	Juliana	351277	3470333	AR chl+ ox-	C	2.0	0.2	34	0.01
378116	Juliana	351235	3470254	AR chl+ ox- Si-	C	2.0	0.2	17	0.02
378117	Juliana	351214	3470207	AR/cong chl+ Si+ Si- ox-	C	2.0	0.2	9	0.02
378118	Juliana	351115	3470110	AR chl+ ox+ fx cco mal	C	2.1	4.8	3410	0.02
378119	Juliana	351115	3470111	AR/SH chl+ (mal)	C	1.0	1.3	1535	0.01
378120	Juliana	351116	3470112	AR chl+	C	2.0	0.2	124	0.01
378121	Juliana	351117	3470113	AR chl+	C	1.0	0.2	105	0.01
378122	Juliana	351049	3470100	AR chl+ ox+	C	1.7	1.4	2440	0.01
378123	Juliana	351050	3470101	AR/SH chl+ ox+	C	2.0	0.2	32	0.01
378124	Juliana	351051	3470102	AR chl+ ox+	C	2.5	0.7	319	0.01
378125	Juliana	351034	3470104	AR chl+ ox+ ox-	C	4.0	1.2	109	0.01
378126	Juliana	351094	3470191	AR chl+ ox+ ox-	C	4.0	0.2	46	0.02
378127	Juliana	351117	3470217	AR chl+ ox+	C	4.0	5.8	4430	0.04
378128	Gloria Extension	349663	3471526	AR chl+ Si- ox-	C	5.0	0.2	269	0.01
378129	Gloria Extension	349656	3471522	AR chl+ ox- Si+	C	5.0	0.2	121	0.06

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378130	Gloria Extension	349644	3471502	AR chl+ ox-	C	6.0	0.2	52	0.01
378131	Gloria Extension	349639	3471494	AR chl+ ox- fx-	C	4.0	0.2	20	0.01
378132	Gloria Extension	349609	3471449	AR chl+ ox+	C	2.0	0.2	47	0.01
378133	Gloria Extension	349601	3471416	AR chl+ ox+	C	2.0	0.2	57	0.01
378134	Gloria Extension	349421	3471129	AR chl+ hm-	C	5.0	0.2	8	0.08
378135	Gloria Extension	349393	3471080	AR chl+ hm- ox-	C	2.0	0.2	11	0.05
378136	Gloria Extension	349541	3471519	AR chl+ ox-	C	5.0	0.2	53	0.02
378137	Gloria Extension	349559	3471552	AR chl+ ox-	C	5.0	0.2	37	0.01
378138	Gloria Extension	349559	3471569	AR chl+ ox+	C	4.0	0.2	238	0.01
378139	Gloria Extension	349602	3471624	AR chl+ ox+	C	5.0	0.2	396	0.02
378140	Gloria Extension	350647	3470855	AR chl+	C	3.0	0.2	9	0.03
378141	Gloria Extension	350618	3470781	AR chl+ Si-	C	4.0	0.2	14	0.01
378142	Gloria Extension	350601	3470763	AR chl+ Si+ ox+ fx mal-	C	4.0	4.9	3360	0.01
378143	Gloria Extension	350581	3470768	AR chl+ Si+ ox fx mal-	C	5.0	2.2	1905	0.04
378144	Gloria Extension	350544	3470781	AR SH chl+ Si+ ox+	C	5.0	1.9	1700	0.01
378145	Gloria Extension	350532	3470851	AR chl+ Si+ ox+ fx mal+	C	4.0	4.6	3290	0.04
378146	Gloria Extension	350570	3470746	AR chl+ ox	C	2.0	0.5	48	0.01
378147	Gloria Extension	350572	3470687	AR chl+ ox-	C	2.0	2.4	1185	0.01
378148	Gloria Extension	350493	3470728	AR chl+	C	2.0	0.7	27	0.005
378149	Gloria Extension	350514	3470790	AR chl+ Si+ ox-	C	4.0	0.6	67	0.02
378150	Gloria Extension	350524	3470794	AR chl+ Si+ ox-	C	2.0	0.8	326	0.01
378151	Gloria Extension	350475	3470876	AR chl+ ox++	C	2.0	8.8	2620	0.01
378152	Gloria Extension	350484	3470869	AR chl++ ox++ fx (ccl)+	C	2.5	9.4	4400	0.01
378153	Gloria Extension	350464	3470883	AR chl+ ox++ fx (mal)	C	2.0	12.5	5070	0.03
378154	Gloria Extension	350472	3470875	AR chl+ ox+ fx mal	C	2.2	6.2	2910	0.01
378155	Gloria Extension	350472	3470875	AR chl+ ox+ fx mal	C	2.8	3.2	1460	0.005
378156	Juliana	351032	3470117	AR hm- ox+	C	2.0	0.8	2840	0.01
378157	Juliana	351032	3470117	Ftl hm fx mal-	C	3.0	3.4	3470	0.09
378158	Gloria Extension	350487	3470841	AR chl+ ox+ (Si+)	C	2.0	4.6	2270	0.01
378159	Gloria Extension	350439	3470846	Ftl AR/SH chl+ ox+ ox-	C	2.0	0.2	184	0.01
378160	Gloria Extension	350371	3470832	AR/SH chl+	C	1.6	0.5	46	0.01
378161	Gloria Extension	350385	3470796	AR hm- chl+	C	1.5	0.2	49	0.005
378162	Gloria Extension	350430	3470864	AR chl+ ox- ox+	C	2.0	0.2	88	0.01
378163	Gloria Extension	350430	3470864	AR SH chl+ ox-	C	2.0	0.6	35	0.01
378164	Gloria Extension	350430	3470864	AR chl+ ox-	C	2.0	3.8	2280	0.01
378165	Gloria Extension	350470	3470838	AR chl+ ox+	C	2.0	0.7	175	0.04
378166	Zorra	352046	3470073	AR chl+ ox+	C	2.5	0.7	404	0.01
378167	Zorra	352046	3470072	AR chl+ ox+	C	3.0	12.7	6330	0.13
378168	Zorra	352054	3470046	AR chl+ hm+ Ox+ fx mal-	C	2.5	4.3	533	0.01
378169	Zorra	352076	3470036	AR chl+	C	3.0	5.3	5930	0.05
378170	Zorra	352083	3470018	AR chl- ox+	C	2.0	1.2	190	0.005
378171	Zorra	352084	3470015	AR chl ox+	C	2.0	1.5	322	0.005
378172	Zorra	352101	3470004	AR chl ox+	C	2.4	1.2	170	0.01

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378173	Zorra	352104	3469993	AR chl ox+	C	1.0	0.2	150	0.01
378174	Zorra	351778	3469913	AR chl-	C	4.0	0.2	5	0.02
378175	Zorra	351653	3469882	AR hm-	C	3.0	3.5	1360	0.02
378176	Zorra	351654	3469881	AR chl+ ox+ S1+	C	2.5	1.4	775	0.01
378177	Zorra	351623	3469897	AR chl+ S1+ ox+	C	1.7	0.2	251	0.01
378178	Zorra	351625	3469897	AR chl+ S1+ ox+	C	2.0	0.2	26	0.01
378179	Zorra	351704	3469817	AR chl+ ox++ fx mal+	C	2.5	29.6	36400	0.01
378180	Zorra	351722	3469808	AR chl+ ox++ psy fx- mal	C	2.0	14.6	19150	0.04
378201	Zorra	349978	3471042	AR chl+ ox+ Ftl	C	1.0	0.2	169	0.005
378202	Zorra	349981	3471046	AR chl+ ox+ vt cal	C	1.2	2.2	311	0.005
378203	Zorra	350006	3471065	AR chl+ ox+ fx ox+	C	2.6	10.2	6050	0.005
378204	Zorra	349974	3471071	fx++ AR hm+ fx ox+ vt qtz cal- s	C	2.0	3.1	1775	0.01
378205	Zorra	349973	3471069	Fx++ AR hm+ fx+ ox+ psy	C	2.0	5.2	4440	0.02
378206	Zorra	349969	3471060	Ftl bx AR hm+ fx+ ox+	C	0.3	0.5	745	0.02
378207	Zorra	350034	3471058	AR chl+ fx goe+ psy	C	2.5	16.7	8960	0.05
378208	Zorra	350033	3471057	AR chl+ fx goe+ psy	C	2.5	3.4	1430	0.005
378209	Zorra	350032	3471057	AR chl+ fx goe+ psy	C	2.5	7.4	5310	0.005
378210	Zorra	350031	3471057	AR chl+ fx goe+ psy	C	2.0	4.3	1420	0.005
378211	Zorra	350029	3471057	AR chl+ fx goe+ psy	C	2.0	3.6	1325	0.005
378212	Zorra	350025	3471058	SH chl+ fx+ goe- psy	C	1.5	2.6	179	0.005
378213	Zorra	350024	3471057	AR chl+ fx goe+ psy	C	1.8	14.0	5680	0.12
378214	Zorra	350013	3471063	AR chl+ fx+ goe+ psy	C	2.0	10.3	6480	0.005
378215	Zorra	350013	3471062	AR chl+ fx+ goe+ psy	C	2.0	12.5	6700	0.005
378216	Zorra	350043	3471039	AR chl+ ox+ fx hm+ psy vt cal	C	2.0	3.7	195	0.005
378217	Zorra	350043	3471037	AR fx++ psy+ mal vt cal	C	1.2	9.3	2310	0.005
378218	Zorra	350042	3471036	AR chl+ fx- ox+	C	1.5	8.6	581	0.005
378219	Zorra	350042	3471034	AR chl+ fx++ mal+ goe psy+	C	1.0	35.6	22900	0.03
378220	Zorra	350041	3471033	Ftl bx cal qtz sid qtz	C	0.2	6.9	1025	0.01
378221	Zorra	349957	3471064	AR ox+ fx hm+ chl- fx (mal+ cc)	C	2.0	0.2	4110	0.13
378222	Gloria Extension	349933	3471073	AR chl- ox+ fx+ (mal- ccl)	C	3.5	0.2	3600	0.02
378223	Gloria Ln02W	349789	341256	AR chl+ vt cal- qtz ccl	C	2.0	3.6	4110	0.005
378224	Gloria Ln02W	349790	341257	AR chl+ fx hm goe	C	2.0	0.2	753	0.005
378225	Gloria Ln02W	349790	341258	AR chl-	C	5.0	0.2	40	0.005
378226	Gloria Ln02W	349842	3471183	AR chl- ox-	C	3.0	5.8	3720	0.005
378227	Gloria Ln02W	349841	3471181	AR chl+ ox+	C	2.0	6.7	2400	0.005
378228	Gloria Ln02W	349846	3471177	AR chl+	C	3.0	0.8	153	0.005
378229	Gloria Ln02W	349847	3471175	AR chl+	C	5.0	0.2	114	0.005
378230	Gloria Ln02W	349846	3471174	Ftl AR hm+ fx++ vt qtz cal sid	C	1.0	0.6	273	0.02
378231	Gloria Ln09W	349302	3471849	AR chl+ vt cal- sid( mal+ hm)	G	-	0.8	813	0.005
378232	Gloria Ln06W	349510	3471504	AR chl+ (mal)	C	5.0	0.2	65	0.005
378233	Gloria	349537	3471512	AR chl+ hm-	C	4.0	0.2	61	0.005
378234	Gloria	349524	3471563	AR chl+ (mal) ox+	C	3.0	0.2	56	0.005
378235	Gloria	349497	3471575	chl+ (mal) ox+ fx- mal vt qtz-	C	5.0	0.9	3060	0.005

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378236	Gloria	349505	3471596	AR chl+ ox+	C	5.0	0.2	25	0.05
378237	Gloria	349515	3471610	AR chl+ ox++ hm- ftl	C	3.0	0.2	430	0.01
378238	Gloria	349446	3471552	AR chl- chl+ ox+	C	2.0	0.2	86	0.01
378239	Concha	348357	3472423	AR chl+ ox+	C	1.5	0.6	110	0.01
378240	Concha	348356	3472421	AR chl+ ( mal) ox++	C	2.7	1.2	268	0.02
378241	Concha	348352	3472412	AR chl+ ox++	C	3.5	5.8	2050	0.02
378242	Concha	348443	3472378	AR chl+ ox+ (mal)	C	2.0	0.6	120	0.04
378243	Concha	348443	3472375	AR chl+ ox++	C	3.7	0.2	161	0.02
378244	Concha	348443	3472372	AR chl- fx epi+ chl (mal ccl) fx	C	3.2	0.5	1175	0.04
378245	Concha	348442	3472370	chl- ox+ fx ccl+ mal+ bro vt qtz	C	3.5	3.2	3820	0.04
378246	Concha	348435	3472369	AR chl+ ox++ fx hm	C	2.5	1.4	172	0.01
378247	Concha	348432	3472368	AR chl+ ox++ fx hm	C	4.0	0.2	76	0.01
378248	Concha	348433	3472365	AR chl+ ox+ fx hm	C	4.7	0.5	133	0.04
378249	Concha	348434	3472361	AR chl+ ox+ fx hm+	C	2.5	0.7	451	0.02
378250	Concha	348436	3472358	AR chl- ox- fx	C	2.0	1.3	151	0.04
378251	Concha	348424	3472360	chl+ ox+ fx+ mal- ccl+ vt cal	C	2.2	4.7	3300	0.03
378252	Concha	348621	3472306	AR chl+ ox+ fx epi	C	2.5	2.3	3540	0.02
378253	Concha	348625	3472302	AR chl+ ox+ dry	C	1.0	2.7	2880	0.01
378254	Concha	348607	3472326	AR chl- ox++	C	3.1	0.5	105	0.01
378255	Gloria Ln02W	348603	3472326	AR chl+ (mal) ftl fx++	C	2.0	0.2	16	0.02
378256	Concha	348679	3472270	AR chl+ ox-	C	2.0	0.2	165	0.01
378257	Concha	348680	3472268	AR chl+ ( mal) ox+	C	2.5	0.6	242	0.01
378258	Concha	348682	3472263	AR chl+ ox-	C	3.0	5.6	2850	0.01
378259	Concha	348669	3472269	AR chl+ ox+ ftl	C	2.0	2.3	376	0.01
378260	Concha	348695	3472275	AR chl+ ox+	C	2.0	0.6	143	0.01
378261	Concha	348752	3472354	Vn qtz bx vt cal- sid	C	1.0	0.7	57	0.03
378262	Concha	348747	3472339	AR chl+ hm	G	-	0.2	37	0.02
378263	Concha	348763	3472370	Ftl bx hm	C	0.3	2.3	31	0.05
378264	Gloria Extension	350238	3470858	AR chl+ ( mal) ox- fx+	C	2.0	0.2	26	0.03
378265	Gloria Extension	350242	3470870	AR chl+ ox+	C	2.0	1.5	1525	0.01
378266	Gloria Extension	350217	3470891	Ftl vt qtz hm+	C	2.0	0.2	33	0.02
378267	Ln04W	350277	3470803	Fx++ AR chl+ ( mal) ftl hm+	C	10.0	0.2	105	0.01
378268	Ln04W	350315	3470791	AR chl+ ( mal)	C	0.4	6.9	7050	0.01
378269	Gloria Extension	350351	3470784	AR chl+ ox+	C	6.0	1.2	562	0.01
378270	Gloria Extension	350335	3471018	AR chl+ ( mal) ox+ fx	C	10.0	4.2	2510	0.01
378271	Concha	348725	3472304	AR chl+	C	2.0	0.2	78	0.02
378272	Gloria Extension	350485	3470882	AR chl+ ox- (mal+ccl)	C	2.0	12.2	6260	0.11
378273	Gloria Extension	350484	3470879	AR chl+ ox+ ftl fx++ (ccl+mal)	C	2.0	10.7	5900	0.02
378274	Gloria Extension	350482	3470876	AR chl+ ox+ fx+ ox hm+	C	2.0	11.4	6400	0.02
378275	Gloria Extension	350384	3470896	AR chl ox+ fx(mal)	C	1.8	0.2	3370	0.01
378276	Gloria Extension	350381	3470895	AR chl+ ox+	C	1.2	2.5	1795	0.01
378277	Gloria Extension	350379	3470893	AR chl++ ox+	C	2.5	0.5	111	0.01
378278	Gloria Extension	350396	3470892	AR chl+ ox++ fx mal vt cal ccl	C	2.2	6.3	3350	0.01

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
378279	Gloria Extension	350398	3470893	AR chl+ ox+ fx (mal+ ccl)	C	3.0	4.2	1960	0.01
378280	Gloria Extension	350238	3471059	AR chl++ ox+	C	2.0	0.2	39	0.01
378281	Gloria Extension	350241	3470984	AR chl+ ox+	C	2.0	0.8	292	0.01
378282	Gloria Extension	350255	3471013	AR chl+ (mal) ox+	C	5.0	0.2	662	0.04
378283	Gloria Extension	350231	3471020	AR chl ox+	G	0.3	0.7	1950	0.01
378284	Gloria Extension	350212	3471027	AR chl+ ox+	C	2.0	0.2	1220	0.01
378285	Gloria Extension	350239	3471027	AR chl+ ox+	C	1.8	0.2	974	0.03
378286	Gloria Extension	350168	3471045	AR chl+ ox+ hm (cco)	C	2.0	0.2	1660	0.01
378287	Gloria Extension	350060	3470678	Vn qtz	C	2.0	0.2	8	0.005
378288	Gloria Extension	350040	3470694	Vn qtz	C	1.0	0.2	4	0.005
378289	Concha	348678	3472267	AR Fx Vt vol cco	C	-	11.1	12000	0.02
378290	La Suerte	351509	3469396	AR chl+ ox+ Fx+ (mal)	C	2.8	4.5	3930	0.005
378291	La Suerte	351508	3469399	AR chl+ ox++ Fx+ (mal)	C	1.8	0.9	657	0.005
378292	La Suerte	351509	3469402	Ftl Ka+	C	0.4	0.2	165	0.02
918501	San Nicolas	350564	3471426	AR	C	1.5	<0.5	5	0.02
918502	San Nicolas	350563	3471426	AR	C	1.6	<0.5	2	0.03
918503	San Nicolas	350561	3471426	AR	C	1.4	<0.5	18	0.07
918504	San Nicolas	350560	3471426	AR	C	1.5	<0.5	10	0.09
918505	San Nicolas	350558	3471426	AR	C	1.6	<0.5	14	0.09
918506	San Nicolas	350556	3471427	AR	C	1.7	<0.5	12	0.02
918507	San Nicolas	350555	3471427	AR	C	1.7	<0.5	6	0.01
918508	San Nicolas	350553	3471428	AR	C	1.5	<0.5	8	0.02
918509	San Nicolas	350552	3471429	AR	C	2.1	<0.5	11	0.06
918510	San Nicolas	350550	3471430	AR	C	2.4	<0.5	28	0.03
918511	San Nicolas	350550	3471432	AR	C	1.7	<0.5	16	0.03
918512	San Nicolas	350551	3471434	AR	C	1.4	<0.5	8	<0.1
918513	San Nicolas	350551	3471435	AR	C	1.3	<0.5	5	0.03
918514	San Nicolas	350552	3471436	AR	C	1.3	<0.5	12	0.05
918515	San Nicolas	350553	3471437	AR	C	1.3	<0.5	6	<0.1
918516	San Nicolas	350554	3471438	AR	C	1.4	<0.5	7	<0.1
918517	San Nicolas	350555	3471439	AR	C	1.4	<0.5	15	0.04
918518	San Nicolas	350460	3471435	AR	C	2.0	<0.5	2	0.02
918519		350237	3471369	AR	C	2.0	2.7	466	0.11
918520		350237	3471367	AR	C	1.8	6.4	5550	0.04
918521		350237	3471365	AR	C	1.7	2.6	3720	0.07
918522		350235	3471365	AR	C	2.0	0.6	122	0.05
918523	Gloria	350156	3471249	AR	C		<0.5	27	0.01
918524	Gloria	350246	3471051	AR	C	0.9	0.9	761	0.02
918525	Gloria	350245	3471050	AR	C	1.3	<0.5	178	<0.1
918526	Gloria	350311	3471018	AR	C		<0.5	187	0.03
918527	San Nicolas	350696	3471282	AR	C	1.9	<0.5	3	<0.1
918528	San Nicolas	350695	3471280	AR	C	2.0	<0.5	4	<0.1
918529	San Nicolas	350693	3471279	AR	C	2.0	<0.5	2	<0.1

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
918530	San Nicolas	350692	3471277	AR	C	2.0	<0.5	3	<0.1
918531	San Nicolas	350690	3471276	AR	C	2.0	<0.5	2	<0.1
918532	San Nicolas	350689	3471275	AR	C	1.8	<0.5	2	<0.1
918533	Trinidad	352031	3470055	AR	C	2.0	8.4	5780	0.01
918534	Trinidad	352032	3470056	AR	C	2.0	1.5	642	<0.1
918535	Trinidad	352034	3470059	AR	C	2.0	2.6	2710	<0.1
918536	Trinidad	352035	3470060	AR	C	2.0	1.4	555	<0.1
918537	Trinidad	352037	3470062	AR	C	2.0	0.6	236	0.01
918538	Trinidad	352094	3470017	AR	C	2.0	2.8	6160	0.23
918539	Trinidad	352092	3470018	AR	C	2.0	10.4	10700	0.11
918540	Trinidad	352091	3470017	AR	C	2.0	11.7	6680	0.1
918541	Trinidad	352089	3470015	AR	C	2.0	0.7	973	0.01
918542	Trinidad	352075	3469782	AR	C	2.0	3.6	3650	0.04
918543	Trinidad	352077	3469783	AR	C	2.0	2.4	3110	0.01
918544	Trinidad	352078	3469785	AR	C	2.0	3.7	2280	0.01
918545	Trinidad	352081	3469785	AR	C	2.0	<0.5	127	0.02
918546	Trinidad	352083	3469785	AR	C	2.0	4.2	3320	0.13
918547	Trinidad	352088	3469783	AR	C	2.0	0.6	610	0.01
918548	Trinidad	352090	3469781	AR	C	2.0	<0.5	294	0.03
918549	Trinidad	352126	3469738	AR	C	2.0	5.0	3140	0.02
918550	Trinidad	352124	3469740	AR	C	2.0	2.5	5110	0.02
918551		352151	3469917	AR	C	2.0	<0.5	76	0.03
918552	Trinidad	351982	3470088	AR	C	2.0	<0.5	534	0.02
918553	Trinidad	351981	3470090	AR	C	2.0	0.9	794	0.01
918554	Trinidad	351980	3470092	AR	C	2.0	1.3	1285	0.03
918555		349450	3471886	AR	C	2.0	1.1	5290	0.01
918556		349451	3471887	AR	C	2.0	0.5	4150	0.01
918557		349452	3471888	AR	C	2.0	<0.5	4700	0.01
918559		349453	3471889	AR	C	2.0	<0.5	3810	0.06
918560		349454	3471890	AR	C	2.0	<0.5	5530	0.09
918561		349455	3471890	AR	C	2.0	<0.5	4630	0.05
918562		349456	3471890	AR	C	2.0	<0.5	4290	0.02
918563	Petroglyph	348205	3472586	AR	C	2.0	5.6	1605	0.01
918564	Concha	348364	3472408	AR	C	2.0	5.2	2160	0.05
918565	Concha	348364	3472408	AR	C	2.0	0.7	392	0.02
918566	Concha	348365	3472410	AR	C	2.0	1.8	2100	0.03
918567	Concha	348367	3472411	AR	C	2.0	11.6	7400	0.03
918568	Concha	348368	3472413	AR	C	2.0	8.4	5170	0.04
918569	Concha	348427	3472380	AR	C	2.0	24.4	9590	0.01
918570	Concha	348429	3472379	AR	C	2.0	2.4	3210	0.01
918571	Concha	348431	3472379	AR	C	2.0	1.7	2310	0.02
918572	Concha	348448	3472373	AR	C	2.0	2.1	943	0.06
918573	Concha	348450	3472371	AR	C	2.0	3.6	2210	0.04

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
918574	Concha	348451	3472369	AR	C	2.0	1.9	1220	0.12
918575	Concha	348452	3472368	AR	C	2.0	0.7	1620	0.03
918576	Concha	348453	3472366	AR	C	2.0	1.7	1980	0.04
918577	Concha	348451	3472365	AR	C	2.0	2.6	856	0.07
918578	Concha	348515	3472341	AR	C	2.0	18.4	10150	0.04
918579	Concha	348611	3472315	AR	C	2.0	14.7	10900	0.07
918580	Concha	348610	3472318	AR	C	2.0	7.6	6980	<0.1
918581	Concha	348608	3472318	AR	C	2.0	1.4	1900	<0.1
918582	Concha	348685	3472262	AR	C	2.0	9.6	4740	0.01
918583		349197	3472127	AR	C	2.0	<0.5	289	0.51
918584	Gloria	349779	3471256	AR	C	2.0	6.4	6180	0.01
918585	Gloria	349778	3471254	AR	C	2.0	13.4	13000	0.02
918586	Gloria	349777	3471252	AR	C	2.0	8.8	5310	0.01
918587	Gloria	349776	3471250	AR	C	2.0	3.3	4540	0.01
918588	Gloria	349990	3471068	AR	C	2.0	11.4	7000	0.07
918589	Gloria	349989	3471068	AR	C	2.0	2.4	2620	<0.1
918590	Gloria	349988	3471067	AR	C	2.0	6.5	3780	<0.1
918591	Gloria	349987	3471066	AR	C	2.0	8.8	6020	<0.1
918592	Gloria	349987	3471065	AR	C	2.0	7.0	4210	<0.1
918593	Gloria	349987	3471064	AR	C	2.0	3.7	1745	<0.1
918594	Gloria	349986	3471063	AR	C	2.0	5.2	3470	<0.1
918595	Gloria	349987	3471062	AR	C	2.0	6.1	4630	<0.1
918596	Gloria	349989	3471061	AR	C	2.0	3.2	2890	<0.1
918597	Gloria	350057	3471026	AR	C	2.0	0.5	620	<0.1
918598	Gloria	350059	3471026	AR	C	2.0	2.0	3340	<0.1
918599	Gloria	350061	3471026	AR	C	2.0	5.0	8010	0.01
918600	Gloria	350063	3471026	AR	C	2.0	3.6	12500	0.01
918601	Gloria	350065	3471026	AR	C	2.0	1.2	2840	0.03
918602	Gloria	350067	3471026	AR	C	2.0	1.9	6650	0.09
918603	Zorra	351714	3469816	AR	C	2.0	26.4	41200	0.02
918604	Zorra	351715	3469817	AR	C	2.0	7.8	12200	<0.1
918605	Zorra	351715	3469817	AR	C	2.0	7.0	15200	0.02
918606	Zorra	351668	3469863	AR	C	1.5	9.8	12400	<0.1
918607	Zorra	351658	3469883	AR	C	2.0	5.6	6280	0.02
918608	Zorra	351659	3469884	AR	C	2.0	1.0	1560	<0.1
918609	Zorra	351660	3469885	AR	C	2.0	<0.5	196	0.01
918610	Zorra	351624	3469899	AR	C	2.0	13.2	17450	0.02
918611	Zorra	351625	3469900	AR	C	2.0	3.4	6390	0.01
918612		350487	3470872	AR	C	2.0	5.6	2990	0.02
918613	Gloria Extension	350487	3470872	AR	C	2.0	10.2	6090	0.01
918614		350488	3470873	AR	C	2.0	10.1	6040	0.01
918615		350489	3470874	AR	C	2.0	8.6	4290	0.01
918616	Gloria Extension	350461	3470878	AR	C	2.0	7.4	4040	0.05

**Table 3.** Localization, description and Au, Ag, Cu and S assay values for chip and grab samples collected from the Samalayuca (2010-2011).

Samples	Open pit/Site	Easting *	Northing	Description	Type	Width (m)	Ag (ppm)	Cu (ppm)	S (wt. %)
918617	Gloria Extension	350462	3470879	AR	C	2.0	12.3	5150	0.02
918618	Gloria Extension	350463	3470880	AR	C	2.0	9.0	5200	0.01
918619	Gloria Extension	350384	3470876	AR	C	2.0	0.8	1590	<0.1
918620	Gloria Extension	350386	3470878	AR	C	2.0	2.7	6720	0.01
918621	Gloria Extension	350387	3470880	AR	C	2.0	0.7	5110	0.21
918622		352394	3469543	AR	C	2.0	3.1	1710	0.01
918623		352396	3469545	AR	C	2.0	0.6	166	<0.1

\*NAD27; Zone 13 N

AR=Arenite/quartzite (sandstone), SH=shale

ox=oxidation/oxide, Si=silicification,

mal=malachite, ccl=chrysocolla, cal=calcite, bro=brocanthite, py=pyrite, cpy=chalcopyrite, cco=chrysocolla, vol=volborthite

goe=goethite, psy=psylomelane, chl=chlorite, hm=hematite, qtz=quartz,

Vn=vein, vt=veinlet, ftl=fault, bx=breccia

## **ITEM 12 DATA VERIFICATION**

A professional geologist was always present during the preparation of the samples before the shipment to the geochemical laboratory. All samples were assembled under the care of Jocelyn Pelletier. The author has also verified the geochemical analyzes provided by the ALS Chemex laboratories including the trace elements concentrations of their in house standards and their blank samples. The author is thus of the opinion that the assay values presented in this report are fully compliant with the NI-43-101 norm and are a just representation of the mineralization currently present at Samalayuca.

To further evaluate the accuracy and precision of the chemical assays, Marchand (2011) conducted a repeat channel sampling on previously assayed sections of the Concha, Gloria, Gloria Extension and Zorra pits. The assay results, presented in Table 3, indicate important variations in Cu concentrations for at least three sites. Marchand (2011) attributed in part these discrepancies to the high mobility of Cu during leaching and remobilization in the sampling zones. This author is of the opinion that the sampling technique used by Jocelyn Pelletier/Luis Medrano in which all samples collected deliberately excluded malachite/chrysocolla coatings in fractures and joints better explains the lower Cu values obtained by the former geologists.

