TECHNICAL REPORT on the CALLANQUITAS STRUCTURE

Igor Mine Project, Northern Peru, South America

NI 43-101 Technical Report

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1 EXECUTIVE SUMMARY

Introduction

This Technical Report was prepared by SIM Geological Inc. (SGI) for Sienna Gold Inc. (Sienna) to provide an initial, independent mineral resource estimate for the Callanquitas Structure at Sienna's 100%-owned, gold and silver Igor Project, in La Libertad, Peru. The report was written under the direction of Robert Sim, P.Geo, and Bruce Davis, F.AusIMM, both independent "qualified persons" as defined by National Instrument 43-101 *Standards of Disclosure for Mineral Projects* (NI 43-101) and as described in *Section 28*.

Robert Sim visited the site from July 17-18, 2012; he reviewed Sienna's drilling activities, inspected core from numerous drill holes, reviewed sampling procedures, and visited a series of drill sites on the property. Bruce Davis has contributed to the development of the resource model, and reviewed the QA/QC procedures and results. Bruce Davis has not visited the property.

Property Description & Location

The property is located in northern Peru, Province of Otuzco, District of Huaranchal, department of La Libertad. The property is approximately 150 km northeast of the coastal city of Trujillo and 700 km from the capital city of Lima. Sienna owns 100% of the Igor Project, which consists of the Igor and La Busqueda XVIII concessions, through its South American subsidiary Sienna Minerals SAC. The Callanquitas Structure is located within the Igor Concession. There are no outstanding royalties or other underlying agreements related to these claims. It covers an area of 1,334 ha and lies within the area bounded by 779000E to 784500E and 9150500N to 9155500N (based on the UTM geographic coordinate system, Zone 17 South and Provisional South American Datum, 1956).

Accessibility, Climate, Local Resources, Infrastructure and Physiography

The area can be accessed by road from Lima on the Pan-American Highway or by air into the city of Trujillo. From Trujillo, there are two land access routes: via Otuzco and via Lucma. Elevations in the area range between 2,800-3,800 m, with abrupt topographic transitions, but slopes on the southern parts of the Igor concession and the La Busqueda XVIII concession are less severe. The climate is typical of the Peruvian Andes with a distinct wet and dry season. Temperatures range between 0^{o} C and 25^{o} C. Despite significant rainfall during the wet season (December to April) there typically are no disruptions during the field programs.

There are two small villages located within the concessions: Callanquitas and Igor; both provide a source of manual labour. The town of Huaranchal is also within the property limits; electrical power is available from this town, and electricity is currently being installed in Callanquitas. Trujillo and Lima supply all other fuel, food, materials, and skilled labour to the project.

Peruvian law does not vest surface rights to companies with existing mineral rights; therefore, Sienna has purchased eight surface claims over the areas of known mineralization on the Igor concession (six of these surface claims cover an area of 233.9 ha in and around Callanquitas), and negotiated access agreements with the local communities of Igor and Callanquitas. Sienna has maintained good relations with the local communities as work advances on the project.

History

Mining in this area dates back to as early as the 1500s, evidenced by shallow underground work dating from this period.

In the 1980s, mineralized mantos on the eastern side of Cerro Bola de Igor were exploited for gold and silver and a 50 tpd plant, now abandoned, is located close to the village of Igor.

Samuel Guia originally purchased the property and, in 1998, he optioned the property to Rio Amarillo Gold Ltd. who later dropped its option over concession ownership. In 2001, Mr. Guia signed a purchase option agreement with Matrix Gold Mining Investment S.A. giving them until June 2006 to pay US$1 million. In June 2005, Sienna, through its subsidiary company, Sienna Minerals SAC, paid Matrix US$1.2 million, plus 2.1 million shares of Sienna Gold Inc valued at CDN$0.10 per share, and 100,000 stock options of Sienna Gold exercisable at US$0.30 until June 30, 2010 to acquire a 60% interest in the concession. In March 2006, Sienna purchased the remaining 40% of the property for US$300,000 and 2.55 million common shares of Sienna Gold Inc valued at CDN$0.85. This guaranteed Sienna 100% interest in the concession. On August 18, 2010, Sienna purchased the Busqueda XVIII concession (400 ha) from Vena Resources for US$55,000 (355,000 shares issued and US$5,000 cash).

Currently, the property is free and clear and does not have any overriding royalties. Sienna owns a total of 1,334 ha in the area.

Geological Setting and Mineralization

The regional geology consists of the Lower Cretaceous Chimú Formation (quartz arenites, black shales, and local coal seams) overlying the shales and intercalated sandstones, quartzites, and mudstones of the Upper Jurassic Chicama Formation. Intermediate to acid intrusives of mid to late Tertiary age are common and responsible for most of the significant mineral deposits in the area.

Metallogenically, the Igor project is part of the Oligocene–Pliocene Gold-Silver Epithermal Belt. Important deposits in the area include: Yanacocha, Shahuindo, and Sayapullo to the north, and Lagunas Norte, La Arena, Salpo, Quiruvilca, Pashpap, and Pierina to the south. To the east lies the Miocene Gold-Copper Porphyry Belt that includes deposits such as Minas Conga, El Galeno, and Magistral

The main rock types at Igor are arenites, quartzites, and carbonaceous shales with syngenetic pyrite in the underlying Chicama Formation.

This sedimentary sequence has been extensively folded, thrusted, and dissected by major faults. The structure is dominated by a 3 km by 2 km anticline.

Mineralization at Igor consists of a series of veins, breccias, and mantos with a predominantly north-south orientation. Gold and silver are the most important metals in this area. Geochemically, there is an abundance of arsenic and antimony, but weak localized base metal (lead and zinc) mineralization. Copper grades are generally low, but these grades often increase with depth. Oxidation, especially along structures, is pervasive and commonly extends to depths of several hundred metres below surface.

The mineralization appears to be intermediate sulphidation and epithermal in character and there are indications of a deep porphyry copper-gold system underlying the Igor project.

The three main areas of known mineralization on the project are as follows:

- **Domo:** a zone of bedding-parallel mantos and perpendicular veins along the crest of the southeast end of the Igor Anticline.

- **Tesoros:** a system of veins, breccias, and mantos along a major north-northeast striking fault that has localized the emplacement of dacitic porphyries and pebble dykes.

  Note: The mineralization at Domo and Tesoros is described in NI 43-101 Technical Report *Updated Technical Report and Resource Estimate of the Igor Miner Project* (Henkle and Lytle, 2008). Further comments regarding the mineralization in these areas are included at the end of *Section 14* of this report.

- **Callanquitas Structure:** the most recently discovered area on the property consists of a north-south striking zone of multiple structures that extends over a 1,200 m by 100-150 m wide zone. Drilling confirmed mineralization to a depth of 450 m below surface. The deposit remains open to the north, south, and at depth.

Deposit Types

The main deposit type at the Callanquitas Structure consists of intermediate sulphidation mineralization developed in breccias and sheeted veins

Exploration and Drilling

Sienna has been active on the Igor project since 2005; this work includes: surface mapping, geophysics (IP and ground magnetics), and sampling from both surface and underground artisanal workings. Sienna has conducted drilling in the area around the Callanquitas structure in three programs since 2007 as summarized in Table 1.1.

TABLE 1.1: DRILL HOLES AT CALLANQUITAS

Drilling Campaign	No. of Drill Holes	Drilling (m)
2007 – 2008	4	849.32
2010 – 2011	8	4,235.30
2011 – 2012	65	14,924.05
Total	**77**	**20,008.67**

Sample Preparation, Analyses and Security

The mineral resource estimate is generated using a total of 74 drill holes that intersect the Callanquitas structure with a total of 18,899 m. Holes are collared from surface drill stations with pierce points designed to intersect the mineralized zone at intervals that generally range from 50-70 m. There are a total of 11,659 individual samples used in the resource estimate. The samples were collected and analyzed in accordance with industry standards. Splits from the drill core samples were submitted to ALS (holes CA-10-01 to CA-11-08) and SGS (holes CA-11-09 to CA-12-73) in Lima, Peru for fire assay and ICP analysis. The accuracy and precision of the assay results were tracked through the systematic inclusion of standards, blanks, and check assays.

Data Verification

Observations during the site visit confirm the physical presence of the drilling activities that have taken place on the property. Drilling and sampling procedures followed by Sienna personnel adhere to accepted industry standards. Independent samples confirm the presence of gold in the rocks in quantities similar to those stated by Sienna. Manual validation of a representative selection from the database shows it to be essentially error free. The database has been monitored through an appropriate QA/QC program ensuring the accuracy and precision of the results.

The results of the data verification indicate that the database is sound and reliable for the purposes of mineral resource estimation.

Robert Sim was not able to visit the Domos or Tesoros occurrences during the site visit. These areas are currently occupied by local miners who are mining gold from these zones without Sienna's permission. This is an illegal practice and there have been periodic hostilities between these miners and the local police forces. Due to the potential hazards present, the author was not able to validate the previous work done at these locations.

Mineral Resource Estimates

The November 2012 mineral resource estimate for the Callanquitas deposit was prepared under the direction of Robert Sim (P.Geo) of SIM Geological Inc. It uses drill hole sample assay results and the interpretation of a geologic model that relates to the spatial distribution of gold and silver in the deposit. Interpolation characteristics were defined based on geology, drill hole spacing, and geostatistical analysis of data. Block grade estimates were done using Ordinary Kriging (OK) with a nominal block size of 5 m long, 3 m wide, and 5 m high. Resources are classified based on the proximity to sample data and are reported, as required under National Instrument 43-101 (NI 43-101), according to the CIM standards for Mineral Resources and Reserves.

The estimated Inferred mineral resource is shown in Table 1.2, with various cut-off grades for comparison purposes. Highlighted in Table 1.2 is a base case cut-off threshold of 1.5 g/t AuEq which is considered appropriate for potential underground mining activities for a deposit of this type, scale, and location. Resource tonnages were estimated using a dry density of 2.55 tonnes per cubic metre.

TABLE 1.2: ESTIMATED INFERRED MINERAL RESOURCE

Cut-off Grade AuEq g/t	Resource (ktonnes)	Au (g/t)	Ag (g/t)	AuEq * (g/t)	Contained Au (koz)	Contained Ag (Moz)	AuEq (koz)
0.5	11,291	1.47	53.8	2.39	535.0	19.5	866.9
1	9,486	1.67	60.5	2.70	508.6	18.4	822.1
1.5	**7,189**	**1.94**	**71.8**	**3.16**	**448.5**	**16.6**	**730.5**
2	5,460	2.19	83.7	3.61	384.6	14.7	634.3
2.5	3,992	2.45	98.2	4.11	313.9	12.6	528.1
3	2,730	2.73	119.1	4.75	239.4	10.5	417.1

*AuEq = Au + (Ag*0.017) based on a gold price of US$1,500/oz and a silver price of US$25/oz (a ration of 60:1)

There are no known factors related to environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues which could materially affect the mineral resource.

Conclusions and Recommendations

The following conclusions are based on Sienna Gold Inc.'s recent drilling at the Igor project:

- The level of understanding of the geology at Callanquitas is relatively good.
- The practices used during the drilling campaigns were conducted in a professional manner and adhered to accepted industry standards.
- There are no known factors that would lead one to question the integrity of the database.
- Drilling to date has outlined an Inferred mineral resource estimate: 7.2 Mtonnes at 1.94 g/t Au and 71.8 g/t Ag, which equates to 3.16 g/t gold equivalent (AuEq) using a cut-off grade of 1.5 AuEq g/t, which contains 448.5 koz contained Au and 16.6 Moz contained Ag.
- The Callanquitas structure remains open along strike and at depth.
- Nearby occurrences, Domos and Tesoros, exhibit the potential to host additional mineral resources; however, additional exploration work is required and recommended in these areas.

The following actions are recommended for the Igor project:

- Continued exploration using a combination of geologic mapping, geochemistry, and geophysics to search for additional satellite deposits on the property. Budget: US$500,000
- In addition to the current resource at Callanquitas, another 7 km of veins and mineralized structures have been identified on the property including those at Domo and Tesoros and in new areas such as Portachuelo. Step-out exploratory drilling will be required to extend the Callanquitas Structure to the south towards the Portachuelo target. Additional exploration drilling is recommended in the Domos and Tesoros areas to evaluate the resource potential for these areas. Exploration drilling along structures is recommended at an initial spacing of 100 m to 150 m. Drilling in the vicinity of known mineralization at Domos and Tesoros should be conducted with holes on a nominal 50 m pattern. Estimated 10,000 m of diamond drilling. Budget: US$3,000,000.

- Additional drilling to continue delineation in the area of the current Callanquitas resource. Drill holes targeted on 50 m spacing would largely focus on previously undrilled sections along the structure and the high grade gold and silver mineralization around Section 9,154,600N. Estimated 4,000 m of diamond drilling. Budget: US$1,200,000

- Conduct preliminary studies to evaluate the metallurgical characteristics of the mineralization. Budget $100,000.

- Preliminary engineering studies to evaluate the viability of potential mining methods that could be used. Budget $100,000.

- Continued environmental baseline studies. Budget: US$50,000.

2 INTRODUCTION

Sienna Gold Inc. (Sienna) commissioned Robert Sim, P.Geo of SIM Geological Inc., and Bruce Davis, F.AusIMM of BD Resource Consulting Inc., to provide an initial, independent mineral resource estimate for the gold and silver resource of the Callanquitas Structure, at its 100%-owned Igor Project), in La Libertad, Peru.

Robert Sim, P. Geo., and Bruce Davis, F.AusIMM, are both independent “qualified persons”, within the meaning of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). They are responsible for the preparation of this technical report on the Callanquitas Structure (Technical Report) in accordance with the guidelines of the Canadian Securities Administrators’ National Instrument 43-101 Standards for Disclosure for Mineral Projects and Form 43-101F. The information, conclusions, opinions, and estimates contained herein are based on:

- The qualified persons’ field observations.
- Data, geological reports, maps, documents, technical reports, and other information supplied by Sienna and other third parties listed in Section 3 (Reliance on Other Experts) and Section 27 (References).

Robert Sim, P.Geo, visited the site from July 17-18, 2012; he reviewed Sienna’s drilling activities, inspected core from numerous drill holes, reviewed sampling procedures, and visited a series of drill sites on the property.

This report is based on available drilling and sampling data provided by Sienna on October 10, 2012. The resource model was produced during October and November 2012. The effective date of the resource model is November 13, 2012

All measurement units in this report are metric, and currency is expressed in US dollars (US$), unless stated otherwise. The currency used in Peru is the *Peruvian new sol (PEN)*: the exchange rate at the effective date of this Technical Report was approximately 2.61 PEN per US$1.

Although all currency is expressed in US dollars we always state $US in the report.

2.1 LIST OF ABBREVIATIONS AND ACRONYMS

.dxf	Drawing eXchange Format file extension
°C	degree Celsius
Ag	Silver
Au	Gold
BDRC	BD Resource Consulting Inc.
DEM	digital elevation model
dpi	dots per inch
g/t	grams per tonnes
h	hour
ha	hectare
ID	inverse distance weighting method
kg	Kilogram
km	Kilometre
koz	kilo ounce
ktonnes	Kilotonnes
Moz	million ounce
Mtonnes	million tonnes
PLT	point load testing
ppm	parts per million
QA/QC	quality assurance/quality control
RQD	rock quality designation
RTP	reduced to pole
Sienna	Sienna Gold Inc.
SGI	SIM Geological Inc.
t/m^3	tonnes per cubic meter
tpd	tonnes per day
US$	US dollar
UTM	Universal Transverse Mercator

3 RELIANCE ON OTHER EXPERTS

The report was prepared by Robert Sim, P.Geo, of SIM Geological Inc. (SGI) and Bruce Davis, F.AusIMM, of BD Resource Consulting Inc. (BDRC); both are independent "qualified persons" within the guidelines of National Instrument 43-101 (NI 43-101) *Standards of Disclosure for Mineral Projects*. The information, conclusions, opinions, and estimates contained herein are based on the qualified persons' field observations and data, reports, and other information supplied by Sienna Gold Inc. (Sienna) and other third parties.

For the purpose of *Section 4.1* (Property Location) and *Section 4.2* (Property Ownership) of this report, SGI relied on the ownership data (mineral, surface, and access rights) provided by Sienna. This information was provided to Sienna by Estudio Grau, Calle Las Palmeras 285 – 299 San Isidro, Lima 27, Peru. BDRC and SGI believe that this information is essentially complete and correct to the best of their knowledge and that no information has been intentionally withheld that would affect the conclusions made herein. BDRC and SGI have not researched the property title or mineral rights for the Callanquitas Structure and express no legal opinion as to the ownership status of the property.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 PROPERTY LOCATION

The property is located in the northern part of the Western Cordillera of the Andes in northern Peru, Province of Otuzco, District of Huaranchal, department of La Libertad, as shown in Figure 4-1.

The property is approximately 150 km northeast of the coastal city of Trujillo and 700 km from the capital city of Lima.