## **ITEM 13 MINERAL PROCESSING AND METALLURGICAL TESTING**

From June 2010 to July 2011 Samalayuca Cobre proceeded with 5 metallurgical tests which comprised 19 bottle and 9 percolation column experiments (6 Vat Leaching, 3 Heap Leaching) on mineralized samples collected from the Gloria pit.

In the first metallurgical test, samples from five bags of copper ore were dissolved with sulphuric acid. All the samples were grouped together (Marquez et al., 2010). The chemical assays read as follows: 0.761 wt. % Cu (0.952 wt. % CuO), with 0.99 wt. % Fe, 8.44 wt. % CaCO<sub>3</sub> and 1.40 wt. % MgO as major impurities. X-ray diffraction indicated a rock matrix composed of quartzofeldspathic minerals. Mineral identified were malachite, chrysocolla, calcite, clays (sericite and kaolinite), and hematite. From the results of sample distribution at the head, it was

observed that copper and iron, in free form, are distributed in all the analyzed fractions, from -3½" to +3" (-90000 to +75000 µm) to ¼" (6300 µm).

In dynamic leaching tests, the pulverized sample (54.44 % at - 200 mesh) left for 24 h, produces a leachate of 97.45% copper, confirming the viability of the leaching method. The distribution of copper values shows that, within the fractions generated in the distribution, the most significant is found in the ¾" to ¼" range in which a 61.09% leachate was recorded leaving an acid consumption of 17.88 g/l in a 72 hours dissolution.

The percolation test (Vat leaching) is performed to a particle size ranging from + 3 " to a fine. The treatment lasted twenty days followed by three days of washing. The acid concentration was 5.0 % H<sub>2</sub>SO<sub>4</sub> and the acid consumption was 57.834 kg of H<sub>2</sub>SO<sub>4</sub>/t of ore resulting in a solution of 46.86 % Cu and 19.14 % Fe (obtained from the sum of the solutions and washes). A flow feed of 0.02737 l/ min was calculated based on the total volume of solution (39.420 l), recirculated for 24 hours. The consumption of acid was also related to the amount of carbonate and iron that were dissolved by the leaching agent. The granulometry of the residue was evaluated and each fraction was chemically analyzed for Cu and Fe to compare the results with those at the head column. The residue was also analyzed by X-ray diffraction to obtain its mineral composition.

The analyzed samples show the viability of sulfuric acid lixiviation process. Malachite and chrysocolla show no resistance to leaching and are present in free form. When comparing the mineral species from the head to the residue, chrysocolla was no longer detected, whereas malachite changed its proportion from low to very low content. It is important to note that the fraction -3 ½" to +3" disintegrated during the percolation process, and no longer appeared in the residue, which is why the first three fractions of the head and the first two the residue were averaged to estimate the solution.

In general, the leaching agent acted on all particle sizes, but when greater concentration of Cu was encountered, the latter was distributed in the larger fractions (from -¾"+½" to +3 "). Thus, the particle size employed was not favorable.

During the second metallurgical study using a percolation column process (Vat leaching), an evaluation of the rate of dissolution of Cu with sulphuric acid was conducted (Munoz-Ochoa et al., 2010a). The results of the chemical analyses at the head of the column yielded 1.350 t/m<sup>3</sup> using a material crushed to a size of 3/8", having a density of 2.713 g/cm<sup>3</sup>, a specific gravity of 2.713 and a material sieved at -100 mesh. With this materiel, two tests were performed to estimate the percentage of dissolved Cu, one with a 0.3 % cyanide solution (NaCN) and the other with a 5.0 % sulphuric acid solution, with a mixing time of 24 hrs (see Table 4 below).

Test	Cu (ppm)	Dissolution (%)	Consumption H <sub>2</sub> SO <sub>4</sub> (g/l)	Cu (ppm)	Dissolution (%)	Consumption NaCN (kg/t)
1	2050	93.91	50.50			
2				598	29.42	8.54

**Table 4.** Cyanide and sulfuric dissolution tests (Vat leaching).

Stoichiometry dictates that malachite and chrysocolla contain 40.3 and 22.1 wt. % Cu respectively. These two minerals are considered pure in the experiment. The cyanide solution dissolved 90.2 % of the malachite and 11.8 % of the chrysocolla. In theory, the cyanide solution should have dissolved 38.95 % of Cu. However, the samples contained impurities such as calcite, clays (sericite, kaolinite) and hematite which interfered with the dissolution process.

In the percolation tests, a constant flow of feeding was used ( $\pm 0.02737 \text{ l/min}$ ), with an acid concentration of 5.0%, a thirteen day process followed by three washes. The particle sized is cited in Table 5. The third test was duplicated, using a six day process (column 4). The sulfuric acid used in all tests had 97.1 % purity and a density of 1.8301 and the water was provided every day from a well.

An increase in the consumption of acid was noted during the first 24 hr of impregnation process. When the ore is in contact with the solution, the reaction is very strong which generates a temperature increase and the evaporation of the solution. At that stage, the ore absorbed 7.5% of the solution. The impurities (calcite, clay, and hematite) are also consumed by the acid solution

The dissolution of Cu obtained, without taking into account the washings, is 39.44 % using a particle size of  $\pm 3''$ , with an acid consumption of 57.834 kg/t. Using a  $\pm 1''$  particle size; we get 50.67 % dissolution with a consumption of 44.827 kg/t. At  $\pm 3/4''$ , a dissolution of 55.63 % with an acid consumption of 53.230 kg/t are attained. Finally, at  $\pm 3/8''$  a yield of 66.66 % dissolution is reached with a consumption of 54.172 kg/t and 66.87 % with a consumption of 52.345 kg/t, after six days of treatment (Table 5 below).

Column	Cu (ppm)	Fe (ppm)	Dissolution (no washing)		Consumption (H <sub>2</sub> SO <sub>4</sub> for 24 hrs)	Specific consumption (g H <sub>2</sub> SO <sub>4</sub> /g Diss. Cu)	Gross consumption (kg H <sub>2</sub> SO <sub>4</sub> /t of ore)
			Cu (%)	Fe (%)			
$\pm 3''$	8852	4038	39.44	16.15	26.52	19.80	57.83
1	2959	1019	50.67	16.76	15.82	13.59	44.83
2	3318	1110	55.63	15.02	18.79	14.37	53.23
3	4614	2432	66.66	24.10	19.78	12.58	54.17
4	4254	1131	66.87	11.22	14.86	10.55	52.35

**Table 5.** Percolation tests (Vat leaching). Final dissolutions without taking into account the washings.

The third metallurgical experiment was performed to test the type of sulphuric acid to employ during dissolution (Munoz-Ochoa et al., 2010b). The Samalayuca sample at the head of the column contained 1.429 % of Cu and 1.194 % of Fe. All tests were conducted with an ore particle size of - 3/8 ", with a 72 hours agitation time and a dilution of 3:1. The water came from Samalayuca. In the first four tests, reagent type sulphuric acid is used with concentrations of 2 %, 3 %, 4 % and 5 % respectively. In the last four tests technical and industrial type acids having concentrations of 3 % and 4 % were employed. After 24 hours of lixiviation, most of the Cu was dissolved using the maximum of sulfuric acid consumption. The best results are obtained with industrial grade sulfuric acid having a 3.0 % concentration and yielding 85.57 % Cu (washed solution) and an acid consumption of 17.74 g/l (See Table 6 below).

Test	Type of acid (H <sub>2</sub> SO <sub>4</sub> )	Conc. (%)	Consumption			Total Dissolution (Cu %)
			g/l	g H <sub>2</sub> SO <sub>4</sub> /g Diss. Cu	kg H <sub>2</sub> SO <sub>4</sub> /t of ore	
1	Reagent	2.0	17.70	5.82	53.10	60.75
2	Reagent	3.0	20.71	6.15	62.13	67.76
3	Reagent	4.0	22.03	6.64	66.09	68.08
4	Reagent	5.0	37.15	11.19	111.45	68.86
5	Technical	3.0	22.21	7.02	66.62	72.45
6	Industrial	3.0	17.74	5.55	53.22	81.57
7	Technical	4.0	22.01	6.35	66.03	76.76
8	Industrial	4.0	18.56	5.47	55.69	72.22

**Table 6.** Testing of different types of sulfuric acid in percolation procedures (Vat leaching).

The fourth metallurgical test first involved three percolation columns (Vat and heap leaching) using an ore granulometry of -3/8 ", a time of lixiviation of 30 days followed by a wash period of eight days, sulfuric acid concentrations of 3.0% and water coming from La Samalayuca (Munoz-Ochoa et al., 2011a).

At the head of the first two columns, Cu and Fe concentrations were 0.613 wt. % and 1.01 wt. %, whereas for the last column, the values were 0.679 wt. % Cu and 1.05 % Fe, respectively. The ore sample is constituted principally of quartz, feldspars (orthoclase and plagioclase), illite, hematite, and Mn oxides. Malachite was the principal Cu-bearing mineral.

The results also showed that the clay material was not plastic and had a low permeability coefficient. To determine the work index ( $W_i$ ) during grinding, it was necessary to reduce manually the size of the ore particles. The equipment used was a laboratory Fabremix of 4 "x 6.5", with a capacity of feeding of ± 3" using a manual feeding. The work index ( $W_i$ ) of trituration was found to be 32.189 kwh/tc, for an energy consumption of 1,427 kwh/tc. The relation of trituration was 5.22, with a potency of 0.876 kW, an  $F_{so} = 84086 \mu\text{m}$ , a  $P_{so}$  of 16,097.61  $\mu\text{m}$ .

A comparison of the percolation for the first two columns was performed. In the first column we applied a flood technique (Vat leaching) with a recirculation of the solution, whereas only an irrigation (Heap leaching) technique was employed for the latter. Both columns had a similar irrigation flow of 46.15 l/h/m<sup>2</sup>.

The result was not significant for the flooding technique, reaching a dissolution of 84.70 % Cu and 16.24 % of Fe. During irrigation, a Cu dissolution of 88.16 % Cu and 22.29 % Fe was obtained. The consumption of acid for the second column was slightly higher (83.19 kg/t). In the third column, the Cu dissolution was 79.13 % and 13.61 % for Fe, with an acid consumption of 67.75 kg/t. The registered percolation was very favorable, testifying of the viability of the process for the minerals present in the sample. After only 2 hours in contact with the minerals, the sulfuric acid already dissolved 23.21 % of Cu (first column) and 21.87 % (second column) (see Table 7 below).

Column	Flux (l/h/m <sup>2</sup> )	Dissolution (%) (Solution + Washing)		Consumption of industrial grade H <sub>2</sub> SO <sub>4</sub>		
		Cu	Fe	g/l	g H <sub>2</sub> SO <sub>4</sub> /g Diss. Cu	kg H <sub>2</sub> SO <sub>4</sub> /t of ore
1	46.15	84.70	16.24	113.35	13.17	72.26
2	46.15	88.16	22.29	131.79	13.93	83.19
3	15.00	79.13	13.61	196.49	13.62	67.75

**Table 7.** Vat and heap leaching test presenting the flux, dissolution and sulfuric acid consumption.

Finally, the fifth metallurgical procedure entailed an irrigation test (Heap leaching) through a percolation column to assess the ore particle size (100% at 2½") and a treatment time (60 days) (Munoz-Ochoa et al., 2011b). The feed flow was set at 15 l x hr x m<sup>2</sup> using an industrial grade sulfuric acid concentration of 3.0% and an average pH of 1.02. At the head of the column the ore

concentration was: 55 g /t Ag, 0.532 wt. % Cu and 0.942 wt. % Fe. In the experiment, the Cu dissolution was very low (39.19%), even with 60 days of treatment (Table 8 below).

Column	Flux (l/h/m <sup>2</sup> )	Dissolution (%) (Solution + Washing)		Consumption of industrial grade H <sub>2</sub> SO <sub>4</sub>		
		Cu	Fe	g/l	g H <sub>2</sub> SO <sub>4</sub> /g Diss. Cu	kg H <sub>2</sub> SO <sub>4</sub> /t of ore
4	15.00	39.14	15.00	74.85	13.62	26.24

**Table 8.** Fifth experiment, vat leaching with the flux, dissolution and consumption of sulfuric acid.

However, the consumption of acid was very similar to the previous experiments (13.616 g of H<sub>2</sub>SO<sub>4</sub>/g of dissolved Cu). The gross consumption was 26.24 kg of H<sub>2</sub>SO<sub>4</sub>/t of ore. This experiment confirms that the optimum particle size for the beneficiation of the ore through a percolation process is ± 3/8" (See Table 9 below).

Granulometry	Time of treatment (d)	H <sub>2</sub> SO <sub>4</sub> concentration (%)	Flux (l/h/m <sup>2</sup> )	Concentration (ppm)		Dissolution (%)		Acid consumption (Kg/t)
				Cu	Fe	Cu	Fe	
3/8"	30	3.0	15.0	17132	5032	79.13	13.61	67.75
2½"	60	3.0	15.0	6520	4730	39.14	15.00	26.24

**Table 9.** Vat leaching test. Comparison between 3/8" and 2½" ore granulometry.

Generally mining companies develop strategies with variable acid flux rates around 15 l/h/m<sup>2</sup>, with rest periods and also prolonged washing periods. The objective is to obtain dissolutions around 75% with a reasonable consumption of sulphuric acid by taking into account the regeneration at the time of copper precipitation. For Samalayuca it is believed that a granulometry of -3" is possible but on prolonged periods (Marchand, 2011). Tests of the industrial type (Bulk sample) will be necessary. Furthermore, historical drill holes principally

collared above (up-slope) the open mined pits detected a significant percentage of sulphide minerals (pyrite, chalcopyrite, bornite and covellite) in the drillcores (Gorski, 1993; Shenk, 1997). The author believes that VVC Exploration will have to consider the necessity of conducting metallurgical testing for sulphide minerals dissolution if these are detected in future drillcores.

## **ITEM 14 MINERAL RESOURCES ESTIMATE**

### *14.1-Introduction*

A Mineral Resources calculation was implemented for the copper and silver mineralization recognized in the following pits: Concha, Petroglyph, Gloria, Gloria Extension, Juliana, Zorra, Suerte, San Nicolas and Trinidad. The results of our calculation place the Mineral Resources into the Inferred Mineral Resources category. The calculation of the Mineral Resources was produced and verified by Dr. Michel Boily (PhD. P. Geo.) who is an independent qualified person (QP) according to NI 43-101 norms.

Following the CIM definition standards for Mineral Resources and Mineral Reserves (2005), an "Inferred Mineral Resource" is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. Due to the uncertainty that may be attached to Inferred Mineral Resources, it cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration. Confidence in the estimate is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Inferred Mineral Resources must be excluded from estimates forming the basis of feasibility or other economic studies.

### *14.2-Inferred Mineral Resources Calculations*

The procedures established for the Inferred Mineral Resources calculation are based on several assumptions and use the available NI-43-101 compliant copper and silver assays determined on chip/channel samples collected from the surface of each investigated mined pit. The calculation is rather straightforward using the length, thickness and width of a designed mineralization zone to obtain the rock volume (i.e. length (m) x thickness (m) and width (m) = volume ( $m^3$ )). The density of the Cu-bearing sandstones ( $t/m^3$ ) is included to get the total tonnage in metric ton (t). The total average Cu and Ag grades are determined with weighted mean Cu and Ag values of each determined mineralized vertical section.

Furthermore, it is assumed that: 1) The channel/chip sampling was performed vertically and perpendicular to the strike of the sandstone layers exposed in the mined pits, 2) The sampling was conducted along NNE-SSW-oriented lines that are roughly perpendicular to the strike of the mined pits and the Samalayuca range. The line spacing was set at 100 m, 3) Weighted mean copper and silver concentration were calculated for a particular vertical section using the thickness and Cu-Ag assays of each channel sample, 4) The sections were combined using the half-width between each line where channel samples were collected, 5) A length of 100 m along each section line was assumed which translates into the extension of the mineralization down-dip. Since the channel sampling demonstrated the uniformity of Cu-Ag grades along strike for lengths exceeding 100 m, this extrapolated interval seems reasonable. Furthermore, air track and RC drilling conducted by MXSUS at the Concha pit and DDH sunk by Minera Phelps Dodge north of the Gloria and Concha pits at higher elevation have determined that the Cu mineralization extends at considerable distance down-dip and 6), A density of 2.82 was calculated for a typical Samalayuca Cu-mineralized sandstones using the proportions and density specified in the table below:

<b>Mineral</b>	<b>Volume (%)</b>	<b>Density (g/cm<sup>3</sup>)</b>
Quartz	60	2.65
Chert	18	2.65
Calcite	10	2.71
Chlorite	7	2.95
Sulphide/oxides*	5	4.84
Total	100	<b>2.79</b>

\* Density (g/cm<sup>3</sup>): Iron oxides (5.2), bornite (5.1), covellite (4.7), pyrite (5.02), chalcopyrite (4.2)

**Table 10.** Average density of a Samalayuca Cu-mineralized sandstone. Mineral proportions were extracted from the thesis of Bruno (1995).

Moreover, the metallurgical studies of the Samaluyuca ore produced by the SGM used a density of 2.85; therefore we have adopted an average density of 2.82 for the resource calculations.

Table 11 presents the weighted mean copper and silver concentration calculation for each vertically sampled section, whereas Table 12 illustrates the calculation procedures to obtain the total Inferred Mineral Resources in metric ton and the average copper and silver grades. Figures 26 to 29 display typical perpendicular and along strike sections for the Concha and Gloria pits. The figures detail the location, thickness and sample number of each sampled section and provide the weighted mean copper concentrations. A cutoff grade of 1,000 ppm Cu (0.1 wt % Cu) is applied which satisfies the preliminary assumptions pertaining to the calculation of the Inferred Resources. Systematic chip sampling on mineralized strata at Samalayuca ensured an uninterrupted vertical continuity and allowed the rejection of outlying Cu values. This resulted in vertical intervals of 2.0 to 18.8 m (see Table 11) containing only four Cu concentrations < 1,000 ppm. The future drilling campaign will provide new Cu assay values on a larger volume of rocks and it is expected that the cutoff grade will increase to 0.2 or 0.3 wt. %. The latter is more compatible to what is used during calculation of moderate to high tonnage copper resources in sediment-hosted stratiform deposit.

**Table 11.** Weighted mean Cu assay values, vertical sections oriented perpendicular to the strike of each open pit investigated. The data was used in the Inferred Reserve calculations.

Line/Station	Sample no.	Thickness (m)	Cu (ppm)	Cu (wt.%)	Ag ppm	Concentration (ppm) /thickness (m) (Weighted Mean)
<b>Concha</b>						
<b>Ln2075W</b>	918568	2.0	5170	0.52	8.4	
	918567	2.0	7400	0.74	11.6	
	918566	2.0	2100	0.21	1.8	
	918565	2.0	392	0.04	0.7	
	918564	2.0	2160	0.22	5.2	
	378241	3.5	2050	0.21	5.8	
						<i>3082 ppm Cu and 5.6 ppm Ag/ 13.5m</i>
<b>Ln1975W</b>	378244	3.2	1175	0.12	0.5	
	378245	3.5	3820	0.38	3.2	
						<i>2556 ppm Cu and 1.9 ppm Ag / 6.7m</i>
<b>JP199</b>	378095	2.0	5040	0.50	8.1	
						<i>5040 ppm Cu and 8.1 ppm Ag/2.0 m</i>
<b>JP201</b>	378096	2.0	14850	1.49	11.1	
						<i>14850 ppm Cu and 11.1 ppm Ag/2.0m</i>
<b>Ln1800W</b>	378099	2.5	7370	0.74	19.3	
	918581	1.3	1900	0.19	1.4	
	918580	1.2	6980	0.70	7.6	
	918579	1.5	10900	1.09	14.7	
	378252	2.5	3540	0.35	2.3	
	378253	1.0	2880	0.29	2.7	
						<i>5735 ppm Cu and 9.0 ppm Ag/ 10.0m</i>
<b>Ln1725W</b>	378258	3.0	2850	0.29	5.6	
						<i>2850 ppm Cu and 5.6 ppm Ag/ 3.0m</i>
<b>Petroglyph</b>						
<b>Ln0850W</b>	918555	2.0	5290	0.53	1.1	
	918556	2.0	4150	0.42	0.1	
	918557	2.0	4700	0.47	---	
	918558	2.0	2870	0.29	---	
	918559	2.0	3810	0.38	---	
	918560	2.0	5530	0.55	---	
	918561	2.0	4630	0.46	---	
	918562	2.0	4290	0.43	---	
						<i>4408ppm Cu / 16.0m</i>
<b>Gloria</b>						
<b>JP142</b>	378073	6.0	2800	0.28	4.4	
						<i>2800 ppm Cu and 4.4 ppm Ag/6.0m</i>

**Table 11.** Weighted mean Cu assay values, vertical sections oriented perpendicular to the strike of each open pit investigated. The data was used in the Inferred Reserve calculations.

Line/Station	Sample no.	Thickness (m)	Cu (ppm)	Cu (wt.%)	Ag ppm	Concentration (ppm) /thickness (m) (Weighted Mean)
<b>Ln0250W</b>	378223	2.0	4110	0.41	3.6	
	918584	2.0	6180	0.62	6.4	
	918585	2.0	13000	1.30	13.4	
	918586	2.0	5310	0.53	8.8	
	918587	2.0	4540	0.45	3.3	
						<b><i>6228 ppm Cu and 7.1 ppm Ag/ 10.0m</i></b>
<b>Ln0200W</b>	378053	2.0	7920	0.79	<b>8.8</b>	
						<b><i>7920 ppm Cu and 8.8 ppm Ag/ 2.0m</i></b>
<b>JP103</b>	378052	2.0	2550	0.26	<b>1.6</b>	
						<b><i>2550 ppm Cu and 1.6 ppm Ag/2.0m</i></b>
<b>Ln150W</b>	378226	3.0	3720	0.37	5.8	
	378227	2.0	2400	0.24	6.7	
						<b><i>3192 ppm Cu and 6.2 ppm Ag / 5m</i></b>
<b>JP101</b>	378050	2.0	1610	0.16	2.8	
						<b><i>1610 ppm Cu and 2.8 ppm Ag/2.0m</i></b>
<b>Ln0050W</b>	378222	3.5	3600	0.36	0.2	
						<b><i>3600 ppm Cu and 0.2 ppm Ag/3.5 m</i></b>
<b>Ln0025W</b>	378221	2.0	4110	0.41	0.2	
						<b><i>4110 ppm Cu and 0.2 ppm Ag/2.0 m</i></b>
<b>JP368</b>	918588	2.0	7000	0.70	11.4	
	918589	2.0	2620	0.26	2.4	
	918590	2.0	3780	0.38	6.5	
	918591	2.0	6020	0.60	8.8	
	918592	2.0	4210	0.42	7.0	
	918593	2.0	1745	0.17	3.7	
						<b><i>5540 ppm Cu and 6.6 ppm Ag/ 12.0m</i></b>
<b>Ln0050E</b>	378207	2.5	8960	0.90	16.7	
	378208	2.5	1430	0.14	3.4	
	378209	2.5	5310	0.53	7.4	
	378210	2.0	1420	0.14	4.3	
	378211	2.0	1325	0.13	3.6	
	378212	1.5	179	0.02	2.6	
	378213	1.8	5680	0.57	14.0	
	378214	2.0	6480	0.65	10.3	
	378215	2.0	6700	0.67	12.5	
						<b><i>4340 ppm Cu and 8.5 ppm Ag/ 18.8m</i></b>
<b>Ln100E</b>	918601	2.0	2840	0.28	1.2	
	918602	2.0	6650	0.67	1.9	
						<b><i>4745 ppm Cu and 1.6 ppm Ag/ 4.0m</i></b>

**Table 11.** Weighted mean Cu assay values, vertical sections oriented perpendicular to the strike of each open pit investigated. The data was used in the Inferred Reserve calculations.

Line/Station	Sample no.	Thickness (m)	Cu (ppm)	Cu (wt.%)	Ag ppm	Concentration (ppm) /thickness (m) (Weighted Mean)
		<b>Gloria Ext.</b>				
<b>Ln0250E</b>	378028	2.0	1035	0.10	1.4	
						<i>1035 ppm Cu and 1.5 ppm Ag/ 2.0 m</i>
<b>Ln0450E</b>	378279	3.0	1960	0.20	4.2	
	378278	2.2	3350	0.34	6.3	
	378275	1.8	3370	0.34	0.2	
	378276	1.2	1795	0.18	2.5	
	378277	2.5	111	0.01	0.5	
	918621	2.0	5110	0.51	0.8	
	918620	2.0	6720	0.67	2.7	
	918619	2.0	1590	0.16	0.7	
						<i>2909 ppm Cu and 2.4 ppm Ag / 16.7m</i>
<b>Ln0500E</b>	378151	2.0	2620	0.26	8.8	
	378152	2.5	4400	0.44	9.4	
	378153	2.0	5070	0.51	12.5	
	918618	2.0	5200	0.52	9.0	
	918617	2.0	5150	0.52	12.3	
	918616	2.0	4040	0.40	7.4	
	378154	2.2	2910	0.29	0.2	
	378155	2.8	1460	0.15	3.5	
						<i>3751 ppm Cu and 7.6 ppm Ag / 17.5m</i>
<b>Ln0550E</b>	378272	2.0	6260	0.63	12.2	
	378273	2.0	5900	0.59	10.7	
	378274	2.0	6400	0.64	11.4	
						<i>6186 ppm Cu and 11.4 ppm Ag/ 6.0m</i>
		<b>Juliana</b>				
<b>Ln1375E</b>	378111	2.5	38	0.00	0.2	
	378110	3.0	4280	0.43	0.8	
	378109	1.5	1900	0.19	2.9	
	378108	2.0	1110	0.11	3.6	
						<i>2000 ppm Cu and 1.6 ppm Ag/ 9.0m</i>
<b>Ln1400E</b>	378124	2.5	2440	0.24	0.7	
						<i>2440 ppm Cu and 0.7 ppm Ag/ 2.5m</i>
<b>L1475E</b>	378119	1.0	1535	0.15	4.8	
	378118	2.1	3410	0.34	1.3	
						<i>2805 ppm Cu and 2.4 ppm Ag/ 3.1m</i>
		<b>Zorra</b>				
<b>Ln2000W</b>	918611	2.0	6390	0.64	3.4	
	918610	2.0	17450	1.75	13.2	
						<i>11920 ppm Cu and 8.3 ppm Ag/ 4.0m</i>

**Table 11.** Weighted mean Cu assay values, vertical sections oriented perpendicular to the strike of each open pit investigated. The data was used in the Inferred Reserve calculations.