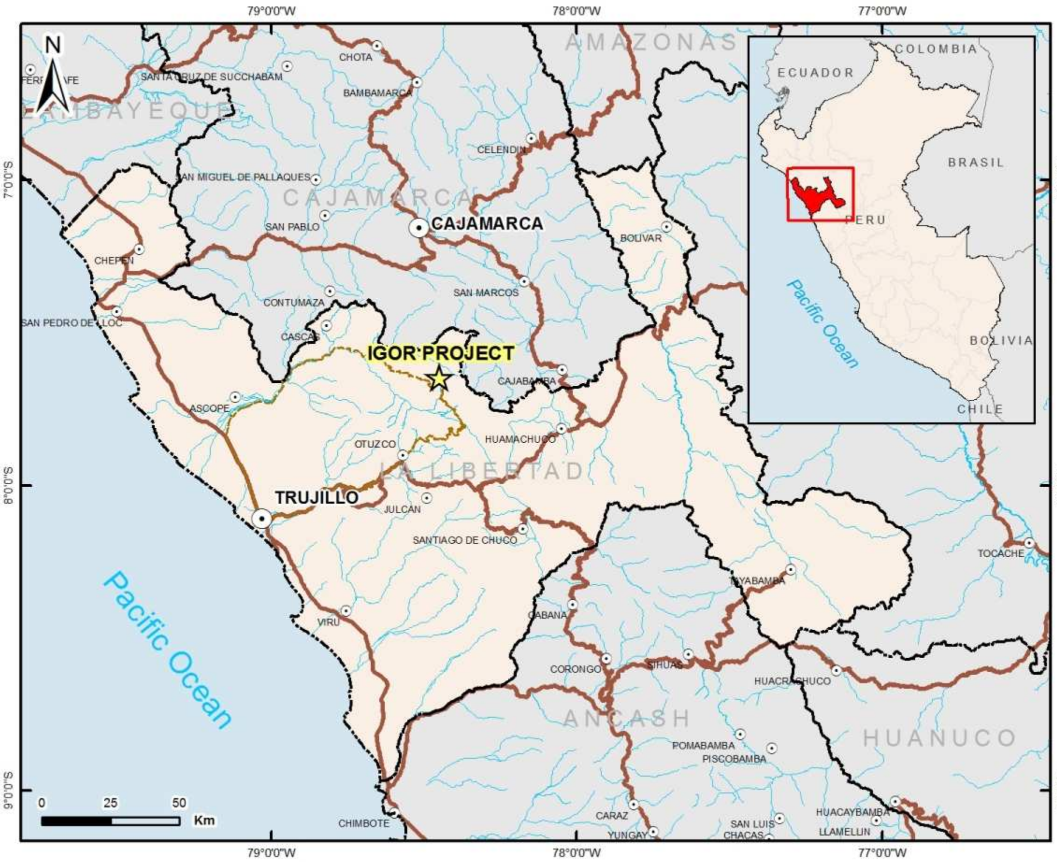


FIGURE 4-1: LOCATION MAP

The Igor project consists of two concessions: Igor and La Busqueda XVIII. It covers an area of 1,334 ha and lies within the area bounded by 779000E to 784500E and 9150500N to 9155500N (based on the UTM geographic coordinate system, Zone 17 South and Provisional South American Datum, 1956).

4.2 PROPERTY OWNERSHIP

Sienna owns 100% of both the Igor and La Busqueda XVIII concessions through its Peruvian subsidiary Sienna Minerals SAC and there are no outstanding royalties or other underlying agreements relating to any of the claims. Details of these concessions are listed in Table 4.1, and a map of the concessions is shown in Figure 14-2.

TABLE 4.1: IGOR PROJECT CONCESSION DETAILS

Code	Mining Concession Name	Owner	Extension (ha)	Formulation Date	Substance	Recording SUNARP
15007753X01	Igor	Sienna Minerals SAC	1,000	12/09/1979	Metallic	20000192
010222202	La Busqueda XVIII	Sienna Minerals SAC	400	28/11/2002	Metallic	11024783

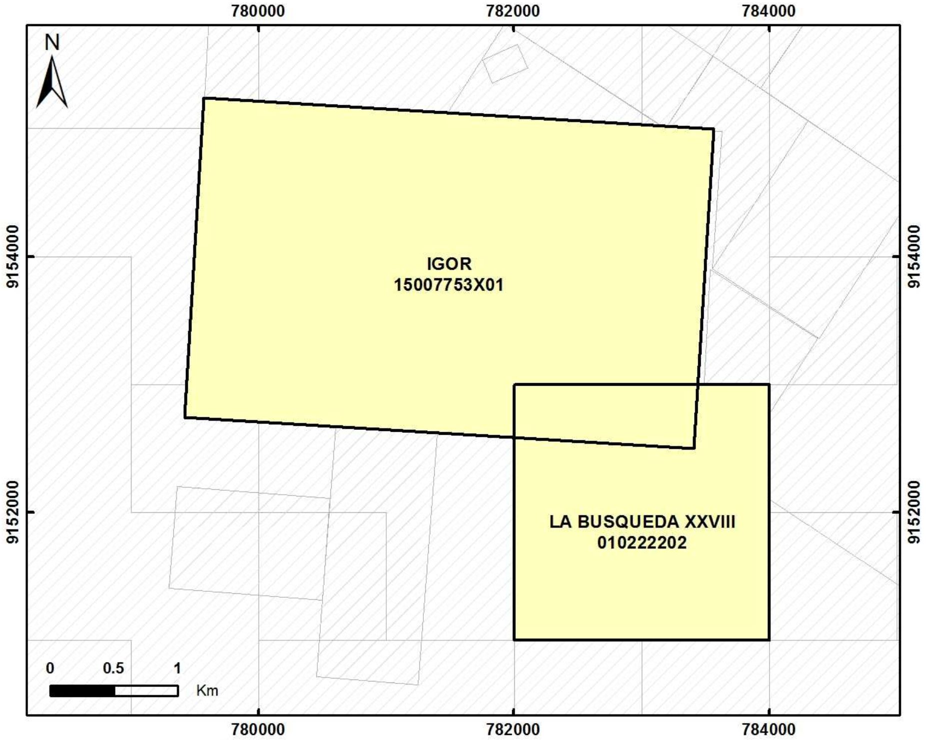


FIGURE 4-2: CLAIM MAP OF IGOR PROJECT

There are no outstanding environmental liabilities associated with this project.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The area can be accessed by road from Lima: Pan-American Highway (approximately 590 km) or by air: flying into the city of Trujillo, La Libertad (population 800,000).

From Trujillo, there are two land access routes: via Otuzco and via Lucma. Tables 5.1 and 5.2 describe these two routes.

TABLE 5.1: CALLANQUITAS CAMP VIA OTUZCO

Route	Distance (km)	Status	Duration (h)
Trujillo to Otuzco	75	paved highway	01:10
Otuzco to Huaranchal	72	packed dirt road	04:00
Huaranchal to Callanquitas Camp	10	rural road	01:15
TOTAL	**157**		**06:25**

TABLE 5.2: CALLANQUITAS CAMP VIA LUCMA.

Route	Distance (km)	Status	Duration (h)
Trujillo to Sausal	25	paved highway	00:20
Sausal to Cascas detour	37	paved highway	00:30
Cascas detour to 9 de Octubre	36	packed dirt road	00:40
9 de Octubre to Lucma	20	packed dirt road	01:00
Lucma to Callanquitas Camp	27	packed dirt road	02:00
TOTAL	**145**		**04:30**

Both land access routes are shown in Figure 5-1: the green line shows the route via Otuzco, and the blue line shoes the route via Lucma.