Line/Station	Sample no.	Thickness (m)	Cu (ppm)	Cu (wt.%)	Ag ppm	Concentration (ppm) /thickness (m) (Weighted Mean)
<b>Ln2050W</b>	918608	2.0	1560	0.16	1.0	
	918607	2.0	6280	0.63	5.6	
	378175	3.0	1360	0.14	3.5	
						<i>2822 ppm Cu and 3.4 ppm Ag/ 7.0m</i>
<b>Ln2125E</b>	378179	2.5	36400	3.64	29.6	
	918605	2.0	15200	1.52	7.0	
	918604	2.0	12200	1.22	7.8	
						<i>22430 ppm Cu and 15.9 Ag/ 6.5m</i>
<b>La Suerte</b>						
<b>Ln2150E</b>	378290	2.8	3930	0.39	4.5	
						<i>3930 ppm Cu and 4.5 ppm Ag/2.8m</i>
<b>Ln1600E</b>	378103	3.5	3900	0.39	7.0	
						<i>3900 ppm Cu and 7.0 ppm Ag/3.5 m</i>
<b>Ln0250E</b>	378043	6.0	1025	0.10	2.5	
						<i>1025 ppm and 2.5 ppm Ag/6.0 m</i>
<b>Ln0250W</b>	378059	2.0	9870	0.99	12.7	
						<i>9870 ppm and 12.7 ppm Ag/2.0 m</i>
<b>Trinidad</b>						
<b>Ln2300E</b>	378167	3.0	6330	0.63	12.7	
	378169	3.0	5930	0.59	5.3	
						<i>6130 ppm Cu and 9.0 ppm Ag/ 6.0m</i>
<b>Ln2375E</b>	918538	2.0	6160	0.62	2.8	
	918539	2.0	10700	1.07	10.4	
	918540	2.0	6680	0.67	11.7	
						<i>3286 ppm Cu and 8.3 ppm Ag /15.4m</i>
<b>Ln2450E</b>	918542	2.0	3650	0.37	3.6	
	918543	2.0	3110	0.31	2.4	
	918544	2.0	2280	0.23	3.7	
						<i>3013 ppm Cu and 3.2 ppm Ag/ 6.0m</i>

---: Not analyzed

**Table 12.** Inferred Resources calculations, Samalayuca property (see text for explanation).

Line/Station	Mining Pit/Zone	Thickness (m)	Width (m)	Length (m)	Volume (m <sup>3</sup> )	Density (t/m <sup>3</sup> )	Tonnage (t)	Cu (wt. % )	Ag (ppm)
Ln2075W	Concha	13.5	100.0	100.0	135,000	2.82	380,700	0.31	5.6
Ln1975W	Concha	6.7	85.0	100.0	56,950	2.82	160,599	0.26	1.9
JP199	Concha	2.0	62.5	100.0	12,500	2.82	35,250	0.50	8.1
JP101	Concha	2.0	45.0	100.0	9,000	2.82	25,380	0.50	11.1
Ln1800W	Concha	10.0	72.5	100.0	72,500	2.82	204,450	0.57	9.0
Ln1725W	Concha	3.0	95.0	100.0	28,500	2.82	80,370	0.29	5.6
<i>Total</i>	Concha	6.8	76.7	100.0	52,408	2.82	886,749	0.39	6.3
Ln0850W	Petroglyh	16.0	100.0	100.0	160,000	2.82	451,200	0.44	---
JP142	Gloria	6.0	115.0	100.0	69,000	2.82	194,580	0.28	4.4
Ln0250W	Gloria	10.0	85.0	100.0	85,000	2.82	239,700	0.62	7.1
Ln0200W	Gloria	2.0	32.0	100.0	6,400	2.82	18,048	0.79	8.8
JP103	Gloria	2.0	22.0	100.0	4,400	2.82	12,408	0.26	1.6
Ln0150W	Gloria	5.0	40.0	100.0	20,000	2.82	56,400	0.32	6.2
JP101	Gloria	2.0	75.0	100.0	15,000	2.82	42,300	0.32	1.8
Ln0050W	Gloria	3.5	47.0	100.0	16,450	2.82	46,389	0.36	0.2
Ln0025W	Gloria	2.0	30.0	100.0	6,000	2.82	16,920	0.41	0.2
JP368	Gloria	12.0	27.0	100.0	32,400	2.82	91,368	0.55	6.6
Ln0050E	Gloria	18.8	42.5	100.0	79,900	2.82	225,318	0.43	8.5
Ln0100E	Gloria	4.0	77.5	100.0	31,000	2.82	87,420	0.47	1.6
<i>Total</i>	Gloria	6.2	53.9	100.0	296,550	2.82	836,271	0.46	5.9
Ln0450E	Gloria Extension	16.7	50.0	100.0	83,500	2.82	235,470	0.29	2.4
Ln0500E	Gloria Extension	17.5	50.0	100.0	87,500	2.82	246,750	0.38	7.6
Ln0550E	Gloria Extension	6.0	50.0	100.0	30,000	2.82	84,600	0.62	11.4
<i>Total</i>	Gloria Extension	13.4	50.0	100.0	201,000	2.82	566,820	0.38	6.0
Ln1375E	Juliana	9.0	37.5	100.0	33,750	2.82	95,175	0.20	1.6
Ln1400E	Juliana	2.5	50.0	100.0	12,500	2.82	35,250	0.24	0.7
Ln1475E	Juliana	3.1	87.5	100.0	27,125	2.82	76,493	0.28	2.4
<i>Total</i>	Juliana	4.2	58.3	100.0	73,375	2.82	206,918	0.22	1.6
Ln2000E	Zorra	4.0	75.0	100.0	30,000	2.82	84,600	1.19	8.3
Ln2050E	Zorra	7.0	62.5	100.0	43,750	2.82	123,375	0.28	3.4
Ln2125E	Zorra	6.5	87.5	100.0	56,875	2.82	160,388	2.24	15.9

**Table 12.** Inferred Resources calculations, Samalayuca property (see text for explanation).

<b>Line/Station</b>	<b>Mining Pit/Zone</b>	<b>Thickness (m)</b>	<b>Width (m)</b>	<b>Length (m)</b>	<b>Volume (m<sup>3</sup>)</b>	<b>Density (t/m<sup>3</sup>)</b>	<b>Tonnage (t)</b>	<b>Cu (wt. % )</b>	<b>Ag (ppm)</b>
<i>Total</i>	Zorra	5.8	75.0	100.0	43,542	2.82	368,363	1.22	9.2
Ln2150E	Suerte Pit	2.8	100.0	100.0	28,000	2.82	78,960	0.39	4.5
Ln0250W	SanNicolas	2.0	100.0	100.0	20,000	2.82	56,400	0.99	7.0
Ln0250E	SanNicolas	6.0	100.0	100.0	60,000	2.82	169,200	0.10	2.5
Ln1600E	SanNicolas	3.5	100.0	100.0	35,000	2.82	98,700	0.39	12.7
<i>Total</i>	SanNicolas	3.8	100.0	100.0	38,333	2.82	324,300	0.34	6.4
Ln2300E	Trinidad	6.0	87.5	100.0	52,500	2.82	148,050	0.61	9.0
Ln2375E	Trinidad	4.0	75.0	100.0	30,000	2.82	84,600	0.33	8.3
Ln2450E	Trinidad	6.0	87.5	100.0	52,500	2.82	148,050	0.30	3.2
<i>Total</i>	Trinidad	5.4	83.3	100.0	45,000	2.82	380,700	0.42	6.7
<b>Grand Total</b>		7.2		100.0	938,208	2.82	4,100,280	0.47	5.8

N210°

N030°

# L0050E-Gloria

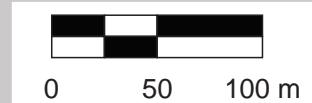
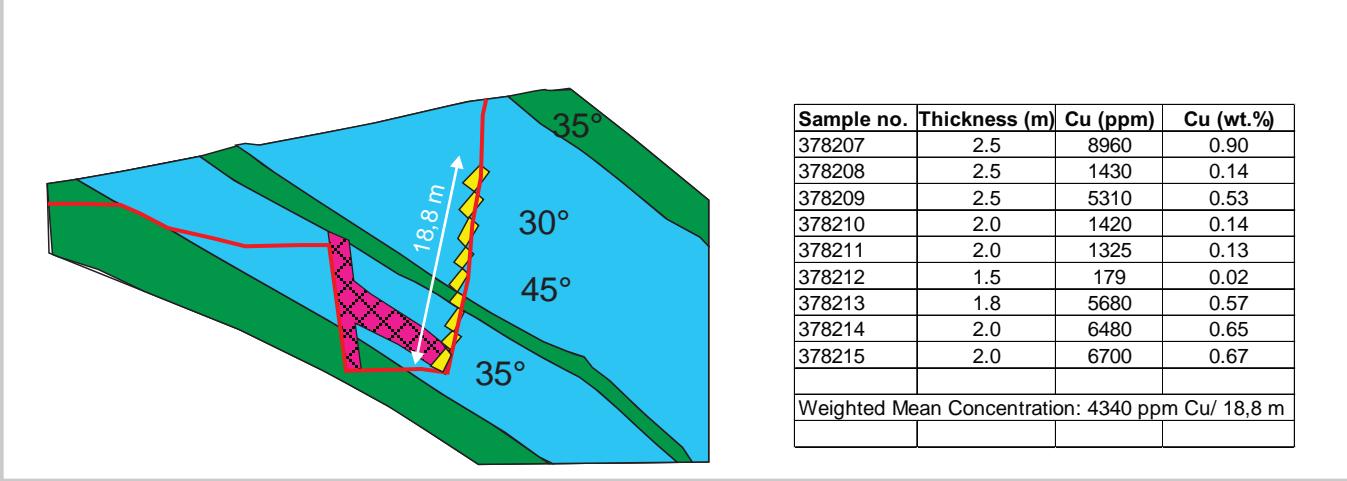
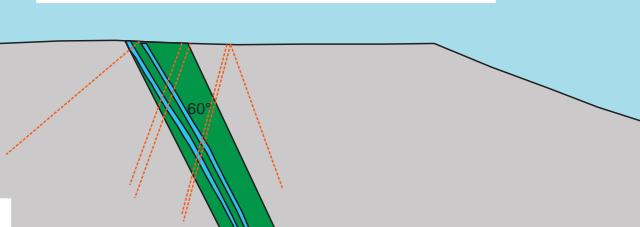
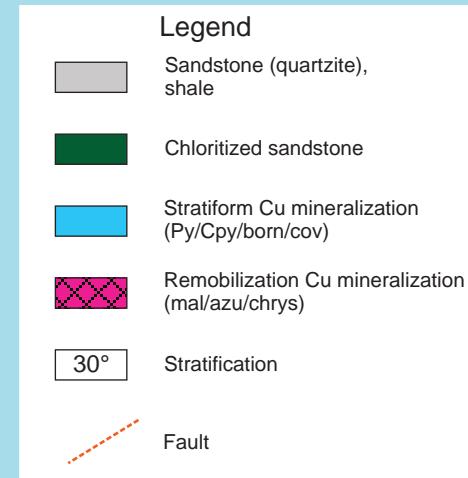
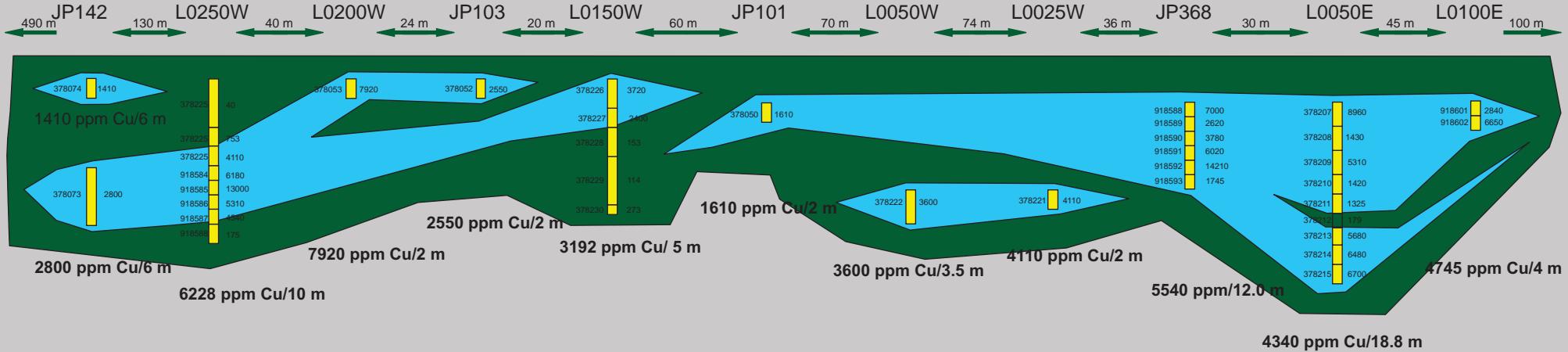
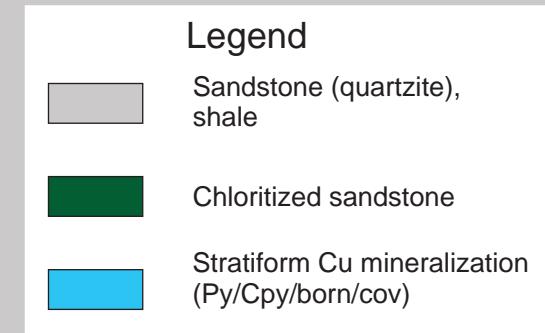


Figure 26. Typical NE-SW cross-section along line 0050E from the Gloria open pit. Zones of chloritized sandstones, stratiform hypogene Cu mineralization and of remobilization are produced in the figure. A section representing a vertical channel sampling procedures in the Gloria pit with the corresponding Cu assays is also presented. Data and mapping from Jocelyn Pelletier.

# Gloria Pit



Weighted Mean: 4586 ppm/6.2 m

Figure 27. Section along the strike of the Gloria open pit and perpendicular to the established gridlines showing the vertical sections where chip samples were collected. The weighted mean Cu value of from each section was used in the calculation of an Inferred Resources. Geology and samples collection from Jocelyn Pelletier.

N210°

N30°

# LN1975W-Concha

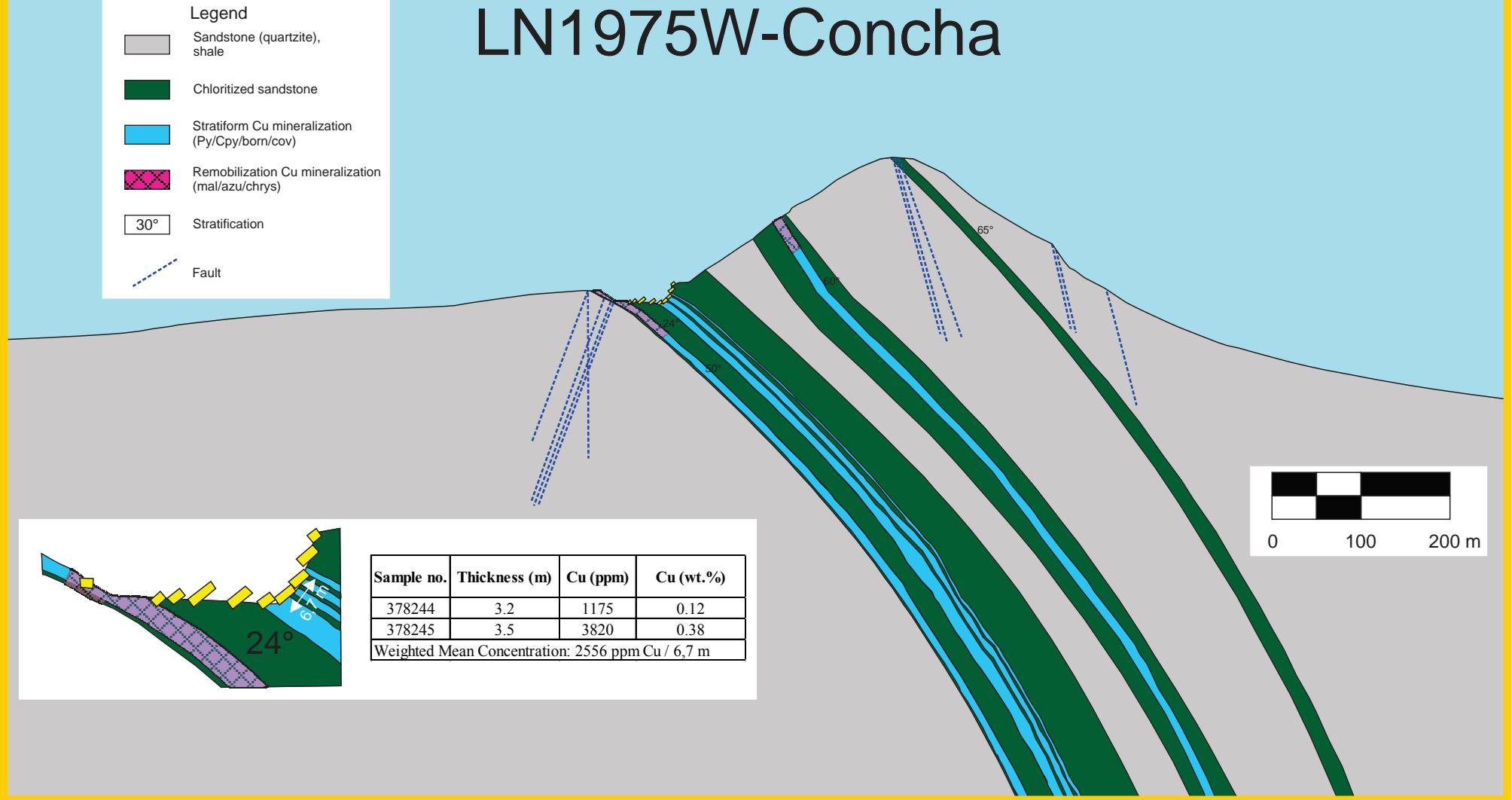


Figure 28. Typical NE-SW cross-section along line 1975W from the Concha open pit. Zones of chloritized sandstones, stratiform hypogene Cu mineralization and of remobilization are produced in the figure. A section representing a vertical channel sampling procedures in the Concha pit with the corresponding Cu assays is also presented. Data and mapping from Jocelyn Pelletier.

# Concha Pit

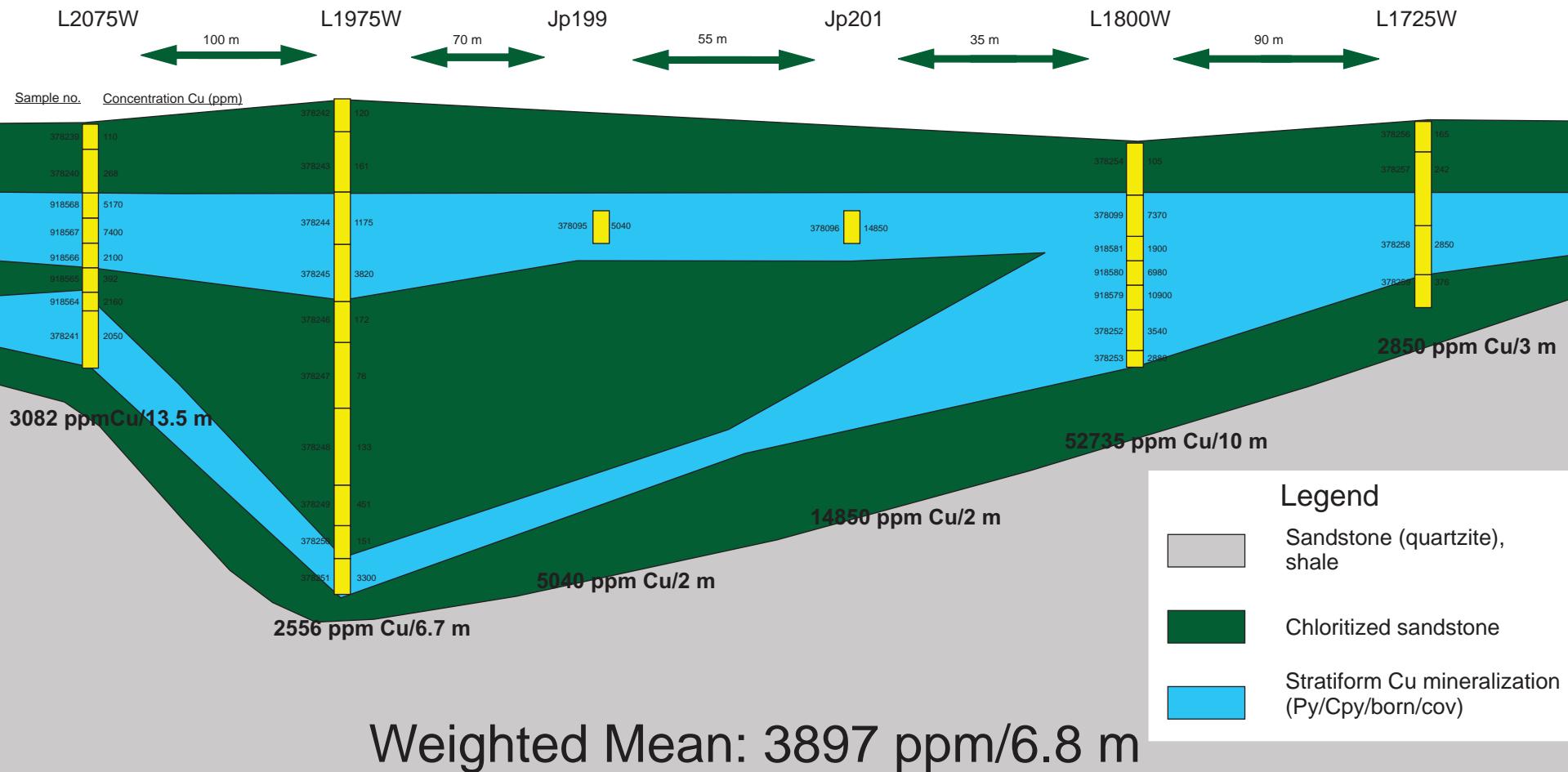


Figure 29. Section along the strike of the Concha open pit and perpendicular to the established gridlines showing the vertical sections where chip samples were collected. The weighted mean Cu value of from each section was used in the calculation of an Inferred Resources. Geology and samples collection from Jocelyn Pelletier.

A total of ***4,100,280 t grading 0.47 wt. % Cu and 5.8 g/t Ag*** is calculated and represents the current Inferred Mineral Resources for the Samalayuca property. The author believes that further exploration work, notably a systematic drilling of the property, will increase the mineral resources. This statement is based on the following assumptions: 1) The Inferred Mineral Resources calculation only represents the near surface part of the mineralization that extends down dip for only 100 m. Previous drilling (RC and DDH) on the upper slopes of the Samalayuca ranges behind the Concha and Gloria pits indicated substantial Cu-mineralization down-dip (Gorski, 1993; Shenk, 1997), 2) The calculation does not take into account the potential Cu mineralization that may be present along strike between the mined pits, 3) According to Gauthier (2011) the exposed Cu-mineralization in the mined pits could represent a leached zone above the water table, signifying that a supergene Cu-rich zone may lie at depth (> 100 m), waiting to be discovered.

### **ITEM 23 ADJACENT PROPERTY**

There is no adjacent property.

### **ITEM 24 OTHER RELEVANT DATA AND INFORMATION**

There is no other relevant data and information.

### **ITEM 25 INTERPRETATION AND CONCLUSIONS**

The Samalayuca Range is the subject of intense exploration for copper mineralization since the early 1960's. Artisanal mining took place on selected open pits but lasted only a few years. The sporadic exploitation nonetheless gives us an appraisal of the potential lateral extension of Cu mineralization which can be estimated at 4.5 km along strike. Obtaining a realistic assessment of the actual copper resources, requires a systematic drilling campaign covering not only the existing mining pits but also the along strike "gaps" in between. There is also a need to assess the possibility of supergene mineralization. According to Gauthier (2011), there are two important

geological characteristics present at Samalayuca that indicate the possibility of finding Cu-enriched supergene zones at depth: 1) The horizontal extension of the hypogene copper mineralization along plurikilometric sedimentary layers and 2), a favourable environment to supergene alteration manifested by a porous and permeable sandstone protholith. Surface observations have shown the paucity of hypogene chalcopyrite and pyrite, except at the Gloria extension pit, and the dominance of Cu-oxides - carbonates such as malachite and chrysocolla. Gauthier (2011) interprets these observations as an indication that copper migrated downward toward a supergene enrichment zone. Moreover, historical drilling at the Gloria pit has demonstrated that the Cu-bearing minerals change principally from malachite at shallow depth to calcocite (supergene?) at greater depth. However, a better understanding of the distribution of sulphide (hypogene and supergene) and oxide minerals in the Samalayuca sandstones is necessary before evaluating and targeting possible supergene zones. Historical drilling has demonstrated a complicated and somewhat erratic distribution of oxide vs. sulphide horizons. Moreover, Cu grades in the hypogene (sulphide) and supergene (sulphide + oxide) zones appear to be similar, averaging 0.4-0.5 wt. % Cu. This casts some doubts on the presence of a “true” supergene Cu-enrichment at Samalayuca.

The Samalayuca property is a stratabound sediment-hosted copper mineralization restricted to a narrow range of decimeter-thick chloritized sandstones. It is located in the Northern Chihuahua State about 35 km south of Juarez and the USA border. Easily accessible via Highway 45, the property consists of one Mining Concession covering 1622.6 ha located in the northwestern Sierra Samalayuca.

Rocks of the Sierra Samalayuca and surrounding areas are principally sedimentary and were deposited during the Paleozoic and Early Cretaceous eras in the Chihuahua trough. The Chihuahua trough is a right-lateral pull-apart basin that underwent important deformation during the Late Cretaceous-Early Tertiary Laramide orogeny. The sedimentary formations containing the Cu mineralization consist of a cyclic sequence of fine- to coarse-grained Permian (?) sandstones (chloritized quartzites/arenites) with subordinate phyllitic and conglomeratic intervals which exhibit low grade regional metamorphism.

The copper mineralization occurs as fine-grained primary and supergene copper sulphides, including digenite, chalcocite, covellite, bornite and chalcopyrite. Oxidized copper minerals such as malachite and azurite are common. The copper sulphides 0.01-8 % in the drilled mineralized zones. The oxidized copper minerals (1-10 %) occur within weathered rocks of all type as fracture fillings and along joint surfaces.

Exploration work conducted by VVC Exploration has begun in early 2010 and is still in progress. It principally involves the geological and structural mapping of the key Cu-mineralized areas including the mining pits. Cross-sections were established following N030°-N210° grid lines spaced by 100m. Channel sampling was conducted along NNE-SSW-oriented lines that are roughly perpendicular to the strike of the mined pits and the Samalayuca range. Assay results from the collected samples served as a basis for calculating an Inferred Resources which was set at ***4,100,280 t grading 0.47 wt. % Cu and 5.8 g/t Ag.***

The author proposes two major recommendations that can be implemented in a future exploration campaign (Phase I). The first recommendation relates to a diamond drilling campaign focused on the Gloria pit. The second recommendation concerns the completion of the structural and geological mapping of the mined pits summarily evaluated during the last exploration campaign. The author includes the Petroglyph, Suerte, San Nicolas and Trinidad pits in the list as well as the northeastern flank of the NW Samalayuca Range. Phase II of the exploration campaign will expand the drilling campaign to the other mined pits notably Concha and Gloria Extension. Phase I of the exploration campaign is expected to cost \$462,500 whereas Phase II is estimated at \$1,000,000.

## **ITEM 26 RECOMMENDATIONS**

Having thoroughly evaluated the historical geological data pertaining to the Samalayuca Cu property and assessed the new geological exploration and geochemical analyses generated by VVC Exploration the author proposes two major recommendations that can be implemented in a future exploration campaign.

**Table 13.** Coordinates for the proposed DDH (2012 campaign) collared north of the Gloria open pit.

Hole no.	Easting*	Northing	Azimuth (°)	Plunge (°)	Depth (m)
GL11-001	350134	3471043	210	-60	100
GL11-002	350091	3471068	210	-70	100
GL11-003	350047	3471093	210	-60	140
GL11-004	350004	3471118	210	-70	155
GL11-005	349974	3471166	210	-60	120
GL11-006	349942	3471211	210	-60	150
GL11-007	349899	3471237	210	-70	160
GL11-009	350072	3471137	210	-60	250

\* NAD27; Zone 13N

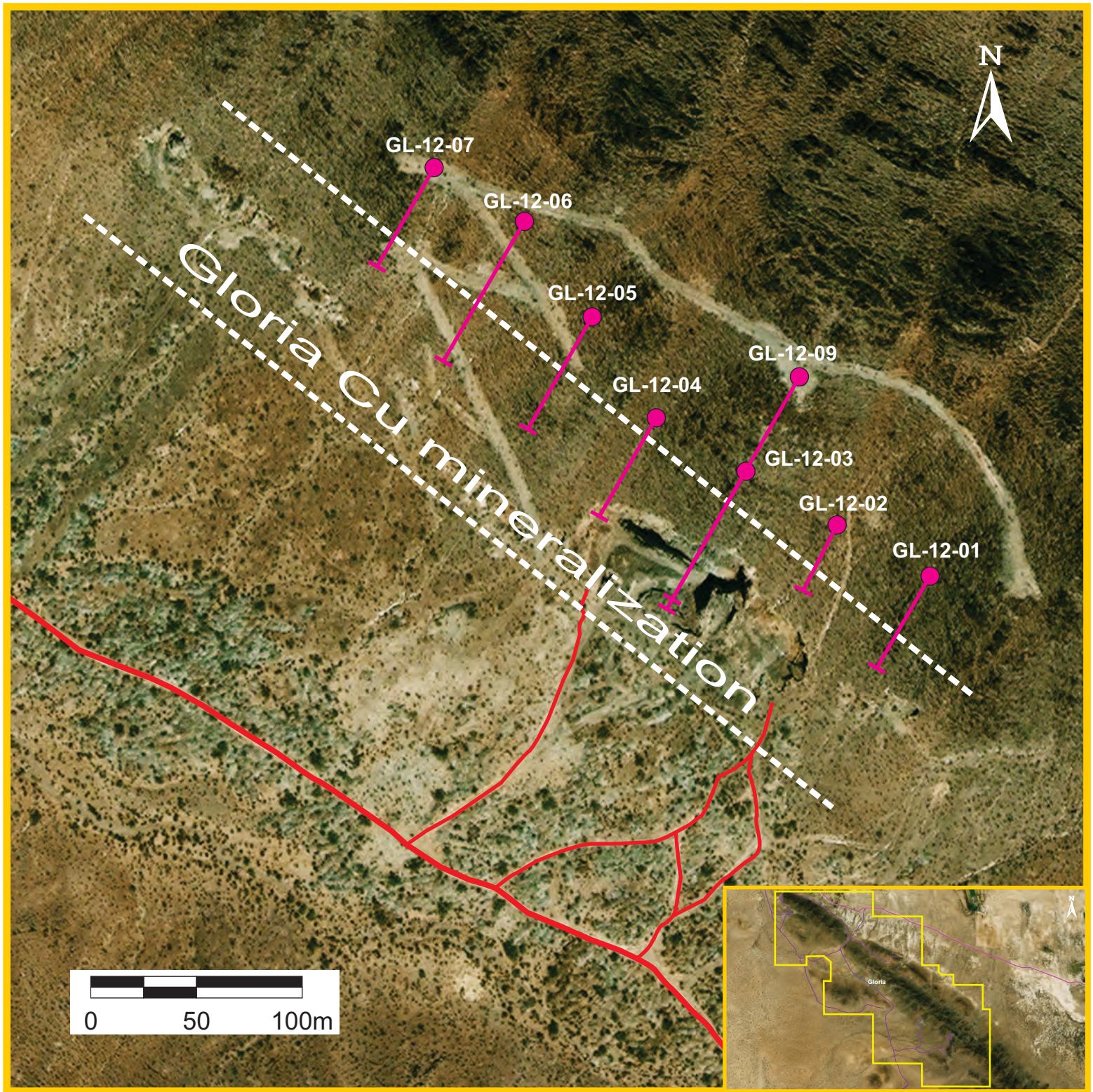


Figure 30. Proposed collar locations for a DDH campaign related to Phase I of VVC exploration campaign. The UTM coordinates of each hole is given in Table 13.