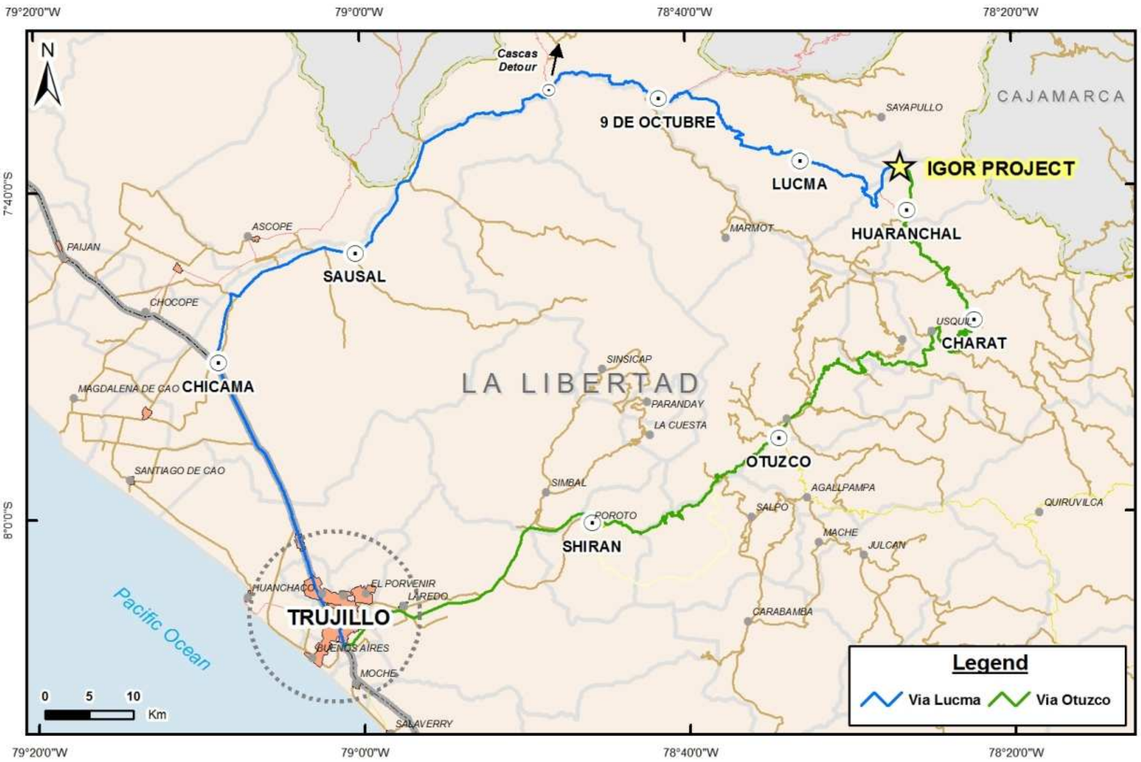


FIGURE 5-1: ACCESS TO THE IGOR PROJECT

5.2 PHYSIOGRAPHY

Elevations in the area range between 2,800 m and 3,800 m, with abrupt topographic transitions. Slopes on the southern parts of the Igor concession and the La Busqueda XVIII concession are less severe; subsistence agriculture is practiced here.

5.3 CLIMATE

The climate is typical of the Peruvian Andes with a distinct wet and dry season. Temperatures range between 0^{o} C and 25^{o} C. Despite significant rainfall (approximately 1,100 mm/yr) during the wet season, from December to April, there typically are no disruptions during field programs.

There is mixed scrub forest and subsistence agriculture at lower elevations and alpine grasslands on Cerro Igor. Figures 5-2 to 5-4 show the typical topography and vegetation on the property.

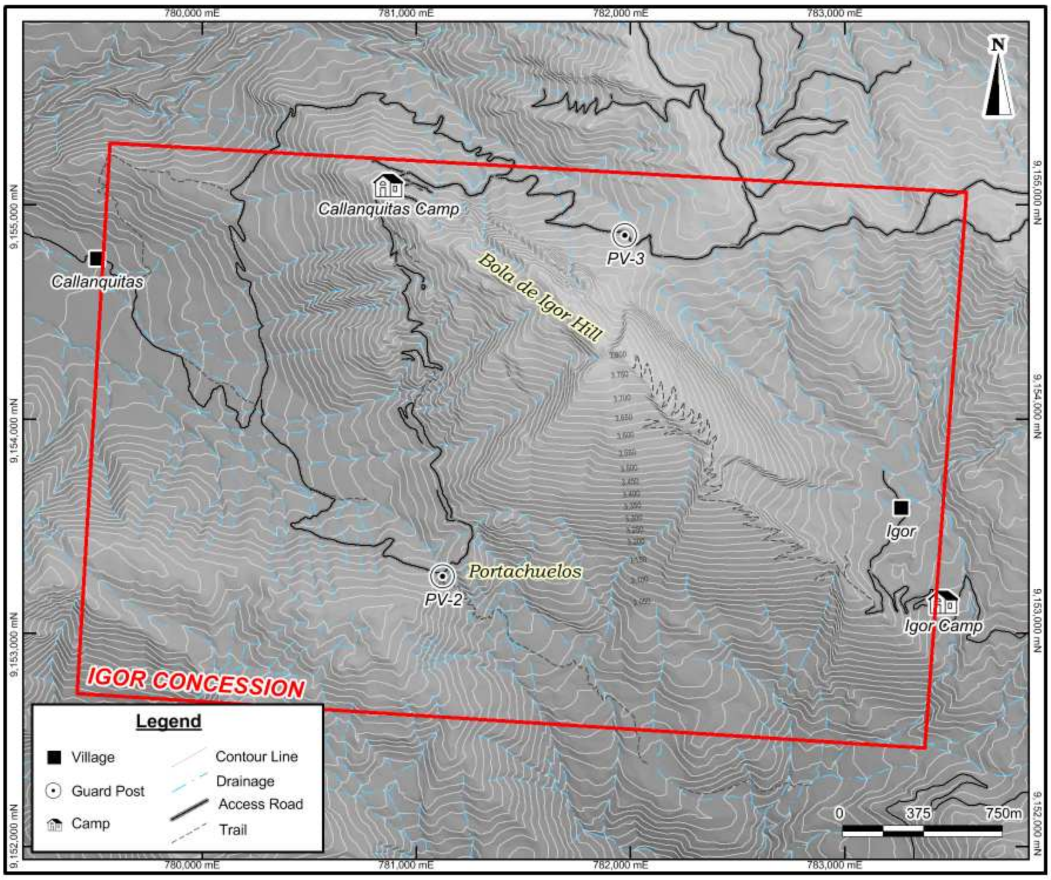


FIGURE 5-2: DEM WITH CONTOURS, DRAINAGE, AND ACCESS

FIGURE 5-3: LOWER ELEVATION VEGETATION

FIGURE 5-4: CERRO IGOR VEGETATION

5.4 LOCAL RESOURCES AND INFRASTRUCTURE

There are two small villages located within the concessions: Callanquitas and Igor. Each village has a population of approximately 250. The town of Huaranchal is also within the property limits; it has a population of 1,500.

The villages of Callanquitas and Igor provide a source for manual labour; this local resource complements Sienna's community social programs. Electrical power is available in Huaranchal and Igor, and is currently being installed in Callanquitas. Figure 5-5 shows the area's infrastructure.

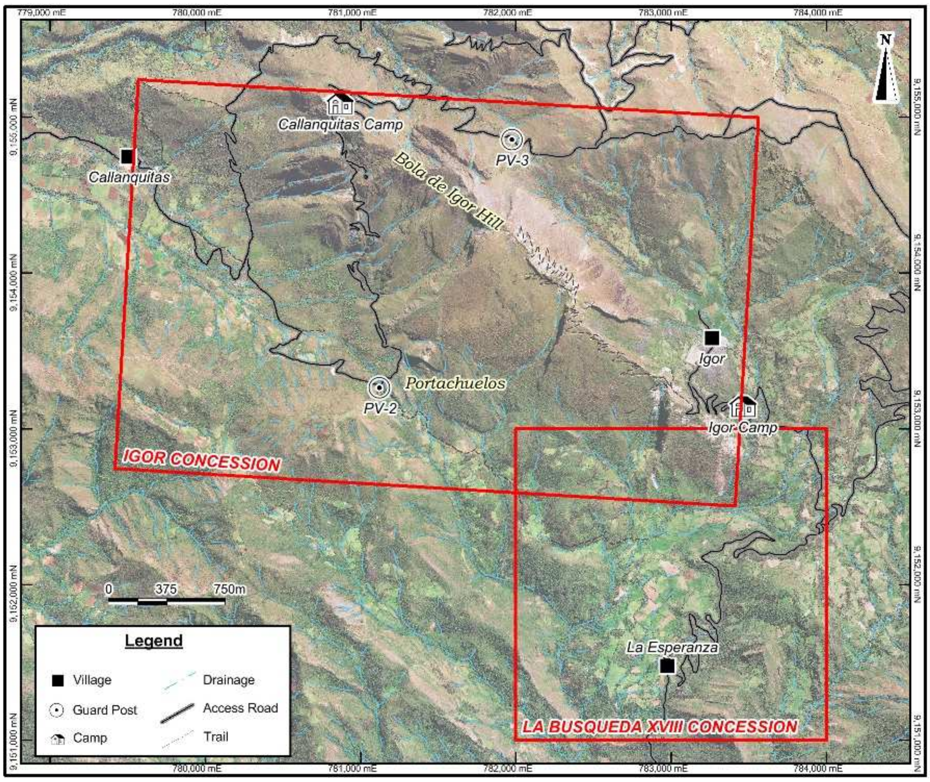


FIGURE 5-5: INFRASTRUCTURE ON THE IGOR AND LA BUSQUEDA XVIII CONCESSIONS

Trujillo and Lima supply all other fuel, food, materials, and skilled labour to the project.

5.5 SURFACE RIGHTS

Peruvian law does not vest surface rights to companies with existing mineral rights; therefore, any proposed development requires Sienna to:

- purchase the surface rights
- draw up an agreement with the owners of the surface rights to guarantee access

Sienna has employed both strategies on the project: purchasing surface rights over the areas of known mineralization, and negotiating access agreements with the local communities of Igor and Callanquitas, as shown in Figure 5-6.

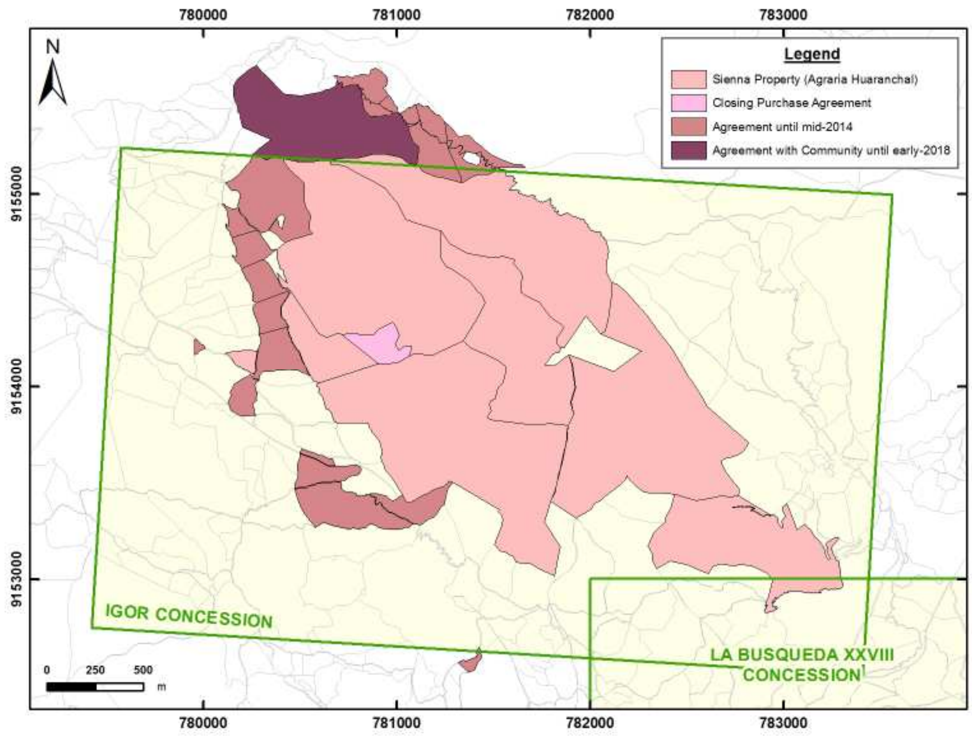


FIGURE 5-6: CONCESSIONS AND SURFACE RIGHTS

The authors of this report have observed that Sienna has maintained good relations with the local communities and no problems are anticipated as work advances on the project.

6 HISTORY

The Igor project gets its name from the son of an immigrant Russian who explored the area in the 1880s, but mining actually dates back to as early as the 1500s, evidenced by shallow underground work dating from this period.

There is little to no documented modern exploration activities conducted on the Property prior to Sienna's involvement beginning in 2005. In the 1980s, mineralized mantos on the eastern side of Cerro Bola de Igor were exploited for gold and silver and a now-abandoned, 50 tpd gold processing plant is located near Sienna's old camp, close to the village of Igor. The exploration work completed by Sienna is summarized in section 9 of this report.

The Igor concession was originally purchased by Samuel Guia. In 1998, he optioned the property to Rio Amarillo Gold Ltd. who later dropped its option over concession ownership. In 2001, Mr. Guia signed a purchase option agreement with Matrix Gold Mining Investment S.A. giving them until June 2006 to pay US$1 million. In June 2005, Sienna, through its subsidiary company, Sienna Minerals SAC, paid Matrix US$1.2 million, plus 2.1 million shares of Sienna Gold Inc valued at CDN$0.10 per share, and 100,000 stock options of Sienna Gold exercisable at US$0.30 until June 30, 2010 to acquire a 60% interest in the concession. In March 2006, Sienna purchased the remaining 40% of the property for US$300,000 and 2.55 million common shares of Sienna Gold Inc valued at CDN$0.85. This guaranteed Sienna 100% interest in the concession

On January 15, 2010, Sienna entered into an agreement with Vena Resources to purchase the Busqueda XVIII concession (400 ha). The deal closed on August 18, 2010. The purchase price was US$55,000, which Sienna settled by issuing 355,000 shares and US$5,000 cash for transfer expenses. Currently, the property is free and clear and does not have any overriding royalties.

With the acquisition of the La Busqueda XVIII concession, and its overlap with the existing Igor concession, Sienna owns a total of 1,334 ha in the area.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Igor project is located on the central spine of the Western Cordillera of the Peruvian Andes.

As shown in Figure 7-1, the regional geology consists of the Lower Cretaceous Chimú Formation (quartz arenites, black shales, and local coal seams) overlying the shales and intercalated sandstones, quartzites, and mudstones of the Upper Jurassic Chicama Formation. Intermediate to acid intrusives of mid to late Tertiary age are common and responsible for most of the significant mineral deposits in the area.

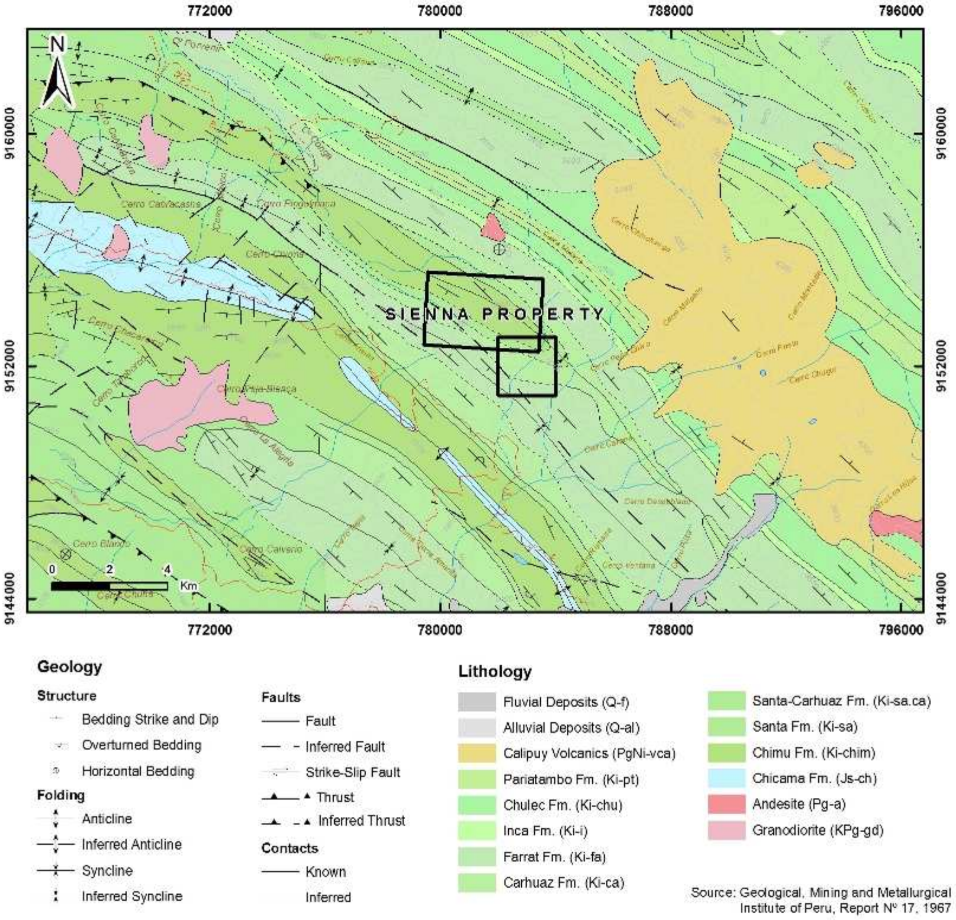


FIGURE 7-1: REGIONAL GEOLOGY

Metallogenically, the Igor project is part of the Oligocene–Pliocene Gold-Silver Epithermal Belt. Important deposits in the area include: Yanacocha, Shahuindo, and Sayapullo to the north, and Lagunas Norte, La Arena, Salpo, Quiruvilca, Pashpap, and Pierina to the south. To the east lies the Miocene Gold-Copper Porphyry Belt that includes deposits such as Minas Conga, El Galeno, and Magistral. These known deposits are shown in Figure 7-2.