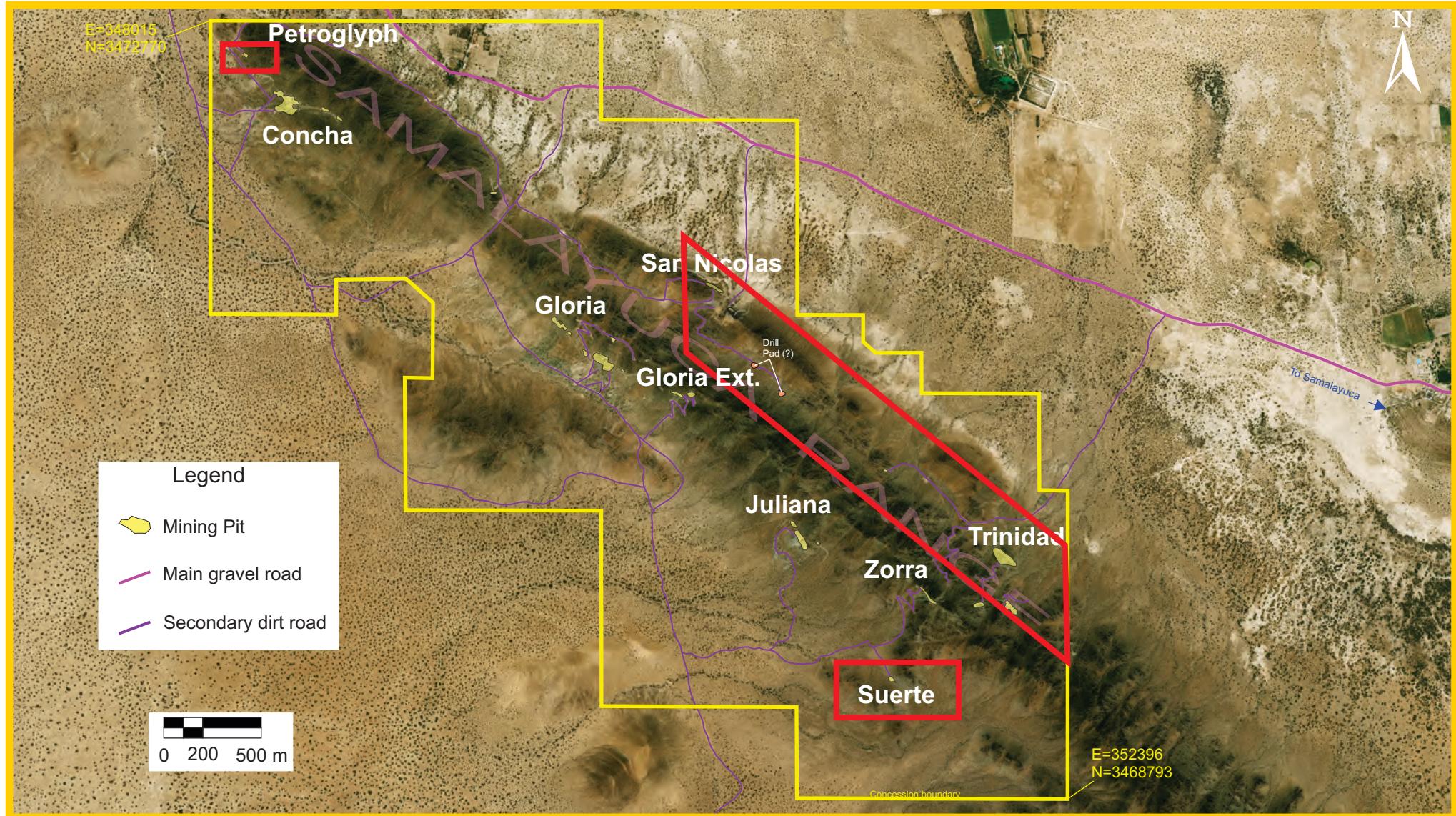


Figure 31. Suggested area of exploration (red outlines) for the 2012-2013 mapping campaign of the Samalayuca property by VVC Exploration (Phase I). UTM Coord.: E=Easting, N=Northing; NAD27, Zone 13N.

The first recommendation relates to a diamond drilling campaign focused on the Gloria pit. The purpose of this campaign is to define the extension at depth of the Cu-mineralized sandstones exposed in the pit and verify their lateral extension. A total of 1200 m of core distributed in eight drillholes is envisaged (Figure 30), with their UTM coordinates, azimuth, plunge and depth given in Table 13. All drillholes are collared up-slope toward the Samalayuca Range since the sandstone layers dip 40°-60° NE. Ultimately, the results of the drilling campaign will be integrated into a more precise evaluation of the resources.

The second recommendation concerns the completion of the structural and geological mapping of the mined pits summarily evaluated during the last exploration campaign. The author includes the Petroglyph, Suerte, San Nicolas and Trinidad pits in the list as well as the northeastern flank of the NW Samalayuca Range (Figure 31). A provision for 300 chemical assays, including copper and other trace metals, is implemented in the budget. This portion of the exploration will serve as complement to determine new targets for the Phase II drilling campaign.

Phase II will expand the drilling campaign to the other mined pits notably Concha and Gloria Extension. A total of 3,000 m of drillcore is suggested. The feasibility to conduct an open pit operation will be evaluated by an economic assessment study.

Phase I of the exploration campaign is expected to cost \$462,500 whereas Phase II is estimated at \$1,000,000.

## 26.1-Budget Breakdown

<b>SAMALAYUCA PROPERTY</b>	
<b>EXPLORATION BUDGET 2012</b>	
<b>(PHASE I )</b>	
<b>GEOLOGICAL MAPPING</b>	
Geologist (\$450/day x 20 days)	\$9,000
Assistant geologist (150/day x 20 days)	\$3,000
Analyses: 300 samples @ \$50/sample (Au+other precious and base metals)	\$15,000
Lodging and food (2 men crew x 30 days)	\$12,000
Truck location, ATV	\$6,000
Maps, stationary, etc..	\$1,000
<b>DRILLING</b>	
1200 m (NQ) X \$220/m	\$264,000
<i>Including:</i>	
Mob-Demob	
Permits	
Core racks and coreshack	
Geologist and technicians	
Core splitter, survey instrument, sample bags, etc..	
Food and lodging	
Analyses: 900 samples X \$50/sample	\$45,000
<b>GOLOGICAL REPORT</b>	
Sub-Total	\$370,000
Contingency (10%)	\$37,000
Administration (15%)	\$55,500
<b>Grand Total</b>	<b>\$462,500</b>

*26.1-Budget Breakdown*

<b>SAMALAYUCA PROPERTY</b>	
<b>EXPLORATION BUDGET 2012</b>	
<b>(PHASE II )</b>	
<b>DRILLING</b>	
2850 m (NQ) X \$220/m	\$627,000
<i>Including:</i>	
Mob-Demob	
Permits	
Core racks and coreshack	
Geologist and technicians	
Core splitter, survey instrument, sample bags, etc..	
Food and lodging	
Analyses: 2300 samples X \$50/sample	\$115,000
<b>ECONOMIC ASSESSMENT</b>	
Sub-Total	\$800,000
Contingency (10%)	\$80,000
Administration (15%)	\$120,000
<b>Grand Total</b>	<b>\$1,000,000</b>

## **ITEM 27 REFERENCES**

- Anderson, J.A. 1982. Leached capping and techniques of appraisal. In Advances in Geology of the Porphyry Copper Deposits, Southwestern North America, Titley, S.R., editor, University of Arizona Press, Tucson; p. 275-295.
- Bautista, J., Goodell, P. 1983. Bimodal Volcanism in the Colonia Mexico- highway 10 area, Chihuahua, Mexico. In Clark, K.F., and Goodell, P., eds., Geology and Mineral Resources of North Central Chihuahua, El Paso Geological Society, publication no. 15; pp. 225-231.
- Berg, E.L. 1970. Geology of the Sierra de Samalayuca, Chihuahua, Mexico. MSc. thesis, University of Texas at Austin; 79 pp.
- Blanchard, R. 1968. Interpretation of leached outcrops. Nevada Bureau of Mines Bulletin 66; 196 pp.
- Bridges, L.W. 1962. geology of Minas Polomosa area, Chihuahua, Mexico. PhD. dissertation; University of Texas at Austin.
- Bruno, C.B. 1995. A mineralogical and geochemical study of the sandstone-hosted stratiform copper deposits at Sierra de Samalayuca, Chihuahua, Mexico. MSc. thesis, University of Colorado at Boulder; 219 pp.
- Chavez Quirarte, R.1986. Stratigraphy and Structural Geology of Sierra de Sapello Northern Chihuahua, Mexico. MSc. thesis, University of Texas at El Paso; 167 pp.
- Clark, K.F., Ponce, B.F. 1983. Summary of the Lithologic Framework and Contained Mineral Resources in North-Central Chihuahua. In Clark, K.F. and Goodell, P., eds., Geology and Mineral Resources of North Central Chihuahua, El Paso Geological

Society, publication no. 15; pp. 76-93.

Cordoba, D.A., Rodriguez, T.R., Guerrero, J.G. 1970. Mesozoic Stratigraphy of the Northern Portion of the Chihuahua Trough. In Seewald, K. and Sundein, D., eds., The Geologic Framework of the Chihuahua Tectonic Belt, West Texas Geological Society; pp. 83-97.

Cox, D.P., Lindsey, D.A., Singer, D.A., Moring, B.C., Diggles, M.F. 2007. Sediment-Hosted Copper Deposits of the World: Deposit Models and Database. USGS Open File Report, 03-1017; 53 pp

Diaz, G.T., Navarro, A.G. 1964. Lithology and Stratigraphic Correlation of the Upper Paleozoic in the Region of Palomas, Chihuahua. In West Texas Geological Society Field Trip Guidebook, Geology of Mina Plomosas - Placer de Guadalupe area, Chihuahua, Mexico, publication no. 64-50; pp. 65 - 84.

Drewes, H. 1978. The Cordilleran orogenic belt between Nevada and Chihuahua. Geological Society of America, v. 89; p. 641-657.

Drewes, H. 1991. Description and Development of the Cordilleran Orogenic belt in the Southwestern United States and Northern Mexico. U.S. Geological Survey Professional Paper no. 1512; 92 pp.

Duarte, A. 1966. Yacimientos cupriferos en la Sierra de Samalayuca, Chihuahua. Technical paper of Compania Fresnillo.

Frantes, T. 1981. The Geology of Palomas Volcanic Field, Northern Chihuahua, Mexico and Southern New Mexico, United States. MSc. thesis, University of Texas at El Paso; 70 pp.

Garcia Esparza, J. 1990. Actualizacion Estratigrafica del Paleozoico del Area de Placer

de Guadalupe - Cerro de Enmedio, Cerro Carrizalillo y Sierra del Cuervo, Estado de Chihuahua, Petroleos Mexicanos, Coordinacion Regional de Exploracion, Zona Noreste, Distrito Chihuahua. Informe inedito; 31 pp.

Gauthier, M. 2011. Rapport de visite au projet Samalayuca du 9 au 13 mai 2011. Technical report produced for Exploración Meus de Mexico SA de CV; 23 pp.

Gorski, D.E. 1993, Samalayuca project report, MXUS S.A. de C.V.

Haenggi, W.T., Muehlberger, W.R. 2005. Chihuahua trough—A Jurassic pull-apart basin. Geological Society of America *Special Papers*, v. 393; p. 619-630.

Hemming, R.F. 1997. Letter of termination, Samalayuca Exploration Agreement dated August 12, 1992. MXUS. Unpublished internal report; 8 pp.

Hoffer, J.M., Sheffield, T.M. 1981. Geology of the West Potrillo Mountains, southcentral New Mexico; in Geology of the Border, Southern New Mexico - Northern Chihuahua. In Hoffer, J., and Hoffer, R., eds., El Paso Geological Society Guidebook; pp. 79-82.

Keller, G.R., Morgan, P., Seager, W.R. 1990. Crustal structure, gravity anomalies and heat flow in the southern Rio Grande rift and their relationship to extensional tectonics. *Tectonophysics*, no.74; p. 21-37.

LeMone D.V. 1982, Stratigraphy of the Franklin Mountains, El Paso County, Texas and Dona Ana County, New Mexico. In Delaware Basin Field Trip Guidebook, West Texas Geological Society; p. 42-72.

LeMone, D.V., Cornell, W. 1984. Field Conference Stratigraphy of El Paso Border Region, Texas and New Mexico. Field Trip Guidebook, El Paso Geological Society and American Association Petroleum Geologists; 97 pp.

Marchand, J. 2011. Camex Development Mining Group Inc., Mineral evaluation, form 43-101F1 technical report, project: Samalayuca, location: Samalayuca, Chihuahua, Mexico; 37 pp.

Marquez, J.A., Montelongo, M.Y., Oiaz Aguilar, E., Paez Coronado, L., Aguilar Medina, S. 2010. Estudio metalurgico preliminara traves de percolation en columna para la recuperacion de cobre sobre una muestra denominada "Gloria" precedente de la compania Invesmin San Miguel S. de R.L. de C.V. Technical report; 33 pp.

Marshak, S., Paulsen, T. 1996. Midcontinent U.S. Fault and Fold Zones: A legacy of Proterozoic intercratonic extensional tectonism? *Geology*, v. 24; p. 152-154.

Mauger, R.L. 1981. Geology and Petrology of the Central part of the Caldera del Nido Block, Chihuahua, Mexico. American Association Petroleum Geologists, studies no. 13; p. 205-242.

Munoz-Ochoa, M.I., Aguilar-Diaz, S.A., Medina-Aguilar, S. 2010a. Secunda parte Experimental realizada sobre una muestra identificada como "La Gloria" a través de percolación en columna precedente de la compania Invesmin San Miguel S. de R.L. de C.V. Technical report; 30 pp.

Munoz-Ochoa, M.I., Aguilar-Diaz, S.A., Medina-Aguilar, S. 2010b. Tercera parte Experimental realizada sobre una muestra identificada como "La Gloria" a través de percolación en columna precedente de la compania Invesmin San Miguel S. de R.L. de C.V. Technical report; 18 pp.

Munoz-Ochoa, M.I., Dominguez, A.L., Valenzuela Castro, G.E., De la Rosa, H.M., Medina-Aguilar, S. 2011a. Cuarta parte Experimental realizada a través de percolacion en columna (irrigacion e inundacion) realizada sobre una muestra identificada "La Gloria" precedente de la compania Invesmin San Miguel S. de R.L. de C.V. Technical report; 18 pp. S.A. de C.V.

Munoz-Ochoa, M.I., Valenzuela Castro, G.E., De la Rosa, H.M., Medina-Aguilar, S. 2011b. Quinta parte Experimental realizada a través de percolacion en columna (no. 9) realizada sobre

una muestra identificada "La Gloria" precedente de la compania Invesmin San Miguel S. de R.L. de C.V. Technical report; 11 pp.

Navarro, A.G., Tovar, J.R. 1974. Stratigraphy and Tectonics of the State of Chihuahua, Mexico; in Geologic Field Trip Guidebook Through the States of Chihuahua and Sinaloa, Mexico. West Texas geological Society, Publication no. 74 -63; p. 87- 91.

Ortega, M., Carciumaru, D. 2010. Tectonic Inversions in the Northern Bend of the Chihuahua Trough. International Journal of Geology, v. 4; p. 14-22.

Pelletier, J. 2011. Exploration activities report, Samalayuca Project, Samalayuca, Chihuahua, Mexico. Internal report, Samalayuca Cobre SA. de CV.; 47 pp.

Royo, M., Reyes, I. 1983. Geology of the Sierra La Candelaria, Chihuahua, Mexico. In Clark, K.F., and Goodell, P., eds., Geology and Mineral Resources of North Central Chihuahua. El Paso Geological Society, publication. no. 15; p. 233 - 236.

Shenk, J.D. 1997. Samalayuca project, final report. Internal report prepared for Minera Phelps Dodge, Mexico, S. de R.L. de C.V.; 16 pp.

Sikka, D.B., Petruk, W., Nehru, C.E., Zhang, Z. 1991. Geochemistry of secondary copper minerals from a Proterozoic porphyry copper deposit, Malanjkhand, India. In Applied Mineralogy in Exploration, W. Petruk, A.H. Vassiliou and D.H. Hausen, editors, Ore Geology Reviews, v. 6; p. 257-290.

Soleto, C.M. 1997. Stratigraphy and structure of the Sierra Samalayuca, Northern Chihuahua, Mexico. MSc. thesis, University of Texas at El Paso; 165 pp.

Strain, W.S. 1970. Late Cenozoic Bolson Integration in the Chihuahua Tectonic Belt. In Seewald, K., and Sundein, D., eds., The Geologic Framework of the Chihuahua Tectonic Belt, West Texas Geological Society; p. 56-59.

Stuart, Ch. J., Willingham, D.L. 1984. Late Tertiary and Quaternary Fluvial Deposits in the Mesilla and Hueco Bolsons, El Paso Area, Texas. *Sedimentary Geology*, no. 38; p. 1-20.

Swanzinger, J.A. 1990. Regionalizacion Sedimentaria del Paleozoico de Chihuahua; Petroleos Mexicanos, Coordinacion Regional de Exploraci6n, Zona Noreste, Distrito Chihuahua. Informe inedito; 34 pp.

Titley, S.R., Marozas, D.C. 1995. Processes and Products of supergene copper enrichment. In *Porphyry copper deposits of the American Cordillera*, Arizona Geological Society Digest 20, Pierce, F.W. and Bolm, J.G., editors; p. 156-168.

Wacker, H.J. 1972. The Stratigraphy and Structure of Cretaceous Rocks in North Central Sierra de Juarez, Chihuahua, Mexico. MSc. Thesis, University of Texas at El Paso; 73 pp.

Wilson, I. F. 1964, Copper deposits in the Sierra de Samalayuca, Chihuahua, Technical paper of Compania Fresnillo.

## **Appendix 1**

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PERIF DE LA JUVENTUD # 6902 L52  
PLAZA CUMBRES  
CHIHUAHUA CHIHUAHUA 31217

Page: 1

Finalized Date: 7-MAY-2010

Account: MIGSAN

**CERTIFICATE CH10051079**

Project: Proyecto No.4

P.O. No.:

This report is for 125 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 30-APR-2010.

The following have access to data associated with this certificate:

ANDRE ST. MICHEL

**SAMPLE PREPARATION**

ALS CODE	DESCRIPTION
FND-02	Find Sample for Addn Analysis

**ANALYTICAL PROCEDURES**

ALS CODE	DESCRIPTION	INSTRUMENT
Au-AA23	Au 30g FA-AA finish	AAS

To: INVESMIN SAN MIGUEL S DE RL DE CV.  
ATTN: ANDRE ST. MICHEL  
PERIF DE LA JUVENTUD # 6902 L52  
PLAZA CUMBRES  
CHIHUAHUA CHIHUAHUA 31217

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

**Signature:**  
Colin Ramshaw, Vancouver Laboratory Manager

**ALS Chemex**

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Page: 2 - A

Total # Pages: 5 (A)

Finalized Date: 7-MAY-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10051079**

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918509		0.018
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918538		0.015
918539		0.031
918540		0.012

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Page: 3 - A

Total # Pages: 5 (A)

Finalized Date: 7-MAY-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10051079**

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918546		0.007
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918548		0.006
918549		0.020
918550		0.063
918551		0.116
918552		0.012
918553		0.012
918554		0.016
918555		0.009
918556		0.009
918557		0.008
918558		0.009
918559		0.007
918560		0.012
918561		0.007
918562		0.009
918563		0.017
918564		<0.005
918565		<0.005
918566		<0.005
918567		<0.005
918568		<0.005
918569		<0.005
918570		<0.005
918571		<0.005
918572		<0.005
918573		<0.005
918574		<0.005
918575		<0.005
918576		<0.005
918577		<0.005
918578		0.008
918579		<0.005
918580		0.008

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Total # Pages: 5 (A)

Finalized Date: 7-MAY-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10051079**

Sample Description	Method Analyte Units LOR	Au-AA23 Au ppm 0.005
918581		0.005
918582		0.007
918583		<0.005
918584		0.006
918585		0.007
918586		0.005
918587		0.006
918588		0.005
918589		<0.005
918590		0.006
918591		0.006
918592		0.005
918593		0.007
918594		0.007
918595		0.007
918596		0.005
918597		<0.005
918598		0.005
918599		0.012
918600		0.010
918601		0.030
918602		0.017
918603		0.076
918604		0.014
918605		0.017
918606		0.016
918607		0.012
918608		0.005
918609		<0.005
918610		0.078
918611		0.025
918612		<0.005
918613		0.006
918614		0.012
918615		<0.005
918616		<0.005
918617		<0.005
918618		0.006
918619		<0.005
918620		<0.005

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Finalized Date: 7-MAY-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10051079**

Sample Description	Method Analyte Units LOR	Au-AA23 Au ppm 0.005
918621		0.009
918622		<0.005
918623		<0.005
918901		0.005
918902		0.007



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Page: 1  
 Finalized Date: 27-APR-2010  
 Account: MIGSAN

## CERTIFICATE CH10047927

Project: Samalayuca

P.O. No.:

This report is for 13 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 21-APR-2010.

The following have access to data associated with this certificate:

ANDRE ST. MICHEL

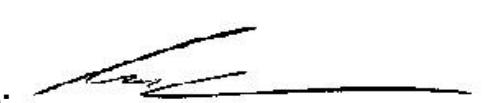
SAMPLE PREPARATION	
ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-24	Pulp Login - Rcd w/o Barcode
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES		
ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP61	33 element four acid ICP-AES	ICP-AES
Au-ICP21	Au 30g FA ICP-AES Finish	ICP-AES

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 ATTN: ANDRE ST. MICHEL  
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This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

**Signature:**



Colin Ramshaw, Vancouver Laboratory Manager



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Finalized Date: 27-APR-2010

Account: MIGSAN

Project: Samalayuca

**CERTIFICATE OF ANALYSIS CH10047927**

Sample Description	Method Analyte Units LOR	WEI-21	Au-ICP21	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61
		Recvd Wt. kg	Au ppm	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %
918640		1.66	0.012	1.8	2.76	<5	240	0.7	<2	2.18	<0.5	12	34	1700	1.95
918641		1.50	0.036	3.1	1.83	37	160	0.5	2	2.83	<0.5	8	25	8190	1.58
918642		1.41	0.026	3.9	2.01	161	180	0.6	<2	4.58	<0.5	8	27	9640	1.89
918643		1.23	0.001	<0.5	2.08	<5	210	<0.5	<2	3.60	<0.5	9	24	92	1.71
918644		1.37	0.008	<0.5	1.55	68	210	<0.5	<2	3.05	<0.5	4	26	29	1.13
918645		1.73	0.043	0.5	2.37	262	250	0.7	3	0.94	<0.5	13	42	9640	2.70
918646		1.33	0.127	0.6	2.42	362	190	0.8	<2	4.82	<0.5	25	36	368	3.89
918647		1.37	0.004	3.0	2.62	9	240	0.7	2	3.24	<0.5	8	32	5810	1.65
918648		1.31	0.001	4.8	2.70	9	220	0.7	<2	3.35	<0.5	11	31	715	1.92
918649		1.46	0.030	5.4	2.41	17	190	0.6	3	2.87	<0.5	8	31	7390	2.00
918650		1.74	0.061	3.4	2.10	<5	360	0.5	<2	2.94	<0.5	6	32	6140	0.99
918651		1.82	0.046	6.0	2.14	<5	370	0.5	<2	2.92	<0.5	6	30	6160	1.09
918652		1.43	0.003	<0.5	2.34	<5	440	0.5	<2	3.28	<0.5	8	28	235	1.27



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Finalized Date: 27-APR-2010

Account: MIGSAN

Project: Samalayuca

**CERTIFICATE OF ANALYSIS CH10047927**

Sample Description	Method	ME-ICP61														
	Analyte	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	Units	%	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
	LOR	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01
918640		0.66	10	1.00	607	3	0.10	17	350	8	0.02	<5	5	21	<20	0.15
918641		0.64	10	0.23	487	170	0.08	10	240	3	0.02	39	3	37	<20	0.08
918642		0.67	10	0.39	867	2	0.09	16	290	9	0.03	<5	4	60	<20	0.09
918643		0.48	10	0.80	645	<1	0.06	14	410	4	0.01	<5	4	28	<20	0.09
918644		0.68	10	0.07	366	1	0.05	6	300	3	0.01	<5	3	30	<20	0.10
918645		0.99	10	0.26	375	7	0.11	10	360	7	0.02	134	5	37	<20	0.13
918646		0.97	10	0.74	947	9	0.13	34	320	21	0.04	7	5	125	<20	0.11
918647		0.76	20	0.64	622	<1	0.11	12	330	<2	0.01	<5	5	31	<20	0.13
918648		0.65	10	0.73	632	8	0.10	16	320	<2	0.01	<5	5	31	<20	0.12
918649		0.60	10	0.54	570	13	0.14	15	300	<2	0.02	<5	5	32	<20	0.11
918650		0.58	10	0.62	436	<1	0.10	10	330	3	0.01	<5	4	25	<20	0.13
918651		0.60	10	0.63	514	<1	0.10	10	280	<2	0.01	<5	4	23	<20	0.11
918652		0.62	10	0.75	484	<1	0.11	11	310	<2	0.01	<5	4	21	<20	0.11

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Finalized Date: 27-APR-2010

Account: MIGSAN

Project: Samalayuca

**CERTIFICATE OF ANALYSIS CH10047927**

Sample Description	Method Analyte Units LOR	ME-ICP61 Tl ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2
918640		<10	<10	48	<10	38
918641		<10	<10	38	<10	18
918642		<10	<10	38	<10	23
918643		<10	<10	34	<10	26
918644		<10	<10	38	<10	<2
918645		<10	<10	120	<10	46
918646		<10	<10	79	<10	19
918647		<10	<10	78	<10	23
918648		<10	<10	77	<10	25
918649		<10	<10	119	<10	20
918650		<10	<10	48	<10	17
918651		<10	<10	48	<10	16
918652		<10	<10	46	<10	20



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Finalized Date: 25-MAR-2010

Account: MIGSAN

## CERTIFICATE CH10024039

Project: Proyecto No.4

P.O. No.:

This report is for 125 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 11-MAR-2010.