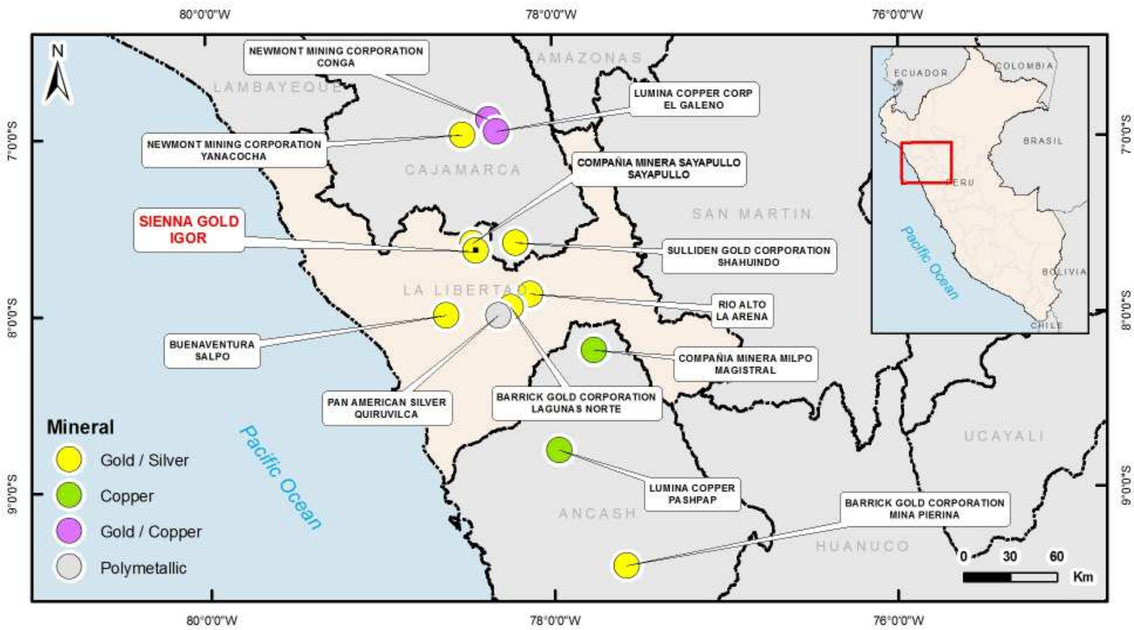


FIGURE 7-2: MINING PROJECTS IN NORTHERN PERU

7.2 LOCAL GEOLOGY

The main rock types at Igor are arenites, quartzites, and carbonaceous shales with syngenetic pyrite in the underlying Chicama Formation.

This sedimentary sequence has been extensively folded, thrusted, and dissected by major faults. The structure is dominated by a 3 km by 2 km anticline.

There are a number of dacitic dykes, stocks, and sills; many have phyllic and argillic alteration. Minor granodiorite is present in some of the deep drill holes.

7.3 MINERALIZATION

Mineralization at Igor consists of a series of veins, breccias, and mantos with a mostly north-south orientation; secondary northeast to southwest, and northwest to southeast trends are also evident.

Gold and silver are the most important metals in this area. Geochemically, there is an abundance of arsenic and antimony, but weak localized base metal (lead and zinc) mineralization. Copper grades are generally low, but these grades often increase with depth. Oxidation, especially along structures, is pervasive and commonly extends to depths of several hundred metres below surface.

The mineralization appears to be intermediate sulphidation and epithermal in character and there are indications of a deep porphyry copper-gold system underlying the Igor project.

The four main areas of known mineralization on the project, as shown in Figure 7-3, are as follows:

- **Domo:** a zone of bedding-parallel mantos and perpendicular veins along the crest of the southeast end of the Igor Anticline. Gold and silver mineralization is controlled by a series of northeast-southwest trending faults.

- **Tesoros:** a system of gold-bearing veins, breccias, and mantos along a major north-northeast striking fault that has localized the emplacement of dacitic porphyries and pebble dykes. Note: The gold and silver mineralization at Domo and Tesoros is described in NI 43-101 Technical Report *Updated Technical Report and Resource Estimate of the Igor Miner Project* (Henkle and Lytle, 2008.) Further comments regarding the gold and silver mineralization in these areas are included at the end of *Section 14* of this report.

- **Callanquitas Structure:** the most recently discovered area on the property consists of a north-south striking zone of multiple structures that extends over a 1,200 m by 100-150 m wide zone. Drilling confirmed mineralization to a depth of 450 m below surface. The deposit remains open to the north, south, and at depth.

- **Portachuelo Target:** this area lies along the possible extension of the Callanquitas Structure. It is an early stage exploration target.

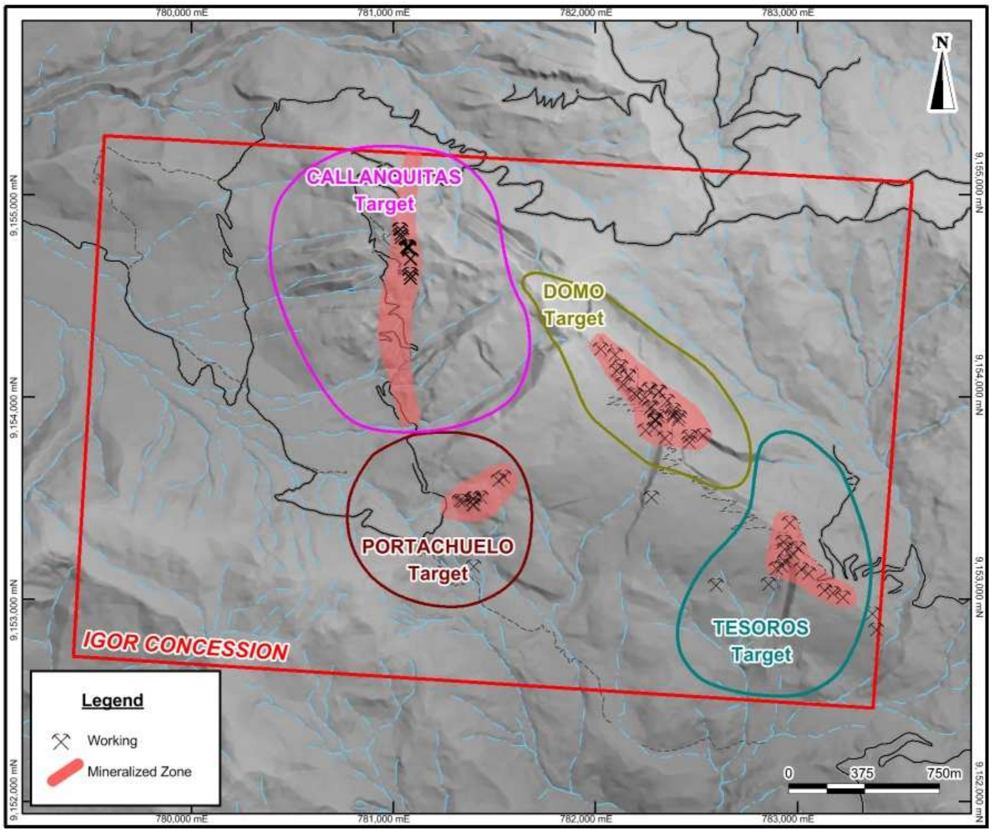


FIGURE 7-3: KNOWN MINERALIZATION AT THE IGOR PROJECT

8 DEPOSIT TYPES

The main deposit type at the Callanquitas Structure consists of intermediate sulphidation mineralization developed in breccias and sheeted veins.

The strong sericite associated with the veins and sericite-pyrite-quartz in the porphyritic intrusives suggests a higher temperature environment than is typical in intermediate sulphidation systems.

9 EXPLORATION

Sienna has been active on the Igor project since 2005; this work includes: surface mapping, geophysics (IP and ground magnetics), and sampling from both surface and underground artisanal workings.

9.1 SURFACE MAPPING

The property has been subject to various mapping programs over the last seven years at distinct scales. The mapping coverage is shown in Figure 9-1.

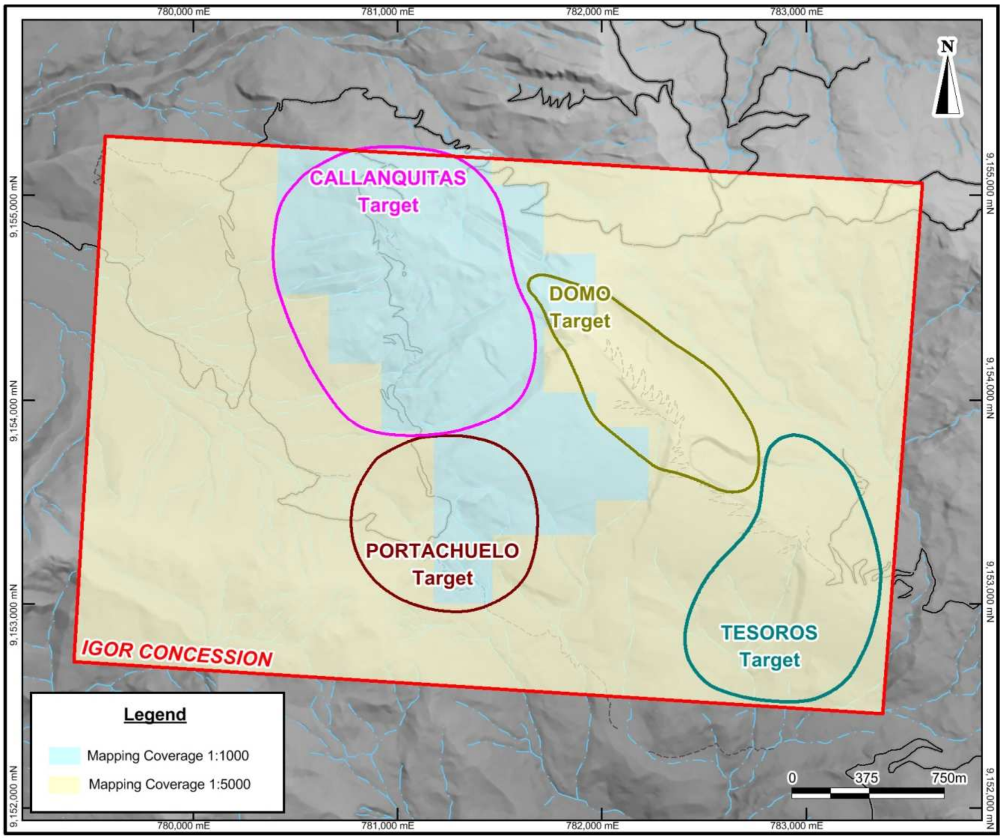


FIGURE 9-1: MAPPING COVERAGE

The main Igor concession (1,000 ha) was mapped (1:5000 scale) in 2006–2007, as shown in Figure 9-2.