The following have access to data associated with this certificate:

ANDRE ST. MICHEL

## SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test

## ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP61	33 element four acid ICP-AES	ICP-AES
ME-OG62	Ore Grade Elements - Four Acid	ICP-AES
Cu-OG62	Ore Grade Cu - Four Acid	VARIABLE

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This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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Finalized Date: 25-MAR-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	WEI-21 Recv'd Wt. kg	ME-ICP61 Ag ppm	ME-ICP61 Al %	ME-ICP61 As ppm	ME-ICP61 Ba ppm	ME-ICP61 Be ppm	ME-ICP61 Bi ppm	ME-ICP61 Ca %	ME-ICP61 Cd ppm	ME-ICP61 Co ppm	ME-ICP61 Cr ppm	ME-ICP61 Cu ppm	ME-ICP61 Fe %	ME-ICP61 Ga ppm	ME-ICP61 K %
918501		2.68	<0.5	5.28	37	1410	2.4	<2	6.55	<0.5	5	57	5	3.53	10	2.31
918502		2.84	<0.5	4.87	111	1120	2.6	<2	5.34	<0.5	5	63	2	3.29	10	2.25
918503		2.40	<0.5	5.10	150	1070	3.3	<2	6.73	<0.5	7	58	18	2.95	10	2.40
918504		2.53	<0.5	4.05	127	820	2.4	<2	5.24	<0.5	7	47	10	2.59	10	1.91
918505		2.98	<0.5	3.39	291	620	2.2	<2	7.07	<0.5	12	38	14	3.47	10	1.55
918506		2.71	<0.5	1.30	176	180	0.6	<2	7.05	<0.5	9	22	12	2.85	<10	0.58
918507		3.09	<0.5	1.63	77	240	0.5	<2	4.32	<0.5	6	21	6	1.66	<10	0.75
918508		2.84	<0.5	1.57	81	220	0.7	<2	3.85	<0.5	8	21	8	1.68	<10	0.72
918509		3.01	<0.5	1.62	197	180	0.5	<2	2.89	<0.5	8	25	11	2.14	<10	0.72
918510		2.92	<0.5	1.31	145	150	0.5	<2	5.61	<0.5	12	18	28	2.01	<10	0.56
918511		2.73	<0.5	1.48	114	290	<0.5	<2	3.61	<0.5	9	22	16	1.71	<10	0.68
918512		2.52	<0.5	1.28	167	200	<0.5	<2	9.71	<0.5	11	18	8	2.24	<10	0.59
918513		3.02	<0.5	2.43	135	1680	0.6	<2	7.63	<0.5	9	30	5	1.68	10	1.14
918514		2.76	<0.5	1.29	68	2390	<0.5	<2	7.05	<0.5	5	17	12	0.99	<10	0.60
918515		2.81	<0.5	3.50	64	560	0.9	<2	5.13	<0.5	7	43	6	1.41	10	1.63
918516		2.61	<0.5	1.08	91	580	<0.5	<2	7.28	<0.5	7	16	7	1.38	<10	0.50
918517		2.82	<0.5	1.64	87	1970	0.5	<2	5.11	<0.5	7	23	15	1.38	<10	0.75
918518		2.10	<0.5	2.37	80	380	0.7	<2	7.38	<0.5	8	34	2	1.84	<10	1.06
918519		2.48	2.7	3.07	44	490	1.1	<2	6.57	<0.5	5	35	466	1.37	10	1.25
918520		2.16	6.4	2.84	57	370	0.8	<2	8.46	<0.5	6	33	5550	0.97	10	1.21
918521		2.27	2.6	2.29	84	270	0.6	<2	9.55	<0.5	6	28	3720	1.21	<10	1.01
918522		2.17	0.6	3.93	32	370	1.1	<2	5.27	<0.5	11	45	122	1.77	10	1.59
918523		2.06	<0.5	1.98	11	340	0.5	<2	4.19	<0.5	7	22	27	1.30	<10	0.85
918524		2.38	0.9	6.36	8	790	1.8	<2	3.14	<0.5	7	80	761	1.60	20	2.66
918525		2.21	<0.5	4.58	8	490	1.2	<2	5.01	<0.5	8	54	178	1.75	10	1.66
918526		2.14	<0.5	1.84	10	400	0.5	<2	11.40	<0.5	3	18	187	0.78	<10	0.67
918527		2.49	<0.5	4.30	6	460	1.1	<2	4.61	<0.5	7	45	3	2.41	10	1.82
918528		2.56	<0.5	3.32	8	320	0.9	<2	4.20	<0.5	9	47	4	2.20	10	1.25
918529		2.71	<0.5	2.34	<5	240	0.6	<2	4.42	<0.5	8	35	2	1.54	<10	0.87
918530		2.60	<0.5	4.36	<5	410	1.0	<2	3.27	<0.5	9	47	3	2.30	10	1.80
918531		2.78	<0.5	3.75	6	330	0.9	<2	3.57	<0.5	9	45	2	1.97	10	1.48
918532		2.72	<0.5	2.83	7	230	0.6	<2	4.73	<0.5	10	32	2	1.73	10	1.00
918533		2.50	8.4	3.53	8	340	1.0	2	0.80	<0.5	12	42	5780	1.72	10	1.15
918534		2.45	1.5	4.98	8	590	1.5	<2	0.19	<0.5	8	54	642	1.58	10	2.00
918535		2.44	2.6	6.44	6	790	1.9	<2	0.27	<0.5	10	68	2710	1.85	20	2.70
918536		2.70	1.4	6.43	<5	790	1.9	<2	0.18	<0.5	8	63	555	1.66	20	2.73
918537		2.56	0.6	6.69	11	940	2.4	<2	4.99	<0.5	10	80	236	1.90	20	3.57
918538		2.83	2.8	5.03	27	550	1.4	<2	3.68	<0.5	19	51	6160	1.74	10	1.97
918539		2.18	10.4	3.89	18	540	1.1	6	7.76	<0.5	12	39	>10000	1.28	10	1.52
918540		2.39	11.7	4.41	9	480	1.2	<2	4.24	<0.5	8	55	6680	1.45	10	1.72



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Total # Pages: 5 (A - C)

Finalized Date: 25-MAR-2010

Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 La ppm 10	ME-ICP61 Mg % 0.01	ME-ICP61 Mn ppm 5	ME-ICP61 Mo ppm 1	ME-ICP61 Na % 0.01	ME-ICP61 Ni ppm 1	ME-ICP61 P ppm 10	ME-ICP61 Pb ppm 2	ME-ICP61 S % 0.01	ME-ICP61 Sb ppm 5	ME-ICP61 Sc ppm 1	ME-ICP61 Sr ppm 1	ME-ICP61 Th ppm 20	ME-ICP61 Ti % 0.01	ME-ICP61 Tl ppm 10
918501		20	0.33	266	3	0.12	22	880	4	0.02	<5	9	56	<20	0.31	<10
918502		20	0.22	317	4	0.11	16	670	<2	0.03	<5	9	78	<20	0.31	<10
918503		30	0.24	773	9	0.13	17	610	<2	0.07	<5	9	125	<20	0.29	<10
918504		20	0.20	505	9	0.15	14	530	4	0.09	<5	7	93	<20	0.24	<10
918505		20	0.20	768	15	0.21	22	470	6	0.09	<5	7	107	<20	0.18	<10
918506		10	0.12	877	10	0.09	13	220	2	0.02	<5	3	95	<20	0.06	<10
918507		10	0.10	502	4	0.06	10	260	3	0.01	<5	3	57	<20	0.08	<10
918508		10	0.10	473	5	0.07	10	260	3	0.02	<5	3	43	<20	0.08	<10
918509		20	0.09	398	3	0.13	10	270	2	0.06	<5	3	68	<20	0.08	<10
918510		10	0.10	772	6	0.08	18	200	2	0.03	<5	2	51	<20	0.04	<10
918511		10	0.09	449	2	0.07	10	220	<2	0.03	<5	3	33	<20	0.07	<10
918512		10	0.15	1095	6	0.04	9	190	<2	<0.01	<5	3	68	<20	0.06	<10
918513		10	0.14	634	2	0.05	10	220	<2	0.03	<5	4	97	<20	0.12	<10
918514		10	0.08	593	1	0.03	4	190	3	0.05	<5	3	104	<20	0.06	<10
918515		30	0.17	450	1	0.06	9	300	2	<0.01	<5	5	41	<20	0.21	<10
918516		10	0.07	717	2	0.03	8	170	3	<0.01	<5	2	50	<20	0.05	<10
918517		20	0.09	499	2	0.05	6	230	4	0.04	<5	3	102	<20	0.08	<10
918518		10	0.14	655	1	0.06	16	380	<2	0.02	<5	5	274	<20	0.15	<10
918519		20	0.35	385	7	0.30	10	420	<2	0.11	<5	6	195	<20	0.17	<10
918520		10	0.42	516	18	0.15	7	430	3	0.04	<5	6	320	<20	0.15	<10
918521		10	0.25	483	32	0.13	11	360	<2	0.07	<5	4	423	<20	0.12	<10
918522		20	0.44	800	18	0.11	20	540	<2	0.05	<5	7	572	<20	0.22	<10
918523		10	0.13	917	1	0.06	12	460	2	0.01	<5	4	47	<20	0.10	<10
918524		40	0.62	353	<1	0.16	12	600	4	0.02	<5	13	34	20	0.43	<10
918525		30	0.75	448	<1	0.10	12	340	2	<0.01	<5	9	27	<20	0.28	<10
918526		10	0.66	260	<1	0.11	4	280	2	0.03	<5	3	252	<20	0.09	<10
918527		20	0.78	571	<1	0.07	13	490	<2	<0.01	<5	8	41	<20	0.24	<10
918528		20	0.85	534	<1	0.06	14	560	2	<0.01	<5	6	37	<20	0.23	<10
918529		20	0.63	563	<1	0.04	9	380	3	<0.01	<5	5	36	<20	0.16	<10
918530		20	0.91	444	<1	0.07	14	500	3	<0.01	<5	8	31	<20	0.25	<10
918531		20	0.83	472	<1	0.06	14	410	2	<0.01	<5	7	30	<20	0.23	<10
918532		10	0.87	546	<1	0.05	14	340	<2	<0.01	<5	5	36	<20	0.16	<10
918533		20	0.97	720	11	0.07	25	450	3	0.01	<5	7	20	<20	0.19	<10
918534		20	0.74	391	<1	0.10	21	560	3	<0.01	<5	10	15	<20	0.25	<10
918535		20	0.91	447	<1	0.11	24	710	4	<0.01	<5	13	19	<20	0.30	<10
918536		30	0.74	246	<1	0.11	17	680	<2	<0.01	<5	12	16	<20	0.29	<10
918537		20	0.94	431	1	0.15	34	810	6	0.01	<5	13	39	<20	0.39	<10
918538		20	0.94	616	3	0.21	25	740	3	0.23	<5	10	326	<20	0.25	<10
918539		20	0.98	382	2	0.09	17	470	<2	0.11	<5	8	279	<20	0.19	<10
918540		20	0.75	656	28	0.09	15	530	3	0.10	<5	9	46	<20	0.26	<10



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**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
918501		<10	91	<10	17	
918502		<10	153	<10	12	
918503		<10	219	<10	11	
918504		<10	172	<10	6	
918505		<10	151	<10	4	
918506		<10	47	<10	3	
918507		<10	37	<10	3	
918508		<10	37	<10	5	
918509		<10	50	<10	2	
918510		<10	28	<10	3	
918511		<10	34	<10	3	
918512		<10	30	<10	3	
918513		<10	56	<10	3	
918514		<10	26	<10	4	
918515		<10	75	<10	4	
918516		<10	21	<10	3	
918517		<10	34	<10	6	
918518		<10	115	<10	6	
918519		<10	96	<10	9	
918520		<10	98	<10	11	
918521		<10	113	<10	10	
918522		<10	129	<10	20	
918523		<10	37	<10	14	
918524		<10	128	<10	21	
918525		<10	89	<10	26	
918526		<10	32	<10	11	
918527		<10	79	<10	18	
918528		<10	73	<10	23	
918529		<10	52	<10	18	
918530		<10	78	<10	23	
918531		<10	66	<10	22	
918532		<10	48	<10	24	
918533		<10	76	<10	30	
918534		<10	89	<10	22	
918535		<10	117	<10	26	
918536		<10	114	<10	20	
918537		<10	136	<10	32	
918538		<10	128	<10	25	
918539		<10	81	<10	16	
918540		<10	85	<10	20	1.070



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Finalized Date: 25-MAR-2010  
Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	WEI-21	ME-ICP61													
		Recvd Wt.	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	K
		kg	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	%	ppm
918541		2.62	0.7	5.08	10	570	1.4	<2	3.13	<0.5	9	63	973	1.51	10	2.05
918542		2.37	3.6	5.72	5	550	1.3	<2	3.68	<0.5	9	68	3650	1.48	10	2.35
918543		2.47	2.4	5.10	5	480	1.2	2	4.60	<0.5	7	59	3110	1.20	10	2.07
918544		2.24	3.7	3.24	9	230	0.7	<2	3.28	<0.5	9	46	2280	1.28	10	1.11
918545		2.30	<0.5	3.16	12	260	0.9	3	0.88	<0.5	9	35	127	1.37	<10	1.07
918546		2.60	4.2	4.77	14	420	1.5	2	3.01	<0.5	10	51	3320	1.57	10	1.86
918547		2.69	0.6	2.65	9	200	0.7	<2	4.33	<0.5	9	34	610	1.31	<10	0.86
918548		2.80	<0.5	2.16	23	160	1.0	<2	5.37	<0.5	6	29	294	1.51	<10	0.82
918549		2.11	5.0	2.52	36	170	0.7	2	3.86	<0.5	7	33	3140	1.36	10	0.91
918550		2.29	2.5	2.33	236	160	0.8	2	4.25	<0.5	9	37	5110	1.93	<10	0.98
918551		2.43	<0.5	1.68	522	290	0.5	2	3.88	<0.5	19	29	76	3.31	<10	0.77
918552		2.36	<0.5	1.43	17	350	<0.5	<2	6.25	<0.5	8	19	534	1.39	<10	0.43
918553		2.68	0.9	1.83	21	330	<0.5	2	5.97	<0.5	10	27	794	1.71	<10	0.65
918554		2.71	1.3	1.55	15	310	<0.5	2	9.92	<0.5	4	20	1285	0.78	<10	0.56
918555		2.97	1.1	1.52	26	140	0.5	<2	2.28	<0.5	3	25	5290	1.37	<10	0.61
918556		3.76	0.5	1.67	13	140	0.5	2	3.19	<0.5	4	24	4150	1.27	<10	0.67
918557		3.26	<0.5	1.97	12	180	0.6	<2	2.46	<0.5	5	31	4700	1.52	<10	0.77
918558		3.49	<0.5	1.84	7	160	0.5	2	3.33	<0.5	4	28	2870	1.13	<10	0.73
918559		3.75	<0.5	1.74	12	160	0.5	2	3.64	<0.5	4	26	3810	1.29	<10	0.71
918560		3.69	<0.5	1.85	12	180	0.5	2	3.66	<0.5	4	29	5530	1.41	<10	0.77
918561		3.63	<0.5	1.76	19	220	0.5	<2	9.19	<0.5	4	25	4630	1.15	<10	0.73
918562		3.52	<0.5	1.84	6	170	0.6	<2	3.72	<0.5	4	27	4290	1.37	<10	0.77
918563		4.07	5.6	1.80	7	420	0.5	2	3.00	<0.5	6	24	1605	1.36	<10	0.63
918564		3.43	5.2	3.15	10	690	0.8	<2	2.41	<0.5	7	47	2160	1.51	<10	1.23
918565		3.38	0.7	3.81	9	780	0.9	<2	2.26	<0.5	9	48	392	1.73	10	1.49
918566		4.98	1.8	4.81	19	1060	1.3	<2	2.90	<0.5	7	53	2100	1.71	10	2.09
918567		4.49	11.6	3.52	14	710	0.9	3	2.57	<0.5	9	43	7400	1.84	10	1.35
918568		4.93	8.4	2.58	12	500	0.7	<2	2.71	<0.5	8	35	5170	1.52	<10	0.95
918569		4.61	24.4	3.31	23	760	0.9	3	3.43	<0.5	9	44	9590	1.60	10	1.28
918570		3.77	2.4	3.52	11	780	0.9	<2	3.04	<0.5	9	43	3210	1.61	10	1.35
918571		3.76	1.7	3.30	9	870	0.8	2	3.50	<0.5	10	42	2310	1.70	10	1.23
918572		4.72	2.1	3.35	11	1340	0.9	<2	1.93	<0.5	5	42	943	1.35	10	1.42
918573		3.96	3.6	2.32	15	1350	0.6	<2	2.49	<0.5	7	32	2210	1.26	10	0.88
918574		4.89	1.9	3.31	16	4190	0.9	<2	1.29	<0.5	4	40	1220	1.42	10	1.39
918575		3.73	0.7	3.74	49	920	1.1	<2	1.99	<0.5	6	48	1620	1.41	10	1.55
918576		4.28	1.7	1.78	86	460	0.5	<2	2.16	<0.5	4	29	1980	1.11	<10	0.73
918577		5.14	2.6	1.83	14	1690	0.5	<2	2.38	<0.5	8	24	856	1.29	10	0.64
918578		4.05	18.4	3.24	12	760	0.8	3	4.29	<0.5	9	41	>10000	1.28	10	1.29
918579		3.83	14.7	3.80	6	1000	1.2	<2	1.71	<0.5	8	48	>10000	1.32	10	1.60
918580		4.10	7.6	3.79	12	980	1.0	2	1.97	<0.5	9	46	6980	1.48	10	1.52



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Account: MIGSAN

Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 La ppm 10	ME-ICP61 Mg % 0.01	ME-ICP61 Mn ppm 5	ME-ICP61 Mo ppm 1	ME-ICP61 Na % 0.01	ME-ICP61 Ni ppm 1	ME-ICP61 P ppm 10	ME-ICP61 Pb ppm 2	ME-ICP61 S % 0.01	ME-ICP61 Sb ppm 5	ME-ICP61 Sc ppm 1	ME-ICP61 Sr ppm 1	ME-ICP61 Th ppm 20	ME-ICP61 Ti % 0.01	ME-ICP61 Tl ppm 10
918541		30	0.80	490	5	0.12	17	650	2	0.01	<5	10	37	<20	0.32	<10
918542		30	0.88	369	<1	0.12	17	590	<2	0.04	<5	11	32	<20	0.35	<10
918543		30	0.68	288	<1	0.11	12	560	<2	0.01	<5	10	34	<20	0.28	<10
918544		10	0.72	426	<1	0.13	15	370	<2	0.01	<5	6	24	<20	0.20	<10
918545		20	0.73	586	<1	0.10	15	360	2	0.02	<5	6	32	<20	0.15	<10
918546		20	0.95	520	1	0.23	18	480	2	0.13	<5	9	51	<20	0.23	<10
918547		10	0.69	528	<1	0.07	13	350	<2	0.01	<5	5	43	<20	0.14	<10
918548		10	0.16	494	1	0.10	10	310	<2	0.03	<5	4	126	<20	0.11	<10
918549		10	0.34	458	1	0.09	10	370	<2	0.02	<5	5	36	<20	0.13	<10
918550		10	0.18	658	6	0.11	7	290	2	0.02	21	5	40	<20	0.14	<10
918551		10	0.13	443	3	0.06	27	370	4	0.03	5	4	84	<20	0.10	<10
918552		10	0.34	580	1	0.07	11	210	<2	0.02	<5	3	83	<20	0.07	<10
918553		10	0.10	769	1	0.10	11	250	<2	0.01	<5	4	61	<20	0.08	<10
918554		10	0.20	460	1	0.09	4	220	4	0.03	<5	3	121	<20	0.08	<10
918555		10	0.21	499	3	0.06	6	220	8	0.01	<5	3	17	<20	0.07	<10
918556		10	0.23	518	3	0.05	6	220	5	0.01	<5	3	17	<20	0.08	<10
918557		10	0.32	574	5	0.05	9	290	5	0.01	<5	4	15	<20	0.10	<10
918558		10	0.27	571	4	0.04	9	250	4	0.03	<5	4	16	<20	0.09	<10
918559		10	0.25	751	8	0.05	8	240	3	0.06	<5	4	20	<20	0.08	<10
918560		10	0.23	618	8	0.05	7	270	4	0.09	<5	4	16	<20	0.09	<10
918561		10	0.24	543	10	0.06	7	280	3	0.05	<5	4	113	<20	0.09	<10
918562		10	0.21	844	26	0.05	7	280	2	0.02	<5	4	20	<20	0.09	<10
918563		10	0.38	585	1	0.02	10	430	3	0.01	<5	4	40	<20	0.08	<10
918564		20	0.50	373	2	0.05	13	340	2	0.05	<5	6	46	<20	0.17	<10
918565		20	0.62	351	<1	0.05	15	410	3	0.02	<5	7	80	<20	0.21	<10
918566		30	0.54	307	<1	0.09	13	530	<2	0.03	8	9	518	<20	0.25	<10
918567		20	0.62	471	2	0.05	17	360	2	0.03	<5	7	34	<20	0.18	<10
918568		10	0.51	490	5	0.05	11	310	2	0.04	<5	5	30	<20	0.14	<10
918569		20	0.57	578	6	0.06	15	390	2	0.01	7	6	50	<20	0.18	<10
918570		20	0.60	479	3	0.05	16	400	2	0.01	<5	7	36	<20	0.20	<10
918571		20	0.62	533	6	0.05	17	390	4	0.02	<5	6	40	<20	0.18	<10
918572		20	0.36	258	5	0.09	9	390	2	0.06	<5	6	51	<20	0.18	<10
918573		10	0.40	394	5	0.05	12	330	3	0.04	<5	4	49	<20	0.14	<10
918574		20	0.27	197	8	0.08	6	360	<2	0.12	<5	6	383	<20	0.18	<10
918575		20	0.43	282	6	0.07	8	440	2	0.03	<5	7	72	<20	0.22	<10
918576		10	0.23	221	12	0.06	6	250	3	0.04	5	4	187	<20	0.11	<10
918577		10	0.40	277	19	0.03	9	220	2	0.07	<5	3	106	<20	0.08	<10
918578		20	0.53	418	1	0.06	10	390	<2	0.04	<5	6	108	<20	0.16	<10
918579		20	0.46	368	1	0.07	10	400	2	0.07	<5	8	22	<20	0.21	<10
918580		20	0.56	379	1	0.11	12	370	2	<0.01	<5	7	20	<20	0.20	<10



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Project: Proyecto No.4

**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
918541		<10	98	<10	24	
918542		<10	112	<10	28	
918543		<10	98	<10	20	
918544		<10	63	<10	24	
918545		<10	63	<10	25	
918546		<10	90	<10	30	
918547		<10	55	<10	24	
918548		<10	62	<10	7	
918549		<10	62	<10	17	
918550		<10	49	<10	21	
918551		<10	155	<10	2	
918552		<10	37	<10	12	
918553		<10	48	<10	8	
918554		<10	35	<10	7	
918555		<10	74	<10	15	
918556		<10	49	<10	15	
918557		<10	52	<10	22	
918558		<10	44	<10	18	
918559		<10	35	<10	17	
918560		<10	48	<10	16	
918561		<10	40	<10	16	
918562		<10	43	<10	15	
918563		<10	40	<10	34	
918564		<10	71	<10	65	
918565		<10	81	<10	77	
918566		<10	127	<10	64	
918567		<10	92	<10	79	
918568		<10	87	<10	63	
918569		<10	122	<10	68	
918570		<10	99	<10	75	
918571		<10	87	<10	81	
918572		<10	97	<10	40	
918573		<10	66	<10	55	
918574		<10	117	<10	30	
918575		<10	231	<10	48	
918576		<10	300	<10	29	
918577		<10	86	<10	53	
918578		<10	87	<10	54	1.015
918579		<10	120	<10	50	1.090
918580		<10	107	<10	68	



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Account: MIGSAN

Project: Proyecto No.4

## CERTIFICATE OF ANALYSIS CH10024039

Sample Description	Method Analyte Units LOR	WEI-21 Recv'd Wt.	ME-ICP61 Ag	ME-ICP61 Al	ME-ICP61 As	ME-ICP61 Ba	ME-ICP61 Be	ME-ICP61 Bi	ME-ICP61 Ca	ME-ICP61 Cd	ME-ICP61 Co	ME-ICP61 Cr	ME-ICP61 Cu	ME-ICP61 Fe	ME-ICP61 Ga	ME-ICP61 K
		kg	ppm	%	ppm	ppm	ppm	ppm	0.01	ppm	0.5	1	1	0.01	10	0.01
918581		3.75	1.4	5.04	9	1330	1.3	<2	2.54	<0.5	10	50	1900	1.55	10	2.14
918582		2.32	9.6	3.39	8	810	0.9	<2	3.82	<0.5	11	39	4740	1.51	10	1.35
918583		2.15	<0.5	4.36	24	570	1.1	<2	7.64	<0.5	7	42	289	1.69	10	1.88
918584		2.65	6.4	2.03	22	260	0.6	<2	3.79	<0.5	5	29	6180	1.02	<10	0.71
918585		2.58	13.4	2.76	25	360	0.8	13	2.38	<0.5	5	36	>10000	1.34	10	1.01
918586		2.87	8.8	2.57	6	330	0.7	<2	3.42	<0.5	7	33	5310	1.30	10	0.88
918587		2.88	3.3	4.21	17	660	1.1	<2	5.88	<0.5	5	45	4540	1.10	10	1.68
918588		2.47	11.4	1.92	7	190	0.5	<2	2.96	<0.5	8	23	7000	1.14	<10	0.57
918589		2.60	2.4	7.22	10	1150	2.1	<2	2.55	<0.5	7	75	2620	1.58	20	3.16
918590		2.67	6.5	2.83	23	310	0.8	2	4.48	<0.5	8	33	3780	1.36	10	1.00
918591		3.37	8.8	2.11	10	230	0.5	<2	3.11	<0.5	7	27	6020	0.98	10	0.71
918592		2.77	7.0	1.60	27	170	0.5	<2	3.29	<0.5	6	23	4210	0.97	<10	0.55
918593		2.85	3.7	1.42	8	140	<0.5	<2	4.04	<0.5	6	30	1745	0.95	<10	0.45
918594		3.17	5.2	2.00	12	210	0.6	2	2.65	<0.5	6	30	3470	1.12	<10	0.64
918595		3.08	6.1	1.75	<5	180	0.5	<2	3.11	<0.5	6	26	4630	1.05	<10	0.55
918596		3.02	3.2	2.30	6	250	0.6	<2	3.93	<0.5	8	27	2890	1.19	10	0.72
918597		2.47	0.5	2.66	22	230	0.7	<2	5.34	<0.5	7	43	620	1.53	10	0.89
918598		2.37	2.0	2.83	74	280	0.9	<2	11.20	<0.5	9	44	3340	2.96	10	1.08
918599		2.83	5.0	3.73	73	430	1.1	<2	2.77	<0.5	7	45	8010	1.64	10	1.44
918600		2.86	3.6	3.01	2370	330	0.8	4	1.11	1.4	14	42	>10000	2.44	10	1.24
918601		2.39	1.2	2.92	427	310	0.7	<2	2.40	<0.5	10	37	2840	4.64	10	1.18
918602		3.00	1.9	2.82	2040	310	0.8	<2	4.53	0.9	11	41	6650	7.78	<10	1.18
918603		2.34	26.4	2.83	47	260	0.8	24	1.67	<0.5	7	33	>10000	1.30	10	1.10
918604		2.43	7.8	5.97	11	660	1.7	<2	2.43	<0.5	7	64	>10000	1.50	10	2.50
918605		2.45	7.0	6.14	16	670	1.8	2	2.46	<0.5	7	62	>10000	1.56	10	2.60
918606		2.02	9.8	1.88	7	170	0.6	<2	5.39	<0.5	7	20	>10000	1.14	<10	0.61
918607		2.20	5.6	2.19	7	190	0.5	<2	3.53	<0.5	7	28	6280	1.09	<10	0.69
918608		2.11	1.0	2.09	6	280	0.5	<2	4.11	<0.5	7	22	1560	1.20	<10	0.65
918609		2.30	<0.5	2.14	<5	200	0.5	<2	3.26	<0.5	5	25	196	1.09	<10	0.73
918610		2.31	13.2	2.21	<5	250	0.6	6	2.24	<0.5	6	30	>10000	1.25	10	0.67
918611		2.45	3.4	1.89	<5	250	0.5	<2	2.26	<0.5	5	25	6390	1.01	10	0.57
918612		2.44	5.6	2.31	<5	260	0.6	<2	3.51	<0.5	6	31	2990	1.29	10	0.71
918613		2.24	10.2	2.62	<5	250	0.6	<2	3.38	<0.5	6	32	6090	1.57	10	0.77
918614		2.31	10.1	2.20	29	240	0.8	<2	3.06	<0.5	6	28	6040	1.49	10	0.64
918615		2.50	8.6	2.01	11	220	0.6	<2	2.45	<0.5	5	26	4290	1.30	10	0.59
918616		2.28	7.4	2.01	<5	220	0.5	<2	2.97	<0.5	6	25	4040	1.22	<10	0.60
918617		2.67	12.3	1.93	6	200	0.5	<2	3.41	<0.5	5	25	5150	1.25	<10	0.60
918618		3.00	9.0	2.25	52	250	0.6	<2	2.51	<0.5	6	31	5200	1.44	<10	0.71
918619		2.38	0.8	5.33	<5	650	1.5	<2	1.72	<0.5	6	51	1590	1.86	10	1.93
918620		2.17	2.7	2.45	9	360	0.7	<2	3.50	<0.5	5	28	6720	1.73	<10	0.76



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**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 La ppm 10	ME-ICP61 Mg % 0.01	ME-ICP61 Mn ppm 5	ME-ICP61 Mo ppm 1	ME-ICP61 Na % 0.01	ME-ICP61 Ni ppm 1	ME-ICP61 P ppm 10	ME-ICP61 Pb ppm 2	ME-ICP61 S % 0.01	ME-ICP61 Sb ppm 5	ME-ICP61 Sc ppm 1	ME-ICP61 Sr ppm 1	ME-ICP61 Th ppm 20	ME-ICP61 Ti % 0.01	ME-ICP61 Tl ppm 10
918581		30	0.61	375	2	0.06	14	490	5	<0.01	<5	10	28	<20	0.26	<10
918582		20	0.46	472	20	0.06	15	350	3	0.01	<5	6	39	<20	0.17	<10
918583		20	0.32	467	3	0.13	11	550	4	0.51	<5	8	179	<20	0.21	<10
918584		10	0.35	583	1	0.05	7	270	2	0.01	<5	4	34	<20	0.11	<10
918585		20	0.31	468	3	0.09	9	330	2	0.02	11	6	30	<20	0.15	<10
918586		10	0.44	575	2	0.07	11	300	<2	0.01	<5	5	37	<20	0.14	<10
918587		20	0.40	573	<1	0.10	8	380	3	0.01	<5	9	159	<20	0.21	<10
918588		10	0.51	524	9	0.05	9	240	2	0.07	<5	4	27	<20	0.10	<10
918589		30	0.52	366	3	0.19	11	600	<2	<0.01	<5	15	46	<20	0.36	<10
918590		20	0.46	478	6	0.08	12	340	2	<0.01	<5	5	55	<20	0.14	<10
918591		10	0.42	521	4	0.05	9	290	3	<0.01	<5	4	39	<20	0.10	<10
918592		10	0.23	442	13	0.05	8	220	2	<0.01	<5	3	32	<20	0.08	<10
918593		10	0.31	599	8	0.04	10	230	3	<0.01	<5	3	44	<20	0.07	<10
918594		10	0.43	434	3	0.06	10	270	4	<0.01	<5	4	29	<20	0.10	<10
918595		10	0.42	503	5	0.05	6	270	2	<0.01	<5	4	34	<20	0.08	<10
918596		10	0.55	629	3	0.06	13	350	4	<0.01	<5	5	49	<20	0.09	<10
918597		20	0.23	449	3	0.10	15	510	2	<0.01	<5	6	43	<20	0.15	<10
918598		20	0.18	1035	9	0.11	22	430	<2	<0.01	7	6	136	<20	0.19	<10
918599		20	0.22	480	5	0.10	9	390	3	0.01	29	7	45	<20	0.20	<10
918600		10	0.07	340	6	0.08	4	320	4	0.01	116	6	82	<20	0.16	<10
918601		20	0.08	229	15	0.09	4	300	9	0.03	13	5	145	<20	0.13	<10
918602		20	0.09	318	30	0.12	12	370	21	0.09	66	6	163	<20	0.13	<10
918603		20	0.28	366	9	0.07	14	320	2	0.02	<5	6	26	<20	0.16	<10
918604		20	0.43	327	1	0.14	14	510	<2	<0.01	<5	11	39	<20	0.31	<10
918605		30	0.44	360	<1	0.15	17	570	2	0.02	<5	12	38	<20	0.31	<10
918606		10	0.43	737	1	0.05	11	240	3	<0.01	<5	4	38	<20	0.08	<10
918607		10	0.51	519	<1	0.08	9	280	<2	0.02	<5	4	26	<20	0.12	<10
918608		10	0.46	603	1	0.07	9	360	2	<0.01	<5	4	37	<20	0.10	<10
918609		10	0.36	403	3	0.07	18	310	6	0.01	<5	4	35	<20	0.11	<10
918610		10	0.56	453	1	0.08	17	290	<2	0.02	<5	4	35	<20	0.12	<10
918611		10	0.46	424	2	0.09	14	300	<2	0.01	<5	4	26	<20	0.10	<10
918612		20	0.56	562	5	0.05	13	290	<2	0.02	<5	4	33	<20	0.13	<10
918613		10	0.67	577	14	0.05	15	380	<2	0.01	<5	5	44	<20	0.13	<10
918614		20	0.57	552	9	0.05	12	390	<2	0.01	<5	4	41	<20	0.11	<10
918615		10	0.52	476	7	0.05	13	310	<2	0.01	<5	4	32	<20	0.10	<10
918616		20	0.50	535	7	0.05	11	260	2	0.05	<5	4	21	<20	0.10	<10
918617		20	0.43	628	19	0.05	10	270	<2	0.02	<5	4	26	<20	0.10	<10
918618		20	0.49	556	7	0.06	13	330	<2	0.01	<5	4	24	<20	0.13	<10
918619		20	0.74	424	3	0.12	21	570	<2	<0.01	<5	10	29	<20	0.23	<10
918620		10	0.51	811	8	0.07	17	330	3	0.01	<5	5	23	<20	0.13	<10



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**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
918581		<10	104	<10	69	
918582		<10	94	<10	69	
918583		<10	103	<10	29	
918584		<10	110	<10	15	
918585		<10	145	<10	16	1.300
918586		<10	84	<10	18	
918587		<10	121	<10	15	
918588		<10	44	<10	21	
918589		<10	146	<10	20	
918590		<10	71	<10	20	
918591		<10	56	<10	16	
918592		<10	52	<10	16	
918593		<10	34	<10	14	
918594		<10	42	<10	18	
918595		<10	37	<10	18	
918596		<10	47	<10	21	
918597		<10	65	<10	21	
918598		<10	141	<10	33	
918599		<10	172	<10	26	
918600		10	215	<10	113	1.250
918601		<10	123	<10	30	
918602		<10	183	<10	119	
918603		<10	56	<10	14	4.12
918604		<10	116	<10	14	1.220
918605		<10	127	<10	14	1.520
918606		<10	33	<10	16	1.240
918607		<10	42	<10	18	
918608		<10	39	<10	19	
918609		<10	40	<10	21	
918610		<10	45	<10	19	1.745
918611		<10	36	<10	18	
918612		<10	49	<10	20	
918613		<10	60	<10	22	
918614		<10	60	<10	23	
918615		<10	47	<10	19	
918616		<10	40	<10	18	
918617		<10	49	<10	15	
918618		<10	58	<10	32	
918619		<10	105	<10	26	
918620		<10	78	<10	20	



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**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	WEI-21 Recvd Wt. kg	ME-ICP61 Ag ppm	ME-ICP61 Al %	ME-ICP61 As ppm	ME-ICP61 Ba ppm	ME-ICP61 Be ppm	ME-ICP61 Bi ppm	ME-ICP61 Ca %	ME-ICP61 Cd ppm	ME-ICP61 Co ppm	ME-ICP61 Cr ppm	ME-ICP61 Cu ppm	ME-ICP61 Fe %	ME-ICP61 Ga ppm	ME-ICP61 K %
918621		2.43	0.7	4.68	10	590	1.4	<2	2.44	<0.5	7	51	5110	1.93	10	1.71
918622		2.32	3.1	2.33	<5	160	0.5	<2	1.12	<0.5	8	29	1710	1.32	10	0.63
918623		1.73	0.6	2.76	<5	190	0.7	<2	0.21	<0.5	11	36	166	1.72	10	0.71
918901		7.21	10.7	2.03	<5	210	0.5	4	2.94	<0.5	6	25	7350	1.11	10	0.65
918902		10.54	10.8	2.24	22	280	0.6	<2	3.52	<0.5	6	31	8320	1.08	10	0.77



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## CERTIFICATE OF ANALYSIS CH10024039

Sample Description	Method Analyte Units LOR	ME-ICP61 La ppm 10	ME-ICP61 Mg %	ME-ICP61 Mn ppm 5	ME-ICP61 Mo ppm 1	ME-ICP61 Na %	ME-ICP61 Ni ppm 0.01	ME-ICP61 P ppm 10	ME-ICP61 Pb ppm 2	ME-ICP61 S %	ME-ICP61 Sb ppm 0.01	ME-ICP61 Sc ppm 5	ME-ICP61 Sr ppm 1	ME-ICP61 Th ppm 20	ME-ICP61 Ti %	ME-ICP61 Tl ppm 0.01
918621		30	0.61	1135	5	0.11	17	440	<2	0.21	<5	9	28	<20	0.25	<10
918622		20	0.74	632	1	0.07	14	310	2	0.01	<5	4	15	<20	0.13	<10
918623		10	0.98	589	<1	0.06	24	260	<2	<0.01	<5	5	9	<20	0.16	<10
918901		20	0.47	486	7	0.05	13	260	<2	0.01	<5	4	31	<20	0.10	<10
918902		20	0.44	573	2	0.06	11	320	<2	0.01	<5	5	44	<20	0.12	<10

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**CERTIFICATE OF ANALYSIS CH10024039**

Sample Description	Method Analyte Units LOR	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
918621		<10	85	<10	22	
918622		<10	46	<10	26	
918623		<10	54	<10	33	
918901		<10	44	<10	19	
918902		<10	117	<10	19	



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Account: SUEMXE

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Project: Samalayuca

P.O. No.:

This report is for 92 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 17-MAY-2011.

The following have access to data associated with this certificate:

ANDRÉ ST-MICHEL

### SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

### ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP61	33 element four acid ICP-AES	ICP-AES
ME-OG62	Ore Grade Elements - Four Acid	ICP-AES
Cu-OG62	Ore Grade Cu - Four Acid	VARIABLE
Au-AA23	Au 30g FA-AA finish	AAS

To: EXPLORACION MEUS DE MEXICO  
ATTN: ANDRÉ ST-MICHEL  
PERIFERICO ORTIZ MENA 2807 24  
QUINTAS DEL SOL  
CHIHUAHUA CHIHUAHUA 31214

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

  
Colin Ramshaw, Vancouver Laboratory Manager



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61											
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
		kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm
378201		2.38	<0.005	<0.5	1.45	6	180	<0.5	<2	5.20	<0.5	9	19	169	1.24
378202		1.82	<0.005	2.2	1.56	5	130	<0.5	<2	3.51	<0.5	9	22	311	1.31
378203		2.61	0.006	10.2	2.17	5	250	0.5	<2	3.77	<0.5	5	29	6050	1.04
378204		2.53	<0.005	3.1	2.63	76	240	0.7	<2	3.73	<0.5	7	30	1775	1.37
378205		2.16	<0.005	5.2	1.91	74	190	0.5	<2	2.69	<0.5	5	26	4440	1.26
378206		2.17	0.010	0.5	1.90	96	130	0.6	<2	4.94	<0.5	6	23	745	1.85
378207		3.00	<0.005	16.7	3.17	<5	400	0.8	2	2.84	<0.5	7	40	8960	1.46
378208		2.97	<0.005	3.4	2.28	<5	220	0.5	<2	2.75	<0.5	8	29	1430	1.41
378209		4.18	<0.005	7.4	3.07	<5	320	0.7	<2	3.38	<0.5	9	34	5310	1.59
378210		3.04	0.007	4.3	3.10	5	290	0.7	<2	3.18	<0.5	11	32	1420	1.84
378211		3.28	0.006	3.6	2.30	<5	190	0.5	<2	4.10	<0.5	11	29	1325	1.79
378212		3.11	0.005	2.6	7.06	<5	990	2.2	<2	2.57	<0.5	9	70	179	1.70
378213		3.97	0.006	14.0	4.89	<5	690	1.2	<2	2.91	<0.5	8	39	5680	1.21
378214		3.14	0.007	10.3	2.22	<5	310	0.6	<2	3.93	<0.5	6	28	6480	0.99
378215		1.80	0.011	12.5	1.98	<5	230	0.5	<2	3.86	<0.5	6	26	6700	0.94
378216		4.63	0.005	3.7	2.19	8	210	0.5	<2	4.69	<0.5	9	29	195	1.34
378217		1.65	0.010	9.3	2.23	14	230	0.5	<2	4.07	<0.5	9	28	2310	1.23
378218		2.06	0.005	8.6	2.27	11	230	0.5	<2	4.19	<0.5	10	25	581	1.34
378219		2.68	0.024	35.6	2.37	10	230	0.6	5	3.89	<0.5	9	27	>10000	1.48
378220		2.64	0.070	6.9	2.22	127	240	0.7	<2	10.15	0.6	7	27	1025	1.70
378221		3.40	0.006	<0.5	2.28	26	230	0.6	<2	4.07	<0.5	6	28	4110	1.49
378222		4.07	0.005	<0.5	1.97	13	200	0.5	<2	5.02	<0.5	8	22	3600	1.48
378223		2.88	0.010	3.6	2.47	9	400	0.6	<2	4.31	<0.5	7	30	4110	1.39
378224		3.21	0.007	<0.5	2.00	5	230	0.5	<2	4.01	<0.5	6	26	753	1.21
378225		2.40	<0.005	<0.5	1.83	<5	220	<0.5	<2	5.52	<0.5	6	23	40	1.16
378226		2.04	0.005	5.8	1.90	<5	200	<0.5	<2	4.97	<0.5	9	21	3720	1.46
378227		2.43	<0.005	6.7	2.34	8	320	0.6	<2	4.57	<0.5	7	27	2400	1.23
378228		3.44	0.006	0.8	1.80	8	310	<0.5	<2	5.08	<0.5	6	18	153	1.07
378229		2.33	0.008	<0.5	1.75	5	220	<0.5	<2	5.02	<0.5	8	17	114	1.30
378230		2.08	0.005	0.6	1.58	22	330	0.8	<2	5.49	<0.5	6	17	273	1.16
378231		2.54	<0.005	0.8	1.25	<5	150	<0.5	<2	2.39	<0.5	2	40	813	<10
378232		1.93	<0.005	<0.5	1.58	5	180	<0.5	<2	3.94	<0.5	7	20	65	1.28
378233		2.45	0.006	<0.5	1.89	<5	220	<0.5	<2	4.59	<0.5	6	22	61	1.29
378234		2.44	<0.005	<0.5	1.76	5	210	<0.5	<2	4.90	<0.5	6	20	56	1.26
378235		4.67	<0.005	0.9	1.81	<5	230	<0.5	<2	3.57	<0.5	4	30	3060	1.32
378236		2.99	<0.005	<0.5	2.08	5	230	0.5	2	2.86	<0.5	7	32	25	1.58
378237		3.80	<0.005	<0.5	1.97	<5	210	<0.5	<2	4.19	<0.5	8	22	430	1.69
378238		3.21	<0.005	<0.5	1.92	<5	250	<0.5	<2	4.08	<0.5	7	24	86	1.71
378239		3.34	<0.005	0.6	2.45	<5	480	0.6	<2	4.48	<0.5	9	31	110	1.78
378240		4.04	<0.005	1.2	3.71	<5	840	0.9	<2	4.70	<0.5	10	39	268	1.90



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %
		0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01
378201		0.33	10	0.58	557	1	0.05	14	190	3	<0.01	<5	3	109	<20	0.06
378202		0.38	10	0.55	595	6	0.05	11	210	3	<0.01	<5	3	68	<20	0.08
378203		0.74	20	0.40	608	7	0.07	10	290	2	<0.01	<5	5	30	<20	0.12
378204		1.06	20	0.15	524	19	0.07	11	340	2	0.01	<5	5	55	<20	0.13
378205		0.83	20	0.07	629	10	0.08	8	250	<2	0.02	5	4	34	<20	0.10
378206		0.77	20	0.06	484	12	0.10	12	230	4	0.02	<5	4	183	<20	0.10
378207		1.06	20	0.59	559	4	0.07	12	360	2	0.05	<5	6	33	<20	0.19
378208		0.67	20	0.60	477	<1	0.05	12	300	2	<0.01	<5	5	23	<20	0.13
378209		0.95	20	0.69	580	1	0.07	14	380	3	<0.01	<5	6	29	<20	0.17
378210		0.87	20	0.91	582	<1	0.06	16	380	<2	<0.01	<5	6	30	<20	0.16
378211		0.53	20	0.88	680	1	0.05	15	280	2	<0.01	<5	4	32	<20	0.12
378212		3.07	30	0.85	464	<1	0.18	22	710	2	<0.01	<5	14	40	<20	0.34
378213		1.81	30	0.61	500	27	0.12	13	510	<2	0.12	<5	9	33	<20	0.23
378214		0.75	20	0.45	632	2	0.06	10	300	3	<0.01	<5	5	34	<20	0.12
378215		0.65	20	0.45	623	2	0.05	10	290	2	<0.01	<5	4	30	<20	0.10
378216		0.67	20	0.48	674	4	0.06	15	290	<2	<0.01	<5	4	43	<20	0.12
378217		0.71	20	0.48	624	4	0.06	13	290	2	<0.01	<5	4	42	<20	0.12
378218		0.68	20	0.59	623	3	0.06	15	290	3	<0.01	<5	4	38	<20	0.10
378219		0.77	20	0.51	567	7	0.09	16	320	2	0.03	<5	5	40	<20	0.11
378220		0.92	20	0.08	630	21	0.08	14	240	3	0.01	6	5	87	<20	0.12
378221		0.80	20	0.37	660	3	0.07	11	290	2	0.13	<5	5	168	<20	0.11
378222		0.57	20	0.53	659	3	0.06	14	290	2	0.02	<5	4	372	<20	0.08
378223		0.83	20	0.51	511	<1	0.06	11	330	2	<0.01	<5	5	95	<20	0.13
378224		0.62	20	0.47	520	<1	0.05	11	300	3	<0.01	<5	4	43	<20	0.11
378225		0.55	20	0.46	568	<1	0.05	10	370	2	<0.01	<5	4	47	<20	0.09
378226		0.48	20	0.65	655	<1	0.04	13	300	<2	<0.01	<5	4	50	<20	0.09
378227		0.75	20	0.50	701	2	0.06	13	290	2	<0.01	<5	5	49	<20	0.12
378228		0.54	20	0.50	538	1	0.05	12	260	2	<0.01	<5	4	92	<20	0.07
378229		0.44	10	0.62	442	<1	0.04	14	250	2	<0.01	<5	3	71	<20	0.07
378230		0.57	10	0.16	520	8	0.07	8	230	<2	0.02	<5	3	139	<20	0.06
378231		0.48	20	0.18	394	<1	0.03	5	380	4	<0.01	<5	3	31	<20	0.14
378232		0.45	10	0.45	457	<1	0.04	12	300	<2	<0.01	<5	3	42	<20	0.07
378233		0.60	20	0.43	501	1	0.04	11	310	2	<0.01	<5	4	40	<20	0.08
378234		0.54	10	0.43	543	<1	0.04	11	300	<2	<0.01	<5	4	37	<20	0.08
378235		0.62	20	0.33	506	1	0.04	9	360	2	<0.01	<5	4	25	<20	0.10
378236		0.58	10	0.56	543	<1	0.04	11	380	2	0.05	<5	4	24	<20	0.11
378237		0.55	10	0.51	644	<1	0.04	13	340	5	0.01	<5	4	33	<20	0.08
378238		0.50	10	0.60	695	<1	0.04	12	530	4	0.01	<5	4	35	<20	0.09
378239		0.80	10	0.59	542	<1	0.04	15	350	3	0.01	<5	5	43	<20	0.13
378240		1.40	20	0.65	596	<1	0.05	14	430	4	0.02	<5	7	73	<20	0.19



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CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	Cu-OG62
	Analyte	Tl	U	V	W	Zn	Cu
	Units	ppm	ppm	ppm	ppm	ppm	%
	LOR	10	10	1	10	2	0.001
378201		<10	<10	37	<10	26	
378202		<10	<10	37	<10	24	
378203		<10	<10	50	<10	18	
378204		<10	<10	51	<10	15	
378205		<10	<10	39	<10	15	
378206		<10	<10	94	<10	8	
378207		<10	<10	65	<10	25	
378208		<10	<10	50	<10	27	
378209		<10	<10	61	<10	30	
378210		<10	<10	67	<10	39	
378211		<10	<10	47	<10	37	
378212		<10	<10	121	<10	32	
378213		<10	<10	82	<10	23	
378214		<10	<10	48	<10	17	
378215		<10	<10	43	<10	18	
378216		<10	<10	48	<10	24	
378217		<10	<10	68	<10	21	
378218		<10	<10	51	<10	28	
378219		<10	<10	55	<10	24	2.29
378220		<10	<10	99	<10	27	
378221		<10	<10	136	<10	17	
378222		<10	<10	109	<10	22	
378223		<10	<10	77	<10	23	
378224		<10	<10	42	<10	20	
378225		<10	<10	35	<10	21	
378226		<10	<10	41	<10	30	
378227		<10	<10	59	<10	22	
378228		<10	<10	33	<10	22	
378229		<10	<10	32	<10	28	
378230		<10	<10	55	<10	7	
378231		<10	<10	56	<10	13	
378232		<10	<10	33	<10	26	
378233		<10	<10	40	<10	26	
378234		<10	<10	33	<10	26	
378235		<10	<10	43	<10	20	
378236		<10	<10	43	<10	35	
378237		<10	<10	36	<10	34	
378238		<10	<10	38	<10	42	
378239		<10	<10	48	<10	82	
378240		<10	<10	70	<10	86	



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## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61											
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
		kg	ppm	ppm	%	ppm	%	ppm							
378241		3.72	0.012	5.8	2.71	7	630	0.6	<2	3.47	<0.5	7	29	2050	1.54
378242		3.75	<0.005	0.6	2.51	<5	460	0.5	<2	3.96	<0.5	12	30	120	1.82
378243		4.69	<0.005	<0.5	3.21	5	700	0.8	<2	3.46	<0.5	9	36	161	1.68
378244		3.27	<0.005	0.5	3.61	31	740	0.9	<2	4.35	<0.5	8	35	1175	1.59
378245		3.30	<0.005	3.2	2.53	13	870	0.6	<2	2.29	<0.5	9	30	3820	1.50
378246		3.97	<0.005	1.4	4.34	5	1180	1.1	<2	2.92	<0.5	10	41	172	1.81
378247		4.87	<0.005	<0.5	3.25	<5	700	0.8	<2	3.09	<0.5	10	33	76	1.68
378248		3.78	<0.005	0.5	3.16	<5	650	0.8	<2	2.46	<0.5	8	35	133	1.52
378249		3.16	<0.005	0.7	2.46	8	570	0.6	<2	4.92	<0.5	7	26	451	1.09
378250		2.69	<0.005	1.3	2.91	<5	580	0.7	<2	2.61	<0.5	9	30	151	1.49
378251		3.14	0.008	4.7	2.64	9	520	0.6	<2	3.39	<0.5	11	34	3300	1.55
378252		2.65	0.005	2.3	2.55	12	710	0.6	<2	3.16	<0.5	10	27	3540	1.46
378253		3.67	0.006	2.7	2.28	6	650	0.5	<2	4.87	<0.5	9	24	2880	1.38
378254		2.33	<0.005	0.5	2.10	<5	580	0.5	<2	3.05	<0.5	8	32	105	1.68
378255		3.24	<0.005	<0.5	1.65	<5	280	<0.5	<2	2.84	<0.5	5	22	16	1.23
378256		2.90	<0.005	<0.5	3.04	<5	790	0.7	<2	5.83	<0.5	10	28	165	1.70
378257		3.58	<0.005	0.6	4.65	<5	1080	1.2	<2	3.57	<0.5	12	47	242	1.88
378258		5.30	0.008	5.6	2.67	<5	700	0.7	<2	3.14	<0.5	7	29	2850	1.16
378259		2.79	<0.005	2.3	3.08	<5	710	0.8	<2	4.43	<0.5	9	33	376	1.38
378260		4.13	<0.005	0.6	2.14	<5	620	0.5	<2	4.18	<0.5	9	23	143	1.56
378261		2.20	0.062	0.7	0.39	423	130	<0.5	<2	3.42	<0.5	4	20	57	2.90
378262		4.57	<0.005	<0.5	2.19	<5	580	0.6	<2	4.55	<0.5	6	29	37	1.56
378263		3.64	0.047	2.3	0.67	485	200	<0.5	<2	2.42	<0.5	2	38	31	4.07
378264		3.14	<0.005	<0.5	2.55	5	330	0.5	<2	4.53	<0.5	10	25	26	1.82
378265		4.31	<0.005	1.5	2.22	5	230	0.5	<2	4.77	<0.5	10	27	1525	1.67
378266		3.07	0.011	<0.5	1.22	182	210	<0.5	<2	2.80	<0.5	9	20	33	2.69
378267		3.19	<0.005	<0.5	2.14	6	250	0.5	<2	5.47	<0.5	8	23	105	1.84
378268		2.52	0.007	6.9	2.26	10	270	0.5	<2	3.89	<0.5	10	27	7050	1.61
378269		2.71	<0.005	1.2	2.12	<5	280	0.5	<2	6.13	<0.5	11	24	562	1.43
378270		2.82	<0.005	4.2	2.05	<5	190	<0.5	<2	3.13	<0.5	6	29	2510	1.51
378271		3.24	<0.005	<0.5	2.11	<5	460	0.5	<2	2.43	<0.5	7	32	78	1.41
378272		4.11	<0.005	12.2	2.29	<5	260	0.5	<2	3.63	<0.5	5	29	6260	1.30
378273		4.08	<0.005	10.7	2.50	<5	270	0.6	<2	2.93	<0.5	7	35	5900	1.42
378274		5.60	<0.005	11.4	2.35	<5	260	0.6	4	2.67	<0.5	7	32	6400	1.41
378275		3.91	<0.005	<0.5	4.34	6	490	1.3	<2	3.39	<0.5	10	43	3370	1.98
378276		2.30	<0.005	2.5	2.84	<5	300	0.8	3	3.07	<0.5	7	32	1795	1.49
378277		2.77	<0.005	0.5	2.29	<5	210	0.6	<2	3.85	<0.5	10	26	111	1.70
378278		3.40	<0.005	6.3	1.69	<5	150	0.5	5	3.97	<0.5	8	23	3350	1.29
378279		3.73	<0.005	4.2	2.12	<5	230	0.5	2	3.27	<0.5	7	28	1960	1.46
378280		2.39	<0.005	<0.5	1.95	<5	170	<0.5	2	3.61	<0.5	7	24	39	1.45



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	%	ppm	%	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	%	
	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01	
378241		0.98	10	0.55	470	1	0.04	11	320	4	0.02	<5	5	238	<20	0.12
378242		0.79	10	0.70	594	<1	0.04	15	330	<2	0.04	<5	5	786	<20	0.12
378243		1.22	20	0.58	535	1	0.06	14	390	2	0.02	<5	6	66	<20	0.18
378244		1.43	20	0.56	605	4	0.06	13	430	4	0.04	<5	7	95	<20	0.17
378245		0.90	10	0.55	396	4	0.04	11	310	2	0.04	<5	5	129	<20	0.13
378246		1.74	20	0.67	412	6	0.06	18	440	2	0.01	<5	8	40	<20	0.21
378247		1.18	20	0.67	462	5	0.05	14	350	3	0.01	<5	6	35	<20	0.16
378248		1.22	20	0.56	351	5	0.05	13	330	2	0.04	<5	6	44	<20	0.15
378249		0.98	10	0.41	718	4	0.06	10	300	3	0.02	<5	5	52	<20	0.12
378250		1.11	10	0.57	321	5	0.05	15	380	<2	0.04	<5	5	81	<20	0.16
378251		0.91	10	0.65	551	2	0.06	18	330	3	0.03	<5	5	35	<20	0.12
378252		0.90	10	0.59	369	2	0.04	13	290	3	0.02	<5	4	58	<20	0.11
378253		0.81	10	0.54	510	<1	0.04	13	310	4	0.01	<5	4	67	<20	0.10
378254		0.77	10	0.45	526	<1	0.03	12	380	2	0.01	<5	4	28	<20	0.13
378255		0.55	10	0.39	676	1	0.03	9	350	5	0.02	<5	3	29	<20	0.08
378256		1.10	10	0.66	770	3	0.05	16	400	2	0.01	<5	5	69	<20	0.15
378257		1.87	20	0.83	582	6	0.07	17	520	2	0.01	<5	9	78	<20	0.25
378258		1.02	10	0.49	558	<1	0.04	10	300	3	0.01	<5	5	36	<20	0.13
378259		1.23	20	0.50	679	<1	0.05	15	360	4	0.01	<5	6	44	<20	0.16
378260		0.67	10	0.61	565	1	0.03	11	380	4	0.01	<5	4	42	<20	0.09
378261		0.17	10	0.03	379	8	0.03	4	140	16	0.03	5	1	56	<20	0.03
378262		0.80	10	0.39	724	<1	0.03	11	420	3	0.02	<5	4	43	<20	0.14
378263		0.30	20	0.06	130	6	0.03	3	290	21	0.05	6	1	82	<20	0.07
378264		0.65	10	0.83	755	1	0.05	17	380	3	0.03	<5	5	171	<20	0.10
378265		0.50	10	0.88	787	<1	0.05	15	380	<2	0.01	<5	4	39	<20	0.10
378266		0.53	10	0.06	771	2	0.04	13	250	2	0.02	<5	3	46	<20	0.04
378267		0.49	10	0.72	751	1	0.04	14	390	<2	0.01	<5	4	45	<20	0.09
378268		0.61	10	0.59	524	1	0.05	15	330	3	0.01	<5	4	38	<20	0.10
378269		0.51	10	0.74	837	<1	0.06	19	320	2	0.01	<5	4	55	<20	0.10
378270		0.57	10	0.59	633	1	0.04	10	340	2	0.01	<5	4	25	<20	0.10
378271		0.77	10	0.39	596	<1	0.03	9	320	3	0.02	<5	4	26	<20	0.12
378272		0.71	10	0.53	644	21	0.05	10	310	2	0.11	<5	4	24	<20	0.11
378273		0.82	20	0.60	609	7	0.06	14	330	7	0.02	<5	5	21	<20	0.15
378274		0.76	20	0.56	676	8	0.06	13	340	5	0.02	<5	5	19	<20	0.13
378275		1.56	30	0.77	844	3	0.10	18	430	5	0.01	<5	8	26	<20	0.22
378276		0.96	20	0.60	536	1	0.06	12	390	<2	0.01	<5	5	20	<20	0.16
378277		0.60	20	0.78	695	1	0.05	15	340	3	0.01	<5	4	29	<20	0.11
378278		0.46	20	0.54	750	2	0.04	12	230	3	0.01	<5	3	29	<20	0.08
378279		0.62	20	0.62	588	2	0.05	11	290	4	0.01	<5	4	28	<20	0.11
378280		0.55	20	0.62	625	<1	0.04	11	270	3	0.01	<5	4	30	<20	0.09



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## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	ME-ICP61 TI ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
378241		<10	<10	67	<10	75	
378242		<10	<10	54	<10	98	
378243		<10	<10	72	<10	75	
378244		<10	<10	220	<10	69	
378245		<10	<10	138	<10	74	
378246		<10	<10	87	<10	82	
378247		<10	<10	65	<10	87	
378248		<10	<10	70	<10	69	
378249		<10	<10	86	<10	49	
378250		<10	<10	72	<10	73	
378251		<10	<10	127	<10	83	
378252		<10	<10	129	<10	78	
378253		<10	<10	53	<10	71	
378254		<10	<10	51	<10	64	
378255		<10	<10	36	<10	23	
378256		<10	<10	55	<10	87	
378257		<10	<10	89	<10	101	
378258		<10	<10	64	<10	62	
378259		<10	<10	60	<10	65	
378260		<10	<10	39	<10	86	
378261		<10	<10	130	<10	3	
378262		<10	<10	46	<10	36	
378263		<10	<10	53	<10	2	
378264		<10	<10	53	<10	35	
378265		<10	<10	44	<10	33	
378266		<10	<10	128	<10	3	
378267		<10	<10	40	<10	31	
378268		<10	<10	60	<10	29	
378269		<10	<10	39	<10	31	
378270		<10	<10	41	<10	23	
378271		<10	<10	47	<10	51	
378272		<10	<10	46	<10	20	
378273		<10	<10	55	<10	23	
378274		<10	<10	52	<10	21	
378275		<10	<10	80	<10	29	
378276		<10	<10	54	<10	22	
378277		<10	<10	42	<10	31	
378278		<10	<10	48	<10	23	
378279		<10	<10	49	<10	26	
378280		<10	<10	35	<10	23	



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61												
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga
		kg	ppm	ppm	%	ppm	%	ppm								
		0.02	0.005	0.5	0.01	5	10	0.5	2	0.01	0.5	1	1	0.01	10	
378281		3.62	<0.005	0.8	2.03	<5	190	0.5	<2	3.54	<0.5	7	33	292	1.53	<10
378282		3.61	<0.005	<0.5	1.85	<5	180	<0.5	4	2.77	<0.5	6	25	662	1.47	<10
378283		2.45	<0.005	0.7	2.08	<5	170	<0.5	4	3.14	<0.5	8	32	1950	1.74	<10
378284		2.89	<0.005	<0.5	1.65	<5	150	<0.5	2	3.43	<0.5	7	23	1220	1.33	<10
378285		2.19	<0.005	<0.5	1.94	<5	180	<0.5	<2	2.71	<0.5	6	28	974	1.40	<10
378286		2.90	<0.005	<0.5	2.29	<5	200	0.6	3	3.04	<0.5	7	32	1660	1.78	<10
378287		4.13	<0.005	<0.5	0.16	<5	20	<0.5	4	1.13	<0.5	2	19	8	0.36	<10
378288		6.65	<0.005	<0.5	0.09	<5	10	<0.5	<2	0.29	<0.5	2	34	4	0.55	<10
378289		3.29	<0.005	11.1	2.25	13	460	0.6	<2	3.39	<0.5	6	29	>10000	1.36	<10
378290		3.96	0.027	4.5	2.43	<5	400	0.6	<2	3.71	<0.5	8	30	3930	0.86	10
378291		4.13	0.006	0.9	2.35	<5	380	0.5	2	2.11	<0.5	9	32	657	0.98	<10
378292		1.98	0.014	<0.5	2.29	<5	450	0.7	<2	8.74	<0.5	4	26	165	0.92	10



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## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	%	ppm	%	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	%	
	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01	
378281		0.57	20	0.62	633	1	0.04	11	370	<2	0.01	<5	4	23	<20	0.12
378282		0.56	20	0.49	607	19	0.04	11	310	4	0.04	<5	4	19	<20	0.09
378283		0.58	20	0.61	474	1	0.04	11	340	4	0.01	<5	4	16	<20	0.12
378284		0.49	20	0.44	474	<1	0.04	7	310	3	0.01	<5	3	17	<20	0.08
378285		0.62	30	0.45	576	1	0.05	10	330	3	0.03	<5	4	17	<20	0.10
378286		0.69	20	0.61	611	1	0.05	14	390	2	0.01	<5	4	20	<20	0.13
378287		0.07	10	0.09	57	<1	0.03	1	30	4	<0.01	<5	<1	34	<20	0.02
378288		0.04	10	0.01	100	1	0.02	3	30	4	<0.01	<5	<1	2	<20	0.01
378289		0.90	20	0.41	674	4	0.04	13	280	6	0.02	<5	5	79	<20	0.11
378290		0.75	20	0.63	542	<1	0.10	11	340	5	<0.01	<5	5	28	<20	0.12
378291		0.66	20	0.78	466	<1	0.08	12	340	5	<0.01	<5	4	19	<20	0.15
378292		0.80	20	0.41	401	2	0.13	8	320	5	0.02	<5	4	69	<20	0.14



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## CERTIFICATE OF ANALYSIS CH11084807

Sample Description	Method Analyte Units LOR	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	Cu-OG62
		Tl	U	V	W	Zn	Cu
		ppm	ppm	ppm	ppm	ppm	%
378281		<10	<10	45	<10	25	
378282		<10	<10	39	<10	25	
378283		<10	<10	47	<10	27	
378284		<10	<10	37	<10	20	
378285		<10	<10	47	<10	19	
378286		<10	<10	51	<10	25	
378287		<10	<10	6	<10	<2	
378288		<10	<10	6	<10	<2	
378289		<10	10	214	<10	51	1.200
378290		<10	<10	56	<10	16	
378291		<10	<10	53	<10	21	
378292		<10	<10	47	<10	10	



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PERIFERICO ORTIZ MENA #2807 LOCAL 24  
QUINTAS DEL SOL  
CHIHUAHUA CHIHUAHUA 31214

Page: 1  
Finalized Date: 10-FEB-2011  
Account: SAMACO

## CERTIFICATE CH11014643

Project: Samalayuca  
P.O. No.:  
This report is for 121 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 28-JAN-2011.