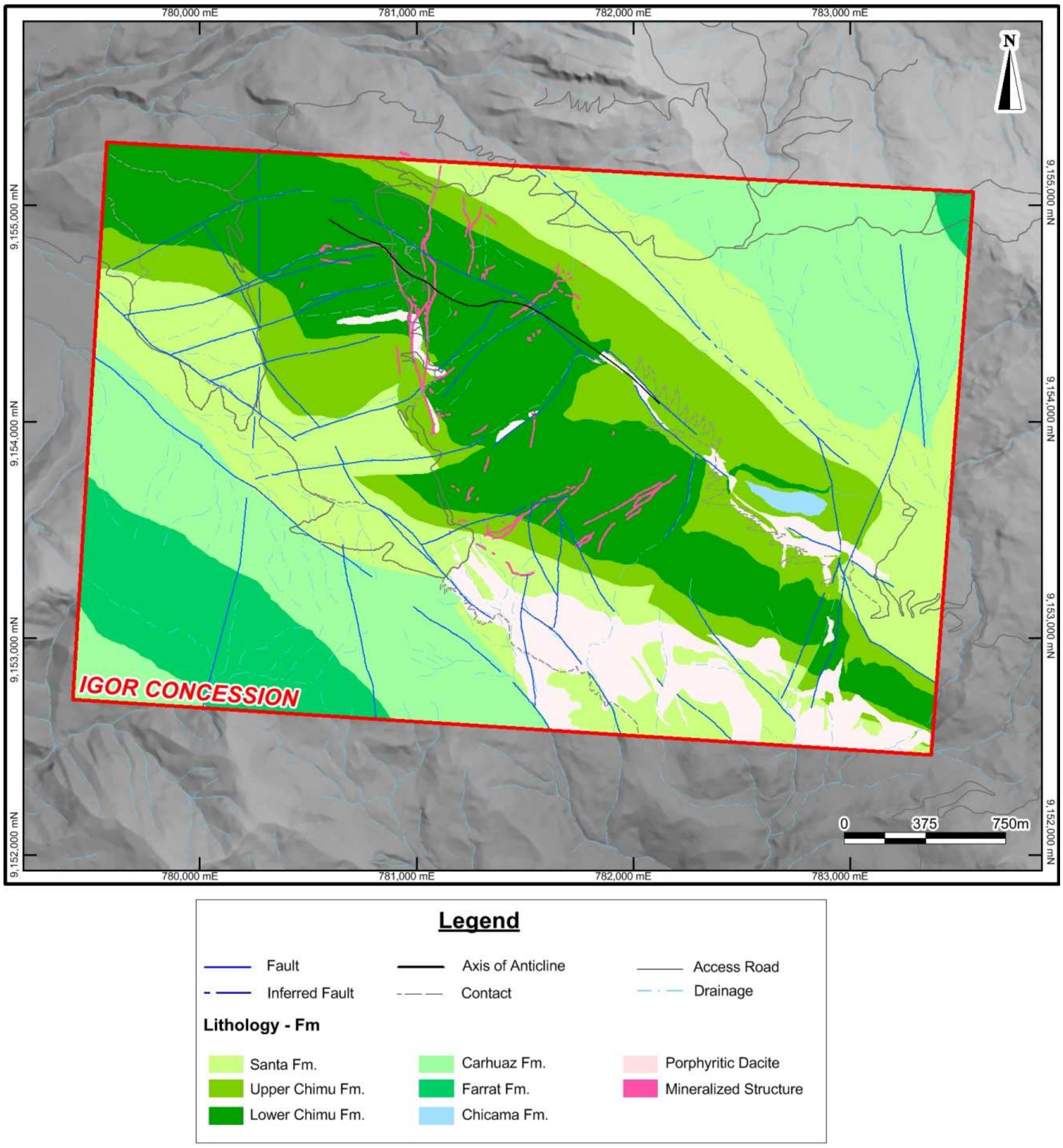


FIGURE 9-2: GEOLOGICAL MAP OF IGOR CONCESSION

9.2 GEOPHYSICS

The two geophysical surveys that were carried out on the property are shown in Table 9.1. The results of these geophysical surveys are shown in Figures 9-3 to 9-5.

TABLE 9.1: GEOPHYSICAL SURVEY

Survey Type	Company	Date	Line Kilometres
IP/Resistivity	Geofisica Consultores SRL	July 2006	14.274
Ground Magnetics	Fugro Ground Geophysics Pty Ltd	October 2007	55.664