The following have access to data associated with this certificate:

ANDRE ST-MICHEL

SAMPLE PREPARATION	
ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES		
ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP61	33 element four acid ICP-AES	ICP-AES
ME-OG62	Ore Grade Elements - Four Acid	ICP-AES
Cu-OG62	Ore Grade Cu - Four Acid	VARIABLE
Au-AA23	Au 30g FA-AA finish	AAS

To: SAMALAYUCA COBRE, S.A. DE C.V.  
ATTN: ANDRE ST-MICHEL  
PERIFERICO ORTIZ MENA #2807 LOCAL 24  
QUINTAS DEL SOL  
CHIHUAHUA CHIHUAHUA 31214

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

  
Colin Ramshaw, Vancouver Laboratory Manager



ALS Chemex de México S.A. de C.V

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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61											
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
		kg	ppm	ppm	%	ppm	%	ppm							
378060		1.78	<0.005	<0.5	2.30	8	350	0.6	<2	4.37	<0.5	7	44	12	1.85
378061		2.52	<0.005	0.8	1.81	<5	220	<0.5	<2	3.63	<0.5	7	33	1460	1.63
378062		2.11	<0.005	<0.5	2.22	<5	250	0.5	<2	4.57	<0.5	7	29	10	1.55
378063		1.80	<0.005	<0.5	2.08	<5	270	0.5	<2	4.98	<0.5	7	32	5	1.72
378064		2.12	<0.005	<0.5	1.89	<5	260	<0.5	<2	3.92	<0.5	7	33	13	1.58
378065		1.68	<0.005	<0.5	1.94	<5	320	0.5	<2	4.07	<0.5	6	32	4	1.79
378066		1.83	<0.005	<0.5	1.94	<5	320	0.5	<2	3.32	<0.5	7	29	10	1.25
378067		1.68	<0.005	<0.5	1.88	<5	300	0.5	<2	3.69	<0.5	7	26	5	1.36
378068		1.58	<0.005	<0.5	1.90	<5	270	0.5	<2	4.13	<0.5	6	29	6	1.62
378069		2.01	<0.005	<0.5	1.99	<5	260	0.5	<2	3.66	<0.5	6	30	9	1.51
378070		1.75	<0.005	<0.5	2.05	<5	250	0.5	<2	3.96	<0.5	6	32	5	1.70
378071		2.03	<0.005	<0.5	1.86	9	260	0.5	<2	3.58	<0.5	6	32	4	1.53
378072		2.26	<0.005	<0.5	1.82	<5	260	<0.5	<2	3.48	<0.5	6	30	10	1.22
378073		2.49	<0.005	4.4	1.89	<5	220	0.5	<2	2.82	<0.5	8	33	2800	1.48
378074		1.87	<0.005	<0.5	1.87	7	230	<0.5	<2	4.54	<0.5	9	27	1410	1.45
378075		2.39	<0.005	<0.5	1.90	<5	270	0.5	<2	4.34	<0.5	7	27	30	1.37
378076		1.63	<0.005	<0.5	2.21	7	280	0.5	<2	5.11	<0.5	9	30	27	1.77
378077		2.70	<0.005	<0.5	2.00	<5	280	0.5	<2	4.34	<0.5	8	28	522	1.63
378078		2.17	<0.005	<0.5	2.13	<5	300	0.5	<2	4.30	<0.5	9	25	8	1.68
378079		2.79	<0.005	<0.5	2.69	<5	360	0.6	<2	4.05	<0.5	9	39	683	2.04
378080		1.86	<0.005	<0.5	2.15	<5	500	0.6	<2	3.26	<0.5	6	27	54	1.25
378081		2.99	0.011	10.5	2.03	5	340	0.5	<2	3.45	<0.5	7	30	2630	1.56
378082		2.33	<0.005	<0.5	3.71	<5	720	1.0	<2	3.87	<0.5	9	42	18	2.02
378083		2.05	<0.005	<0.5	1.98	<5	520	0.5	<2	3.45	<0.5	7	25	737	1.30
378084		2.30	<0.005	2.6	1.88	<5	360	0.5	<2	2.94	<0.5	8	32	2670	1.44
378085		2.37	<0.005	<0.5	2.18	<5	470	0.6	<2	3.60	<0.5	6	33	32	1.31
378086		3.80	<0.005	11.0	1.88	5	390	0.5	<2	4.54	<0.5	7	26	4310	1.31
378087		2.00	<0.005	<0.5	2.50	7	510	0.6	<2	3.63	<0.5	7	32	29	2.10
378088		1.76	<0.005	12.3	1.94	<5	820	0.6	<2	2.29	<0.5	8	31	3620	1.63
378089		3.14	0.238	<0.5	0.26	1290	410	<0.5	<2	0.21	<0.5	1	25	128	14.35
378090		2.07	<0.005	<0.5	2.31	<5	1060	0.6	<2	4.74	<0.5	8	28	21	1.51
378091		2.34	<0.005	4.1	2.09	<5	480	0.6	<2	3.04	<0.5	9	30	1140	1.50
378092		1.91	<0.005	1.1	2.03	<5	1580	0.6	<2	4.33	<0.5	6	26	477	1.40
378093		3.18	<0.005	<0.5	2.32	<5	1080	0.6	<2	3.93	<0.5	8	32	78	1.59
378094		2.48	<0.005	6.1	1.83	<5	2720	0.5	<2	3.26	<0.5	7	31	2140	1.27
378095		2.06	0.008	8.1	2.55	<5	560	0.6	<2	3.96	<0.5	12	32	5040	1.57
378096		2.19	0.037	11.1	2.48	5	740	0.6	12	3.47	<0.5	9	36	>10000	1.36
378097		1.66	<0.005	0.6	2.13	<5	530	0.6	<2	3.17	<0.5	7	32	99	1.88
378098		3.22	<0.005	<0.5	2.44	<5	460	0.6	<2	5.04	<0.5	8	28	146	1.40
378099		2.79	0.007	19.3	2.90	<5	780	0.8	2	3.32	<0.5	11	32	7370	1.48



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## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	%	ppm	%	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01	
378060		0.75	20	0.59	705	1	0.08	17	460	2	0.02	<5	5	39	<20	0.13
378061		0.57	20	0.47	676	5	0.08	12	430	5	0.02	<5	4	28	<20	0.10
378062		0.70	20	0.64	660	<1	0.05	15	380	2	0.02	<5	4	38	<20	0.10
378063		0.70	20	0.53	839	<1	0.05	16	360	2	0.01	<5	4	37	<20	0.11
378064		0.53	10	0.60	714	<1	0.04	15	350	2	0.01	<5	4	34	<20	0.10
378065		0.67	10	0.46	604	<1	0.04	12	350	2	0.01	<5	4	33	<20	0.12
378066		0.65	20	0.48	697	<1	0.05	9	430	3	0.02	<5	4	28	<20	0.11
378067		0.60	10	0.52	699	<1	0.04	13	330	<2	0.01	<5	4	24	<20	0.09
378068		0.61	10	0.41	742	<1	0.05	14	430	3	0.02	<5	4	30	<20	0.10
378069		0.61	10	0.54	617	<1	0.05	12	330	2	0.01	<5	4	25	<20	0.10
378070		0.64	20	0.48	609	<1	0.05	13	360	3	0.01	<5	4	32	<20	0.11
378071		0.61	10	0.40	572	6	0.06	12	320	8	0.01	<5	4	28	<20	0.10
378072		0.57	20	0.44	569	<1	0.05	11	350	<2	0.02	<5	4	27	<20	0.09
378073		0.58	20	0.47	485	3	0.05	9	410	2	0.02	<5	4	15	<20	0.10
378074		0.54	10	0.49	731	<1	0.05	12	350	4	0.01	<5	4	34	<20	0.09
378075		0.57	10	0.48	628	<1	0.05	11	350	3	0.02	<5	4	36	<20	0.09
378076		0.59	10	0.66	679	<1	0.05	14	340	3	0.01	<5	4	42	<20	0.11
378077		0.58	10	0.53	732	<1	0.04	13	390	5	0.03	<5	4	29	<20	0.10
378078		0.57	10	0.70	695	<1	0.04	16	380	3	0.01	<5	4	37	<20	0.09
378079		0.80	10	0.75	753	<1	0.05	14	390	4	0.01	<5	5	24	<20	0.14
378080		0.83	10	0.41	614	<1	0.05	10	480	2	0.02	<5	4	29	<20	0.11
378081		0.70	10	0.47	568	2	0.04	10	300	5	0.01	<5	4	19	<20	0.10
378082		1.47	20	0.63	599	<1	0.06	18	490	4	0.01	<5	7	30	<20	0.20
378083		0.74	10	0.35	600	<1	0.04	8	270	2	0.02	<5	4	30	<20	0.09
378084		0.66	10	0.37	549	1	0.03	9	320	3	0.01	<5	4	22	<20	0.09
378085		0.85	10	0.41	632	<1	0.05	8	580	<2	0.02	<5	5	32	<20	0.12
378086		0.69	10	0.39	667	<1	0.04	10	300	3	0.02	<5	4	37	<20	0.09
378087		0.90	10	0.50	531	<1	0.04	14	310	4	0.02	7	5	126	<20	0.13
378088		0.63	10	0.45	506	<1	0.03	10	350	7	0.03	<5	4	31	<20	0.10
378089		0.06	10	0.03	70	11	0.03	<1	200	16	0.34	8	1	4920	20	0.01
378090		0.83	10	0.53	683	<1	0.04	11	400	2	0.02	<5	5	58	<20	0.12
378091		0.73	10	0.48	584	<1	0.03	9	370	5	0.01	<5	4	28	<20	0.11
378092		0.73	10	0.42	690	1	0.05	9	300	5	0.04	<5	4	68	<20	0.09
378093		0.84	10	0.44	705	2	0.04	10	400	3	0.02	<5	5	40	<20	0.13
378094		0.65	10	0.38	588	2	0.04	7	250	2	0.07	<5	4	116	<20	0.09
378095		0.84	10	0.72	585	1	0.05	14	340	4	0.01	<5	5	34	<20	0.11
378096		0.97	20	0.47	533	9	0.06	13	360	5	0.02	6	5	47	<20	0.13
378097		0.87	20	0.35	474	<1	0.08	12	350	6	0.01	<5	4	36	<20	0.12
378098		0.86	10	0.55	577	<1	0.03	16	400	4	<0.01	<5	5	45	<20	0.12
378099		1.09	20	0.61	561	2	0.04	15	350	4	<0.01	<5	5	29	<20	0.14



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	Cu-OG62
		Tl ppm 10	U ppm 10	V ppm 1	W ppm 10	Zn ppm 2	Cu % 0.001
378060		<10	<10	44	<10	21	
378061		<10	<10	37	<10	18	
378062		<10	<10	40	<10	23	
378063		<10	<10	37	<10	19	
378064		<10	<10	35	<10	23	
378065		<10	<10	41	<10	14	
378066		<10	<10	43	<10	17	
378067		<10	<10	37	<10	17	
378068		<10	<10	36	<10	16	
378069		<10	<10	38	<10	19	
378070		<10	<10	39	<10	19	
378071		<10	<10	39	<10	19	
378072		<10	<10	37	<10	16	
378073		<10	<10	40	<10	20	
378074		<10	<10	45	<10	19	
378075		<10	<10	40	<10	18	
378076		<10	<10	45	<10	26	
378077		<10	<10	41	<10	21	
378078		<10	<10	38	<10	25	
378079		<10	<10	52	<10	30	
378080		<10	<10	43	<10	20	
378081		<10	<10	42	<10	28	
378082		<10	<10	69	<10	42	
378083		<10	<10	44	<10	31	
378084		<10	<10	44	<10	38	
378085		<10	<10	46	<10	20	
378086		<10	<10	46	<10	45	
378087		<10	<10	50	<10	54	
378088		<10	<10	48	<10	58	
378089		<10	<10	69	<10	<2	
378090		<10	<10	45	<10	31	
378091		<10	<10	46	<10	35	
378092		<10	<10	40	<10	35	
378093		<10	<10	45	<10	57	
378094		<10	<10	39	<10	51	
378095		<10	<10	58	<10	96	
378096		<10	<10	113	<10	60	1.485
378097		<10	<10	43	<10	40	
378098		<10	<10	45	<10	58	
378099		<10	<10	64	<10	75	



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## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	WEI-21 Recvd Wt.	Au-AA23	ME-ICP61												
		kg	Au ppm	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm
378100		1.60	<0.005	<0.5	2.38	<5	650	0.6	<2	3.29	<0.5	10	27	177	1.75	10
378101		1.20	<0.005	6.7	2.13	<5	710	0.6	<2	3.42	<0.5	8	26	1870	1.59	10
378102		2.22	<0.005	5.9	2.10	<5	520	0.5	<2	3.82	<0.5	7	29	1380	1.21	10
378103		3.29	0.044	7.0	2.42	<5	230	0.6	2	0.15	<0.5	10	29	3900	1.24	10
378104		3.57	<0.005	0.8	3.18	7	350	0.8	<2	1.17	<0.5	9	34	226	1.17	10
378105		3.42	0.007	2.1	3.41	<5	460	0.9	2	1.57	<0.5	10	40	1190	1.32	10
378106		1.61	0.963	<0.5	1.56	3520	160	0.5	<2	7.84	<0.5	20	22	1000	15.05	<10
378107		2.05	<0.005	<0.5	2.25	5	250	0.6	2	4.70	<0.5	8	21	9	1.65	10
378108		2.73	<0.005	3.6	3.15	<5	280	0.7	<2	3.18	<0.5	13	26	1110	1.74	10
378109		2.67	0.019	2.9	2.36	31	200	0.7	3	4.54	<0.5	11	19	1900	1.52	10
378110		2.08	<0.005	2.8	2.89	9	240	0.6	2	1.97	<0.5	11	31	4280	1.70	10
378111		3.27	<0.005	<0.5	2.79	6	280	0.6	<2	3.27	<0.5	8	33	38	1.54	10
378112		1.68	<0.005	<0.5	2.91	18	290	0.8	<2	3.97	<0.5	7	28	32	1.49	<10
378113		3.22	<0.005	<0.5	3.43	14	330	0.8	<2	3.24	<0.5	8	26	16	1.66	10
378114		2.57	<0.005	<0.5	2.85	10	280	0.7	<2	2.75	<0.5	9	35	184	1.51	<10
378115		2.40	<0.005	<0.5	2.77	<5	250	0.6	<2	3.11	<0.5	8	24	34	1.79	<10
378116		3.00	<0.005	<0.5	2.15	<5	260	0.5	<2	4.30	<0.5	7	23	17	1.29	<10
378117		2.39	<0.005	<0.5	2.46	7	320	0.6	<2	2.65	<0.5	7	33	9	1.75	10
378118		2.25	0.014	4.8	3.10	5	310	0.7	<2	3.38	<0.5	10	31	3410	1.49	10
378119		1.82	0.008	1.3	3.13	8	450	0.8	<2	5.02	<0.5	9	31	1535	1.49	10
378120		2.81	<0.005	<0.5	2.26	5	240	0.5	<2	4.30	<0.5	7	26	124	1.23	<10
378121		4.48	<0.005	<0.5	2.20	5	230	0.5	<2	3.76	<0.5	7	24	105	1.16	10
378122		3.25	0.022	1.4	2.81	<5	220	0.7	<2	3.11	<0.5	11	30	2440	1.65	10
378123		2.11	<0.005	<0.5	8.37	<5	960	2.5	<2	1.55	<0.5	10	73	32	2.98	20
378124		2.11	<0.005	0.7	3.47	5	320	0.9	<2	3.89	<0.5	12	34	319	1.81	10
378125		2.51	<0.005	1.2	2.58	<5	280	0.6	<2	3.83	<0.5	9	29	109	1.87	<10
378126		2.48	<0.005	<0.5	2.23	5	230	0.5	<2	4.17	<0.5	9	22	46	1.58	<10
378127		2.82	0.009	5.8	2.87	<5	310	0.6	4	3.86	<0.5	9	34	4430	1.78	10
378128		3.03	<0.005	<0.5	2.31	<5	270	0.5	<2	4.10	<0.5	7	24	269	1.83	10
378129		2.82	<0.005	<0.5	1.90	<5	230	<0.5	<2	3.48	<0.5	6	24	121	1.56	<10
378130		2.82	<0.005	<0.5	2.22	6	250	<0.5	<2	4.44	<0.5	7	27	52	1.90	<10
378131		2.79	<0.005	<0.5	2.24	<5	280	0.5	<2	3.63	<0.5	6	29	20	1.70	<10
378132		3.45	<0.005	<0.5	1.97	<5	250	<0.5	<2	3.96	<0.5	6	25	47	1.28	<10
378133		1.96	<0.005	<0.5	1.72	<5	200	<0.5	<2	5.12	<0.5	6	21	57	1.20	<10
378134		3.61	<0.005	<0.5	1.96	6	400	0.5	<2	3.19	<0.5	8	26	8	1.53	<10
378135		3.57	<0.005	<0.5	1.80	7	360	<0.5	<2	4.11	<0.5	7	24	11	1.18	<10
378136		2.92	<0.005	<0.5	2.15	6	240	0.5	<2	6.41	<0.5	6	24	53	1.52	<10
378137		3.12	<0.005	<0.5	2.26	6	250	0.5	<2	4.55	<0.5	6	25	37	1.54	<10
378138		3.32	<0.005	<0.5	2.56	<5	320	0.6	<2	3.57	<0.5	5	31	238	1.47	<10
378139		3.09	<0.005	<0.5	2.06	10	270	0.6	<2	3.95	<0.5	6	29	396	1.57	<10



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Sample Description	Method Analyte Units LOR	ME-ICP61														
		K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	%	ppm	%	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01	
378100		0.77	10	0.60	760	<1	0.05	14	380	3	0.01	<5	5	33	<20	0.11
378101		0.70	10	0.54	649	<1	0.05	11	360	8	0.03	<5	4	38	<20	0.10
378102		0.77	10	0.41	584	<1	0.02	9	350	5	0.02	<5	4	22	<20	0.11
378103		0.79	10	0.71	530	<1	0.04	15	330	<2	0.01	<5	5	7	<20	0.13
378104		1.12	20	0.62	396	<1	0.07	13	350	2	0.01	<5	6	26	<20	0.17
378105		1.27	20	0.69	464	<1	0.06	17	430	2	0.02	<5	7	33	<20	0.21
378106		0.55	10	0.14	706	8	0.04	76	260	101	0.12	75	5	192	<20	0.05
378107		0.67	10	0.63	677	<1	0.04	17	350	2	0.01	<5	4	33	<20	0.11
378108		0.77	20	1.00	568	4	0.07	16	350	<2	0.01	<5	6	28	<20	0.14
378109		0.62	10	0.51	563	12	0.08	14	310	2	0.01	<5	4	40	<20	0.09
378110		0.74	20	0.90	412	1	0.09	20	410	<2	0.01	<5	5	26	<20	0.13
378111		0.80	20	0.77	649	1	0.07	15	380	4	0.01	<5	5	28	<20	0.16
378112		1.02	20	0.74	569	<1	0.12	16	350	3	0.02	<5	6	46	<20	0.12
378113		1.13	20	0.79	601	1	0.11	24	450	<2	0.01	<5	6	50	<20	0.14
378114		0.96	20	0.66	535	1	0.09	14	370	<2	0.02	<5	6	46	<20	0.15
378115		0.73	20	0.87	584	2	0.07	17	490	<2	0.01	<5	5	25	<20	0.11
378116		0.61	20	0.64	663	1	0.06	13	450	2	0.02	<5	4	30	<20	0.10
378117		0.71	20	0.72	614	1	0.08	13	490	<2	0.02	<5	4	26	<20	0.16
378118		0.87	20	0.94	583	<1	0.08	17	410	2	0.02	<5	6	31	<20	0.16
378119		0.96	20	0.70	730	1	0.11	18	450	4	0.01	<5	6	55	<20	0.16
378120		0.64	20	0.65	685	<1	0.07	12	370	2	0.01	<5	4	36	<20	0.12
378121		0.60	20	0.67	632	<1	0.07	13	340	<2	0.01	<5	4	31	<20	0.10
378122		0.69	20	1.00	674	4	0.07	18	320	<2	0.01	<5	5	25	<20	0.15
378123		3.13	40	1.39	399	2	0.25	31	670	3	0.01	<5	15	57	<20	0.38
378124		0.93	20	1.07	762	4	0.10	19	440	3	0.01	<5	6	33	<20	0.18
378125		0.69	20	0.85	698	6	0.08	17	330	3	0.01	<5	5	33	<20	0.14
378126		0.50	20	0.91	774	1	0.05	15	360	2	0.02	<5	4	29	<20	0.10
378127		0.75	20	0.94	776	<1	0.07	17	430	3	0.04	<5	5	33	<20	0.16
378128		0.65	20	0.65	735	1	0.05	15	360	2	0.01	<5	4	30	<20	0.10
378129		0.53	20	0.52	612	1	0.04	12	620	2	0.06	<5	4	30	<20	0.09
378130		0.57	20	0.68	733	1	0.05	14	460	<2	0.01	<5	4	31	<20	0.10
378131		0.66	20	0.56	642	<1	0.05	13	380	3	0.01	<5	4	27	<20	0.12
378132		0.63	20	0.46	589	<1	0.05	12	510	3	0.01	<5	4	36	<20	0.10
378133		0.56	20	0.49	527	<1	0.07	13	280	2	0.01	<5	3	55	<20	0.09
378134		0.67	20	0.42	774	<1	0.05	14	510	3	0.08	<5	4	40	<20	0.12
378135		0.58	20	0.40	716	<1	0.08	15	390	2	0.05	<5	4	45	<20	0.09
378136		0.68	20	0.43	626	3	0.06	14	340	3	0.02	<5	4	71	<20	0.10
378137		0.71	20	0.50	622	1	0.05	12	380	<2	0.01	<5	5	34	<20	0.12
378138		0.88	20	0.47	684	<1	0.05	12	420	<2	0.01	<5	5	32	<20	0.13
378139		0.66	20	0.43	670	<1	0.05	12	400	<2	0.02	<5	4	36	<20	0.11



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## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	ME-ICP61 TI ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
378100		<10	<10	45	<10	57	
378101		<10	<10	45	<10	50	
378102		<10	<10	44	<10	35	
378103		<10	<10	52	<10	20	
378104		<10	<10	70	<10	16	
378105		<10	<10	75	<10	18	
378106		<10	<10	84	<10	38	
378107		<10	<10	39	<10	18	
378108		<10	<10	69	<10	29	
378109		<10	<10	89	<10	14	
378110		<10	<10	70	<10	32	
378111		<10	<10	54	<10	27	
378112		<10	<10	61	<10	14	
378113		<10	<10	63	<10	18	
378114		<10	<10	62	<10	17	
378115		<10	<10	44	<10	28	
378116		<10	<10	38	<10	22	
378117		<10	<10	52	<10	25	
378118		<10	<10	57	<10	31	
378119		<10	<10	62	<10	26	
378120		<10	<10	42	<10	22	
378121		<10	<10	39	<10	23	
378122		<10	<10	49	<10	32	
378123		<10	<10	122	<10	44	
378124		<10	<10	61	<10	33	
378125		<10	<10	44	<10	27	
378126		<10	<10	35	<10	29	
378127		<10	<10	50	<10	32	
378128		<10	<10	41	<10	32	
378129		<10	<10	39	<10	27	
378130		<10	<10	39	<10	33	
378131		<10	<10	45	<10	28	
378132		<10	<10	40	<10	24	
378133		<10	<10	35	<10	23	
378134		<10	<10	38	<10	15	
378135		<10	<10	31	<10	13	
378136		<10	<10	47	<10	26	
378137		<10	<10	41	<10	27	
378138		<10	<10	52	<10	26	
378139		<10	<10	42	<10	24	



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## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61											
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
		kg	ppm	ppm	%	ppm	%	ppm							
378140		2.40	<0.005	<0.5	2.22	5	300	0.5	<2	4.21	<0.5	7	30	9	1.86
378141		3.02	<0.005	<0.5	2.54	<5	270	0.6	<2	3.63	<0.5	7	32	14	1.65
378142		2.35	0.005	4.9	1.94	<5	230	<0.5	3	2.87	<0.5	6	35	3360	1.23
378143		3.36	<0.005	2.2	2.03	5	260	0.5	<2	1.45	<0.5	5	30	1905	1.32
378144		4.47	<0.005	1.9	3.17	<5	300	0.7	<2	4.01	<0.5	10	37	1700	2.18
378145		2.94	0.018	4.6	2.26	<5	290	0.5	2	2.77	<0.5	6	30	3290	1.37
378146		2.88	<0.005	0.5	2.82	5	320	0.8	<2	3.90	<0.5	9	35	48	2.42
378147		2.73	<0.005	2.4	1.96	<5	230	0.5	2	3.64	<0.5	8	29	1185	1.48
378148		2.70	<0.005	0.7	3.06	6	370	0.7	<2	3.10	<0.5	10	31	27	1.91
378149		3.02	<0.005	0.6	1.94	7	220	0.5	<2	3.31	<0.5	8	28	67	1.57
378150		2.27	<0.005	0.8	2.14	5	260	0.5	<2	2.46	<0.5	7	29	326	1.33
378151		2.71	<0.005	8.8	3.51	9	390	0.8	<2	2.61	<0.5	10	36	2620	1.86
378152		2.06	<0.005	9.4	2.93	10	330	0.8	<2	2.36	<0.5	8	35	4400	1.68
378153		2.52	<0.005	12.5	2.40	11	290	0.6	<2	2.60	<0.5	7	33	5070	1.39
378154		2.45	<0.005	6.2	2.23	21	230	0.6	<2	3.34	<0.5	8	30	2910	1.51
378155		2.13	<0.005	3.2	3.21	6	310	0.8	<2	4.80	<0.5	10	36	1460	2.02
378156		2.45	0.100	0.8	3.62	144	380	1.3	<2	1.28	<0.5	11	41	2840	3.43
378157		2.14	0.051	3.4	6.05	109	530	2.1	<2	5.64	<0.5	13	59	3470	2.94
378158		1.89	0.005	4.6	1.89	<5	330	0.5	<2	4.05	<0.5	7	26	2270	1.23
378159		2.78	<0.005	<0.5	2.05	10	250	0.5	<2	6.90	<0.5	8	24	184	1.50
378160		2.48	<0.005	0.5	2.08	8	290	0.6	<2	4.44	<0.5	7	29	46	1.44
378161		3.57	<0.005	<0.5	2.26	6	290	0.5	<2	4.72	<0.5	10	29	49	1.70
378162		4.12	<0.005	<0.5	2.28	5	290	0.7	<2	3.25	<0.5	7	30	88	1.39
378163		2.07	<0.005	0.6	5.15	13	780	1.6	<2	4.69	<0.5	8	49	35	1.89
378164		1.60	<0.005	3.8	3.44	6	320	0.9	<2	4.06	<0.5	13	33	2280	2.28
378165		2.84	<0.005	0.7	2.10	6	250	0.5	<2	3.38	<0.5	9	24	175	1.58
378166		3.57	<0.005	0.7	4.47	10	560	1.4	<2	0.34	<0.5	11	53	404	1.72
378167		2.63	0.013	12.7	2.40	7	270	0.6	<2	3.77	<0.5	9	33	6330	1.38
378168		4.37	<0.005	4.3	3.69	<5	470	1.0	<2	0.21	<0.5	9	51	533	1.25
378169		2.83	<0.005	5.3	2.79	12	320	0.8	<2	2.95	<0.5	9	37	5930	1.56
378170		2.79	<0.005	1.2	3.87	<5	390	1.0	<2	2.36	<0.5	13	48	190	1.61
378171		3.94	<0.005	1.5	3.80	8	410	1.0	<2	1.43	<0.5	8	52	322	1.19
378172		3.91	<0.005	1.2	3.67	<5	430	1.0	<2	2.01	<0.5	8	48	170	1.30
378173		2.04	<0.005	<0.5	5.52	<5	700	1.7	<2	0.73	<0.5	9	54	150	1.53
378174		1.87	<0.005	<0.5	2.51	<5	280	0.6	2	1.95	<0.5	8	32	5	1.64
378175		1.68	<0.005	3.5	3.35	5	310	0.8	<2	2.89	<0.5	10	38	1360	1.67
378176		2.63	<0.005	1.4	3.17	7	260	0.8	<2	3.25	<0.5	11	37	775	1.79
378177		2.15	<0.005	<0.5	3.38	<5	310	0.9	<2	4.41	<0.5	10	33	251	1.60
378178		1.67	<0.005	<0.5	3.09	5	310	0.9	<2	3.88	<0.5	10	34	26	1.84
378179		2.97	0.024	29.6	4.03	14	410	1.2	4	2.58	<0.5	8	43	>10000	1.54



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## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P Ppm	Pb ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %
		0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01
378140		0.66	20	0.73	963	<1	0.07	18	440	3	0.03	<5	5	41	<20	0.12
378141		0.73	20	0.75	647	<1	0.10	15	460	3	0.01	<5	5	28	<20	0.12
378142		0.56	20	0.54	504	<1	0.06	10	300	<2	0.01	<5	4	25	<20	0.09
378143		0.59	20	0.58	492	2	0.05	10	300	<2	0.04	<5	4	17	<20	0.09
378144		0.82	20	1.05	824	1	0.08	20	470	<2	0.01	<5	6	31	<20	0.15
378145		0.66	20	0.61	585	3	0.05	12	330	2	0.04	<5	4	23	<20	0.11
378146		0.78	20	0.86	755	1	0.07	20	500	7	0.01	<5	5	35	<20	0.15
378147		0.55	20	0.60	655	1	0.06	9	360	4	0.01	<5	4	31	<20	0.10
378148		0.93	20	0.83	511	<1	0.08	13	390	3	<0.01	<5	5	26	<20	0.15
378149		0.53	10	0.55	560	2	0.06	9	340	3	0.02	<5	3	28	<20	0.10
378150		0.63	20	0.56	472	2	0.05	8	320	4	0.01	<5	4	19	<20	0.12
378151		1.04	20	0.86	652	9	0.09	17	500	2	0.01	<5	6	29	<20	0.16
378152		0.90	20	0.71	637	8	0.07	12	410	2	0.01	<5	5	22	<20	0.17
378153		0.73	20	0.56	606	8	0.06	9	320	2	0.03	<5	5	25	<20	0.14
378154		0.59	10	0.69	663	3	0.05	12	290	2	0.01	<5	4	27	<20	0.11
378155		0.89	20	0.96	823	2	0.08	17	400	2	<0.01	<5	6	36	<20	0.16
378156		1.48	20	0.10	643	25	0.12	28	460	3	0.01	6	7	46	<20	0.22
378157		2.87	20	0.21	647	30	0.42	17	570	5	0.09	8	10	114	<20	0.32
378158		0.56	20	0.52	604	3	0.06	8	300	4	0.01	<5	4	51	<20	0.10
378159		0.52	20	0.69	592	2	0.07	9	390	<2	0.01	<5	4	63	<20	0.10
378160		0.67	20	0.53	614	1	0.06	11	320	2	0.01	<5	4	44	<20	0.13
378161		0.58	20	0.83	538	1	0.06	15	300	<2	<0.01	<5	4	60	<20	0.12
378162		0.67	20	0.60	619	3	0.05	11	350	<2	0.01	<5	4	28	<20	0.12
378163		1.94	20	0.80	612	1	0.13	17	560	2	0.01	<5	9	66	<20	0.27
378164		0.90	20	1.12	785	4	0.09	23	380	2	0.01	<5	6	35	<20	0.16
378165		0.53	20	0.69	662	2	0.06	11	340	<2	0.04	<5	4	27	<20	0.09
378166		1.69	30	0.83	766	2	0.11	21	570	<2	0.01	<5	8	23	<20	0.26
378167		0.72	20	0.66	651	42	0.09	9	290	3	0.13	<5	5	24	<20	0.13
378168		1.44	30	0.62	590	2	0.08	14	470	<2	0.01	<5	7	13	<20	0.23
378169		0.98	20	0.58	577	3	0.07	13	360	2	0.05	<5	5	19	<20	0.16
378170		1.30	30	0.92	449	1	0.10	17	530	2	<0.01	<5	7	25	<20	0.24
378171		1.45	30	0.55	414	3	0.13	10	460	2	<0.01	<5	7	18	<20	0.27
378172		1.36	30	0.69	493	7	0.11	13	470	<2	0.01	<5	7	24	<20	0.24
378173		2.30	40	0.78	382	2	0.12	15	550	3	0.01	<5	10	21	<20	0.31
378174		0.87	20	0.52	398	1	0.08	12	430	2	0.02	<5	4	27	<20	0.15
378175		1.09	20	0.74	456	<1	0.10	13	280	3	0.02	<5	6	25	<20	0.19
378176		0.95	20	0.86	562	<1	0.08	16	390	<2	0.01	<5	6	27	<20	0.18
378177		1.08	20	0.83	553	<1	0.10	15	450	2	0.01	<5	6	43	<20	0.17
378178		1.02	20	0.68	604	<1	0.09	16	380	<2	0.01	<5	5	34	<20	0.17
378179		1.52	20	0.59	559	1	0.12	15	370	<2	0.01	<5	8	30	<20	0.22



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Sample Description	Method Analyte Units LOR	ME-ICP61 TI ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
378140		<10	<10	37	<10	24	
378141		<10	<10	44	<10	26	
378142		<10	<10	41	<10	19	
378143		<10	<10	39	<10	20	
378144		<10	<10	54	<10	38	
378145		<10	<10	42	<10	23	
378146		<10	<10	48	10	32	
378147		<10	<10	37	<10	21	
378148		<10	<10	51	<10	30	
378149		<10	<10	34	<10	21	
378150		<10	<10	42	<10	20	
378151		<10	<10	68	<10	31	
378152		<10	<10	62	<10	27	
378153		<10	<10	51	<10	22	
378154		<10	<10	45	<10	26	
378155		<10	<10	54	<10	36	
378156		<10	<10	153	<10	6	
378157		<10	<10	189	<10	5	
378158		<10	<10	39	<10	19	
378159		<10	<10	39	<10	25	
378160		<10	<10	41	<10	20	
378161		<10	<10	41	<10	32	
378162		<10	<10	45	<10	22	
378163		<10	<10	91	<10	26	
378164		<10	<10	60	<10	40	
378165		<10	<10	38	<10	25	
378166		<10	<10	90	<10	25	
378167		<10	<10	45	<10	17	
378168		<10	<10	82	<10	19	
378169		<10	<10	56	<10	16	
378170		<10	<10	74	<10	29	
378171		<10	<10	77	<10	16	
378172		<10	<10	75	<10	21	
378173		<10	<10	108	<10	23	
378174		<10	<10	48	<10	19	
378175		<10	<10	67	<10	26	
378176		<10	<10	55	<10	30	
378177		<10	<10	54	<10	29	
378178		<10	<10	49	<10	26	
378179		<10	<10	82	<10	19	3.64



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CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method Analyte Units LOR	WEI-21 Recvd Wt. kg	Au-AA23 Au ppm	ME-ICP61 Ag ppm	ME-ICP61 Al %	ME-ICP61 As ppm	ME-ICP61 Ba ppm	ME-ICP61 Be ppm	ME-ICP61 Bi ppm	ME-ICP61 Ca %	ME-ICP61 Cd ppm	ME-ICP61 Co ppm	ME-ICP61 Cr ppm	ME-ICP61 Cu ppm	ME-ICP61 Fe %	ME-ICP61 Ga ppm	ME-ICP61 ppm
378180		2.66	0.030	14.6	2.29	6	200	0.6	9	3.59	<0.5	7	26	>10000	1.17	10	



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PERIFERICO ORTIZ MENA #2807 LOCAL 24  
QUINTAS DEL SOL  
CHIHUAHUA CHIHUAHUA 31214

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Finalized Date: 10-FEB-2011

Account: SAMACO

Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11014643

Sample Description	Method	ME-ICP61														
	Analyte	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti
	Units	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
	LOR	0.01	10	0.01	5	1	0.01	1	10	2	0.01	5	1	1	20	0.01
378180		0.72	10	0.57	635	1	0.11	14	280	2	0.04	<5	4	30	<20	0.11



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**CERTIFICATE OF ANALYSIS CH11014643**

Sample Description	Method Analyte Units LOR	ME-ICP61 TI ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
378180		<10	<10	48	<10	15	1.915



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Finalized Date: 27-JAN-2011  
Account: SAMACO

## CERTIFICATE CH11007312

Project: Samalayuca

P.O. No.:

This report is for 60 Rock samples submitted to our lab in Chihuahua, CHIHUAHUA, Mexico on 17-JAN-2011.

The following have access to data associated with this certificate:

ANDRE ST-MICHEL

SAMPLE PREPARATION	
ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES		
ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP61	33 element four acid ICP-AES	ICP-AES
ME-OG62	Ore Grade Elements - Four Acid	ICP-AES
Cu-OG62	Ore Grade Cu - Four Acid	VARIABLE
Au-AA23	Au 30g FA-AA finish	AAS

To: SAMALAYUCA COBRE, S.A. DE C.V.  
ATTN: ANDRE ST-MICHEL  
PERIFERICO ORTIZ MENA #2807 LOCAL 24  
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This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

  
Colin Ramshaw, Vancouver Laboratory Manager



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## CERTIFICATE OF ANALYSIS CH11007312

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61											
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
		kg	ppm	ppm	%	ppm	%	ppm							
378001		1.52	0.009	<0.5	2.18	<5	240	0.5	<2	4.46	<0.5	9	28	44	1.56
378002		1.49	0.007	<0.5	1.94	<5	250	<0.5	<2	4.28	<0.5	7	26	35	1.23
378003		1.11	0.009	<0.5	1.71	<5	250	0.5	<2	4.42	<0.5	5	25	51	1.19
378004		1.07	0.008	<0.5	1.69	<5	230	<0.5	<2	6.23	<0.5	5	25	66	1.14
378005		1.53	0.028	3.5	3.04	<5	360	0.8	2	5.08	<0.5	7	31	2040	1.55
378006		1.51	0.009	<0.5	2.25	<5	310	0.5	<2	3.53	<0.5	8	30	54	1.42
378007		1.63	0.009	<0.5	2.00	5	240	0.5	<2	3.81	<0.5	7	29	55	1.11
378008		1.78	0.005	<0.5	2.84	<5	340	0.7	<2	3.56	<0.5	8	35	19	1.65
378009		1.70	0.006	<0.5	2.33	<5	260	0.5	<2	3.34	<0.5	9	26	81	1.69
378010		2.50	0.013	5.5	2.39	<5	330	0.6	3	2.96	<0.5	6	32	4260	1.18
378011		1.10	0.013	8.4	2.49	<5	330	0.6	6	3.43	<0.5	6	30	5790	1.25
378012		1.15	0.007	<0.5	2.12	<5	260	0.5	<2	3.59	<0.5	8	25	28	1.42
378013		1.36	0.007	<0.5	2.09	<5	210	<0.5	<2	4.36	<0.5	8	24	31	1.42
378014		3.20	0.006	<0.5	2.08	<5	220	0.5	<2	4.14	<0.5	7	26	1115	1.30
378015		1.40	0.008	<0.5	2.33	<5	240	0.5	<2	3.61	<0.5	8	29	1485	1.46
378016		2.15	0.010	<0.5	1.80	9	180	<0.5	<2	3.56	<0.5	9	24	1550	1.47
378017		1.62	0.005	<0.5	2.28	<5	210	0.5	<2	3.53	<0.5	8	29	293	1.68
378018		1.80	0.007	<0.5	1.67	<5	170	<0.5	<2	3.55	<0.5	5	23	108	1.20
378019		1.32	0.007	<0.5	2.53	6	250	0.7	<2	2.99	<0.5	8	37	17	1.88
378020		0.58	0.006	0.9	2.42	<5	230	0.5	3	4.72	<0.5	8	36	6820	2.02
378021		1.59	0.005	<0.5	2.79	<5	270	0.7	<2	3.62	<0.5	8	35	37	1.80
378022		1.49	0.035	19.9	4.23	13	520	1.4	<2	1.90	1.1	5	54	>10000	1.79
378023		2.17	0.006	0.6	5.27	<5	1990	1.4	3	4.19	<0.5	5	50	6590	1.86
378024		0.90	0.008	1.7	1.91	<5	210	0.5	2	3.97	<0.5	6	28	792	1.29
378025		1.54	0.008	<0.5	2.39	<5	270	0.5	<2	4.26	<0.5	8	31	61	1.59
378026		1.37	0.006	<0.5	2.25	<5	230	0.5	<2	3.82	<0.5	8	27	30	1.58
378027		3.36	0.008	2.8	1.87	<5	180	<0.5	<2	3.32	<0.5	6	28	1465	1.37
378028		1.92	0.015	1.4	4.86	<5	560	1.2	2	6.49	<0.5	5	48	1035	1.30
378029		2.57	0.007	<0.5	2.00	<5	170	<0.5	<2	3.31	<0.5	6	29	204	1.65
378030		1.95	0.006	<0.5	2.26	7	240	0.5	<2	5.49	<0.5	11	25	63	1.40
378031		1.95	0.007	<0.5	2.26	6	200	0.5	<2	5.31	<0.5	8	27	24	1.87
378032		2.76	0.008	<0.5	2.02	<5	220	0.5	<2	3.75	<0.5	6	28	2140	1.43
378033		1.88	0.006	<0.5	2.26	<5	300	0.5	<2	1.05	<0.5	9	30	18	1.83
378034		1.68	0.007	<0.5	1.89	<5	280	0.5	<2	4.51	<0.5	8	32	10	1.23
378035		2.03	0.007	<0.5	1.82	<5	240	<0.5	<2	2.12	<0.5	8	34	5	1.35
378036		1.31	0.008	<0.5	2.67	<5	280	0.6	<2	4.34	<0.5	8	35	5	1.96
378037		1.70	0.006	<0.5	2.04	<5	280	0.5	<2	4.05	<0.5	7	24	4	1.37
378038		3.01	0.110	0.7	1.06	112	160	<0.5	<2	5.57	<0.5	8	15	22	2.55
378039		2.53	0.005	<0.5	1.98	<5	220	<0.5	<2	3.73	<0.5	6	26	5	1.49
378040		2.44	0.131	<0.5	1.84	281	210	<0.5	<2	3.37	<0.5	25	31	27	4.65



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Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11007312

Sample Description	Method Analyte Units LOR	ME-ICP61														
		K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P Ppm	Pb ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %
		0.01	10	0.01	5	1	0.01	10	2	0.01	5	1	1	20	0.01	
378001		0.58	10	0.77	635	<1	0.05	16	310	2	0.01	<5	4	41	<20	0.10
378002		0.57	10	0.60	588	<1	0.05	12	310	3	0.01	<5	4	44	<20	0.09
378003		0.57	10	0.40	629	<1	0.04	9	310	2	0.01	<5	4	37	<20	0.09
378004		0.66	10	0.26	622	<1	0.07	10	300	3	0.01	<5	4	55	<20	0.09
378005		0.93	10	0.74	788	6	0.07	14	480	3	0.02	<5	6	34	<20	0.14
378006		0.69	10	0.61	623	<1	0.05	12	420	3	0.04	<5	5	29	<20	0.12
378007		0.63	10	0.50	606	<1	0.04	10	350	3	0.01	<5	4	33	<20	0.11
378008		0.89	10	0.71	636	<1	0.05	14	510	4	0.01	<5	5	29	<20	0.15
378009		0.58	10	0.81	777	<1	0.04	15	420	2	0.03	<5	4	29	<20	0.11
378010		0.81	10	0.46	741	2	0.05	9	390	3	0.03	<5	5	24	<20	0.13
378011		0.80	10	0.55	632	8	0.05	10	390	3	0.07	<5	5	31	<20	0.13
378012		0.63	10	0.63	770	<1	0.04	12	450	3	0.02	<5	4	30	<20	0.11
378013		0.57	10	0.62	676	<1	0.04	11	330	<2	0.01	<5	4	31	<20	0.10
378014		0.65	10	0.47	780	1	0.05	10	330	<2	<0.01	<5	4	31	<20	0.10
378015		0.72	10	0.55	647	<1	0.05	10	340	2	0.04	<5	4	21	<20	0.12
378016		0.54	10	0.43	562	2	0.04	8	290	3	0.01	<5	3	21	<20	0.08
378017		0.58	10	0.69	689	1	0.04	12	310	2	0.03	<5	4	27	<20	0.11
378018		0.48	10	0.43	603	<1	0.03	9	240	<2	0.01	<5	3	27	<20	0.08
378019		0.67	10	0.76	603	<1	0.05	15	420	<2	0.01	<5	5	26	<20	0.15
378020		0.69	10	0.67	758	<1	0.05	19	350	2	0.54	<5	5	31	<20	0.11
378021		0.77	10	0.80	674	1	0.05	15	390	<2	<0.01	<5	5	34	<20	0.16
378022		1.63	50	0.46	339	5	0.09	9	590	16	0.02	<5	9	33	<20	0.25
378023		2.10	20	0.54	643	<1	0.12	13	560	3	0.61	<5	10	214	<20	0.25
378024		0.55	10	0.51	748	<1	0.05	10	290	2	0.01	<5	4	34	<20	0.10
378025		0.72	10	0.72	731	<1	0.04	13	370	2	<0.01	<5	5	30	<20	0.13
378026		0.61	10	0.70	659	<1	0.04	13	370	2	<0.01	<5	4	27	<20	0.10
378027		0.54	10	0.51	642	1	0.05	10	310	<2	0.01	<5	4	27	<20	0.09
378028		1.90	40	0.51	498	<1	0.10	11	630	3	0.01	<5	9	38	<20	0.24
378029		0.52	10	0.56	654	<1	0.04	10	340	2	0.03	<5	4	26	<20	0.10
378030		0.62	10	0.76	580	<1	0.05	17	340	2	0.01	<5	4	56	<20	0.09
378031		0.61	10	0.65	763	<1	0.06	14	370	3	<0.01	<5	5	39	<20	0.10
378032		0.61	10	0.48	834	1	0.05	10	380	2	0.01	<5	4	24	<20	0.10
378033		0.61	10	0.71	662	<1	0.07	14	380	2	0.01	<5	4	16	<20	0.11
378034		0.58	10	0.63	783	<1	0.04	12	500	3	0.01	<5	4	36	<20	0.11
378035		0.53	10	0.61	490	<1	0.03	12	550	2	0.01	<5	3	22	<20	0.10
378036		0.84	10	0.72	696	<1	0.05	15	420	2	0.01	<5	5	29	<20	0.15
378037		0.62	10	0.58	722	<1	0.05	11	350	2	0.02	<5	4	33	<20	0.09
378038		0.46	10	0.09	658	4	0.04	15	300	4	0.03	<5	2	70	<20	0.04
378039		0.63	10	0.48	696	<1	0.05	10	360	3	0.01	<5	4	28	<20	0.09
378040		0.81	20	0.10	822	11	0.04	18	370	6	0.05	<5	3	87	<20	0.07



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## CERTIFICATE OF ANALYSIS CH11007312

Sample Description	Method Analyte Units LOR	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	ME-ICP61	Cu-OG62
		Tl ppm 10	U ppm 10	V ppm 1	W ppm 10	Zn ppm 2	Cu % 0.001
378001		<10	<10	38	<10	29	
378002		<10	<10	36	<10	23	
378003		<10	<10	38	<10	15	
378004		<10	<10	30	<10	11	
378005		<10	<10	48	<10	26	
378006		<10	<10	42	<10	23	
378007		<10	<10	41	<10	20	
378008		<10	<10	51	<10	26	
378009		<10	<10	39	<10	31	
378010		<10	<10	47	<10	19	
378011		<10	<10	46	<10	20	
378012		<10	<10	39	<10	23	
378013		<10	<10	40	<10	24	
378014		<10	<10	46	<10	18	
378015		<10	<10	45	<10	21	
378016		<10	<10	49	<10	17	
378017		<10	<10	45	<10	28	
378018		<10	<10	32	<10	20	
378019		<10	<10	52	<10	33	
378020		<10	<10	39	<10	26	
378021		<10	<10	57	<10	32	
378022		<10	<10	166	<10	18	3.14
378023		<10	<10	90	<10	18	
378024		<10	<10	43	<10	21	
378025		<10	<10	43	<10	26	
378026		<10	<10	42	<10	30	
378027		<10	<10	39	<10	23	
378028		<10	<10	88	<10	18	
378029		<10	<10	40	<10	24	
378030		<10	<10	37	<10	32	
378031		<10	<10	41	<10	27	
378032		<10	<10	41	<10	19	
378033		<10	<10	44	<10	30	
378034		<10	<10	41	<10	23	
378035		<10	<10	34	<10	24	
378036		<10	<10	49	<10	27	
378037		<10	<10	38	<10	22	
378038		<10	<10	57	<10	5	
378039		<10	<10	40	<10	20	
378040		<10	<10	58	<10	2	



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**CERTIFICATE OF ANALYSIS CH11007312**

Sample Description	Method Analyte Units LOR	WEI-21	Au-AA23	ME-ICP61												
		Revd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga
		kg	ppm	ppm	%	ppm	%	ppm								
378041		2.41	0.006	<0.5	2.29	<5	260	0.6	<2	3.68	<0.5	7	33	13	1.72	10
378042		1.86	0.008	1.1	2.09	6	210	0.5	2	3.26	<0.5	7	33	2290	1.32	<10
378043		1.67	0.009	2.5	2.96	5	290	0.6	<2	3.89	<0.5	10	38	1025	1.55	10
378044		1.50	0.007	<0.5	2.27	<5	200	0.5	<2	3.30	<0.5	11	29	21	1.60	10
378045		1.91	0.007	0.5	1.96	<5	280	0.5	<2	6.88	<0.5	8	28	87	1.51	<10
378046		2.28	0.007	1.0	1.91	<5	250	<0.5	<2	4.05	<0.5	8	27	1950	1.63	<10
378047		2.28	0.005	<0.5	2.09	<5	210	0.5	<2	4.43	<0.5	8	26	19	1.81	<10
378048		1.61	0.007	<0.5	1.80	<5	200	<0.5	<2	4.70	<0.5	6	27	17	1.30	<10
378049		2.34	0.024	<0.5	2.02	56	250	0.5	<2	5.06	<0.5	8	25	17	1.69	<10
378050		3.11	0.014	2.8	1.54	7	390	<0.5	<2	4.57	<0.5	6	20	1610	1.13	<10
378051		2.55	0.006	<0.5	1.86	<5	230	<0.5	<2	4.25	<0.5	9	24	169	1.44	<10
378052		2.72	0.007	1.6	2.19	<5	240	0.5	<2	3.27	<0.5	8	30	2550	1.38	10
378053		2.42	0.008	8.8	2.19	<5	270	0.5	5	3.76	<0.5	7	33	7920	1.46	<10
378054		1.67	0.008	3.2	1.77	<5	230	<0.5	<2	3.43	<0.5	7	24	175	1.06	<10
378055		1.91	0.007	<0.5	2.09	<5	290	0.5	<2	5.50	<0.5	8	27	22	1.45	10
378056		2.21	0.006	<0.5	2.12	<5	260	0.5	<2	3.11	<0.5	7	31	16	1.38	<10
378057		2.19	0.006	<0.5	1.88	5	330	<0.5	<2	4.40	<0.5	8	26	8	1.45	<10
378058		1.68	0.006	<0.5	2.21	<5	360	0.5	<2	3.67	<0.5	7	25	21	1.82	10
378059		2.30	0.011	12.7	2.31	9	310	0.5	8	3.03	<0.5	9	28	9870	1.79	<10
808653		4.52	0.006	<0.5	3.52	<5	440	0.9	<2	2.36	<0.5	8	47	14	1.90	10



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 Account: SAMACO

Project: Samalayuca

## CERTIFICATE OF ANALYSIS CH11007312

Sample Description	Method Analyte Units LOR	ME-ICP61 K % 0.01	ME-ICP61 La ppm 10	ME-ICP61 Mg % 0.01	ME-ICP61 Mn ppm 5	ME-ICP61 Mo ppm 1	ME-ICP61 Na % 0.01	ME-ICP61 Ni ppm 1	ME-ICP61 P ppm 10	ME-ICP61 Pb ppm 2	ME-ICP61 S % 0.01	ME-ICP61 Sb ppm 5	ME-ICP61 Sc ppm 1	ME-ICP61 Sr ppm 1	ME-ICP61 Th ppm 20	ME-ICP61 Ti % 0.01
378041		0.70	10	0.57	652	<1	0.06	12	360	<2	0.02	<5	5	30	<20	0.11
378042		0.63	10	0.55	558	<1	0.06	11	280	2	0.01	<5	4	52	<20	0.10
378043		0.97	20	0.77	703	43	0.05	13	430	2	0.01	<5	5	38	<20	0.16
378044		0.66	10	0.67	522	1	0.04	17	480	<2	0.01	<5	4	26	<20	0.11
378045		0.57	10	0.64	515	1	0.06	12	450	2	0.05	<5	4	123	<20	0.10
378046		0.58	10	0.52	639	4	0.05	14	370	3	0.02	<5	4	31	<20	0.09
378047		0.60	10	0.51	703	<1	0.05	16	500	2	0.01	<5	4	31	<20	0.10
378048		0.54	10	0.46	606	<1	0.05	10	280	2	0.01	<5	4	42	<20	0.09
378049		0.81	10	0.22	619	<1	0.05	13	390	4	0.02	<5	4	58	<20	0.10
378050		0.46	10	0.41	571	8	0.05	8	310	<2	0.02	<5	3	69	<20	0.07
378051		0.46	10	0.67	659	<1	0.05	13	450	3	0.01	<5	4	37	<20	0.08
378052		0.68	10	0.50	554	<1	0.05	11	310	<2	0.03	<5	4	277	<20	0.10
378053		0.66	10	0.54	657	2	0.07	12	310	<2	0.02	<5	4	47	<20	0.10
378054		0.54	10	0.46	513	1	0.05	9	230	2	0.01	<5	3	32	<20	0.08
378055		0.61	10	0.58	680	<1	0.05	13	380	<2	0.01	<5	4	44	<20	0.10
378056		0.65	10	0.50	597	<1	0.04	11	560	2	0.01	<5	4	30	<20	0.11
378057		0.54	10	0.59	742	<1	0.04	13	300	3	0.02	<5	4	36	<20	0.10
378058		0.71	10	0.53	591	<1	0.03	13	340	3	<0.01	<5	4	30	<20	0.11
378059		0.71	10	0.60	618	2	0.04	14	350	2	0.03	<5	5	416	<20	0.10
808653		1.28	20	0.63	484	<1	0.05	14	440	3	0.01	<5	6	26	<20	0.21



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## CERTIFICATE OF ANALYSIS CH11007312

Sample Description	Method Analyte Units LOR	ME-ICP61 TI ppm 10	ME-ICP61 U ppm 10	ME-ICP61 V ppm 1	ME-ICP61 W ppm 10	ME-ICP61 Zn ppm 2	Cu-OG62 Cu % 0.001
378041		<10	<10	44	<10	27	
378042		<10	<10	69	<10	23	
378043		<10	<10	60	<10	29	
378044		<10	<10	41	<10	27	
378045		<10	<10	38	<10	26	
378046		<10	<10	40	<10	28	
378047		<10	<10	37	<10	26	
378048		<10	<10	39	<10	21	
378049		<10	<10	70	<10	10	
378050		<10	<10	41	<10	18	
378051		<10	<10	35	<10	29	
378052		<10	<10	57	<10	23	
378053		<10	<10	58	<10	22	
378054		<10	<10	37	<10	20	
378055		<10	<10	39	<10	26	
378056		<10	<10	43	<10	25	
378057		<10	<10	38	<10	26	
378058		<10	<10	39	<10	23	
378059		<10	<10	82	<10	27	
808653		<10	<10	67	<10	44	