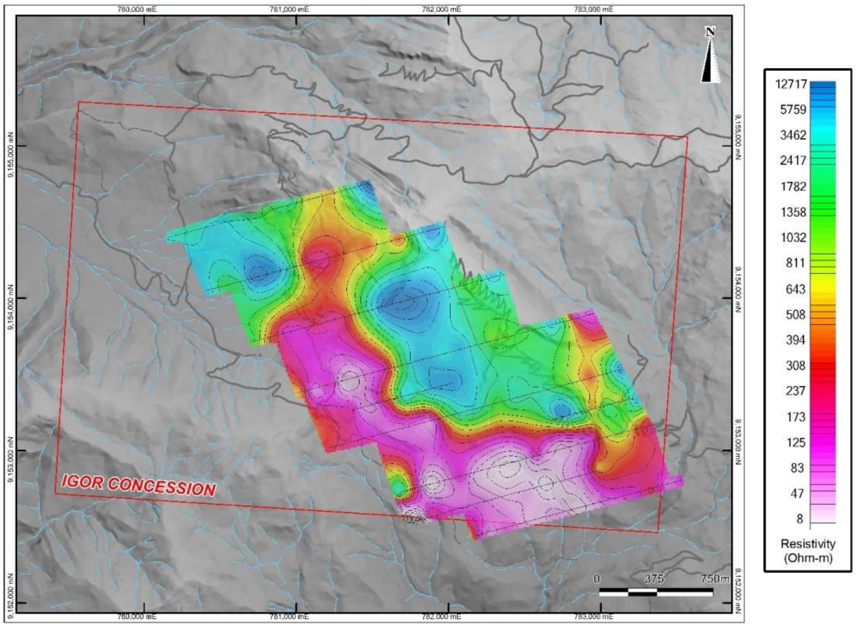


FIGURE 9-3: RESISTIVITY

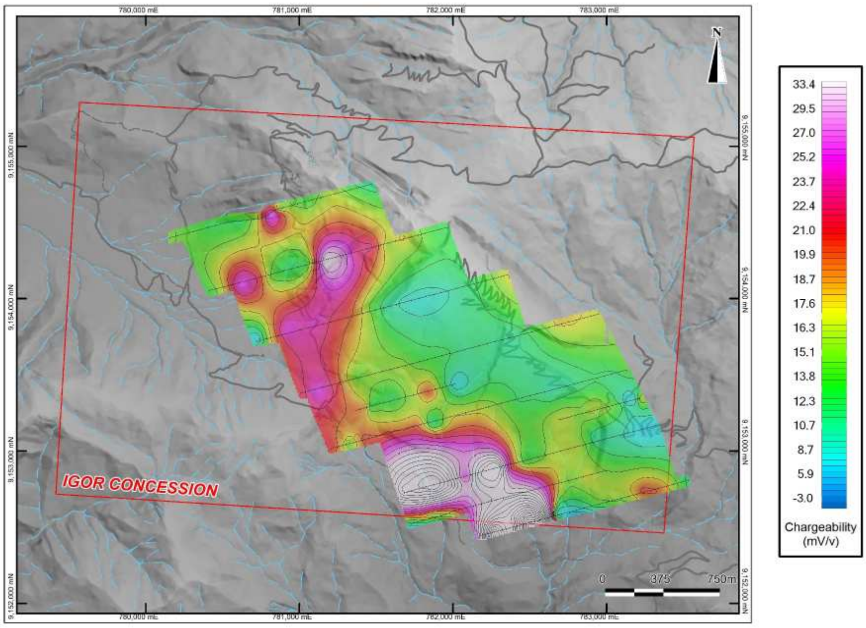


FIGURE 9-4: CHARGEABILITY

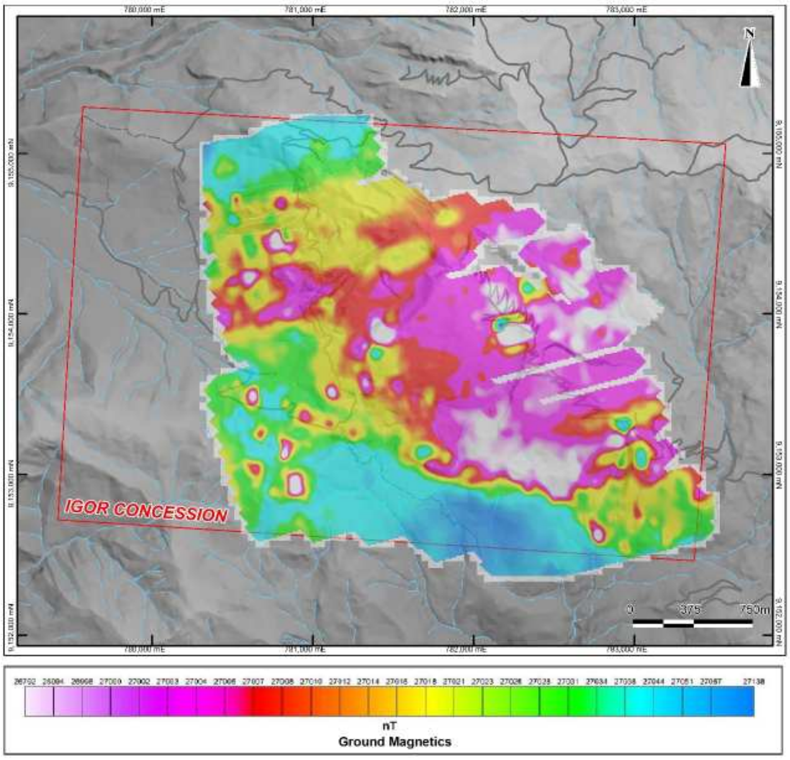


FIGURE 9-5: GROUND MAGNETICS - RTP

From mid-2008 to mid-2009, work was suspended on the property. Since 2009, exploration activity has focused on the western half of the property, close to the village of Callanquitas. This report focuses on the exploration and drilling on the Callanquitas Structure.

9.3 SURFACE SAMPLING

Since 2005, Sienna has collected approximately 4,200 surface samples (rock and soil) on the property. Table 9.2 shows the distribution of these samples. Most are rock samples that include outcrop, trench, and old working samples. It should be noted that surface samples provide information in the interpretation of the shape and location of the mineralized zones, but these samples are not used directly to estimate the mineral resources.

TABLE 9.2: DISTRIBUTION OF SAMPLES

Sample Type	Number of Samples	
	2005 - 2008	2010 - Present
Rock	2983	989
Soil	252	0
QA/QC	12	121
Total	**3,247**	**1,110**

Sample distribution across the project is shown in Figure 9-6, by sample type, and in Figure 9-7, by year.

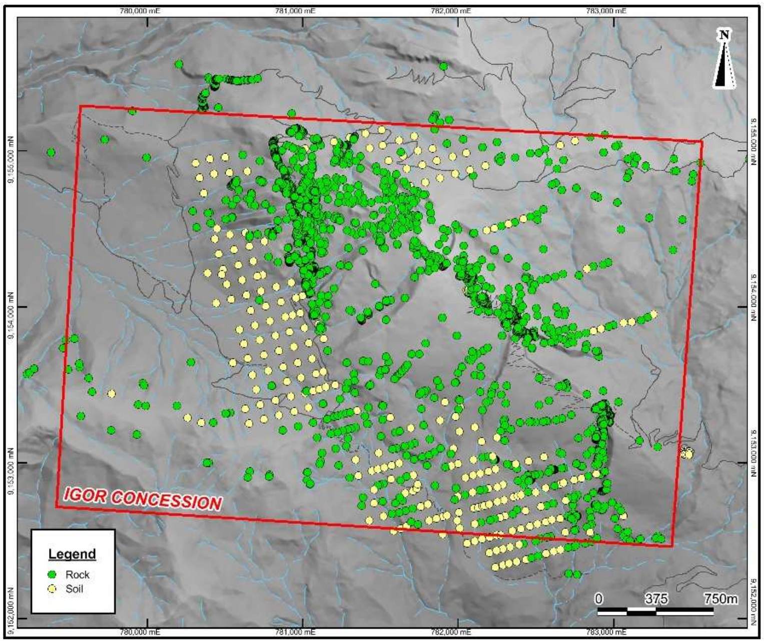


FIGURE 9-6: SAMPLE DISTRIBUTION BY SAMPLE TYPE

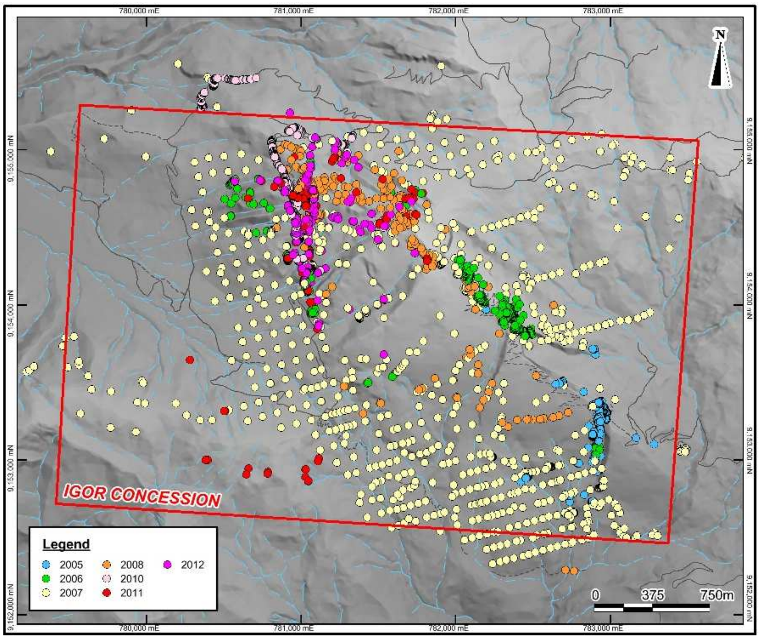


FIGURE 9-7: SAMPLE DISTRIBUTION BY YEAR

9.3.1 SURFACE SAMPLING METHODOLOGY

The authors cannot comment directly on the sampling methodology from 2005 to 2008, but this information is available in the report *Updated Technical Report and Resource Estimate of the Igor Miner Project* (Henkle and Lytle, 2008). The authors believe that the samples collected at that time were representative and without sample bias.

Surface Samples

Surface sampling methodology for the current exploration program includes the following:

- The sample area is marked and cleaned of vegetation, moss, and any loose material. In the case of structures, the sampling is done perpendicular to the strike of the structure (see Figure 9-8).
- Samples are collected along a channel, 20 cm wide, 2.5 cm deep and no more than 3.0 m long using a lump hammer and chisel. Sampling intervals account for any lithological and mineralogical changes in the outcrop (see Figure 9-9).

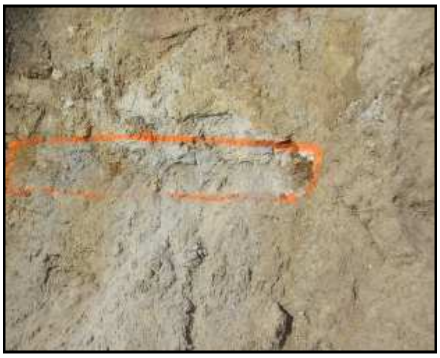
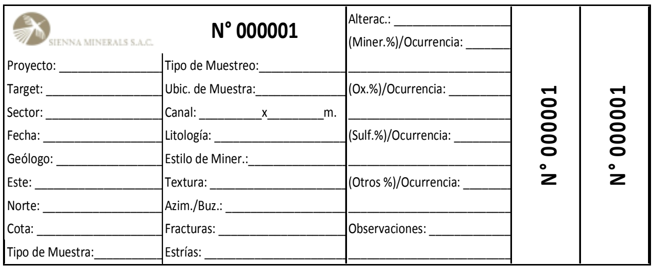


FIGURE 9-8: TYPICAL AREA DELINEATED FOR SURFACE ROCK SAMPLING

FIGURE 9-9: COLLECTING A SURFACE ROCK SAMPLE

- Fragments, no more than 2-3 cm in diameter, are placed in a heavy-duty plastic sample bag. A typical sample weight should be 4-5 kg.
- The channel sample's coordinates are noted on a pre-numbered sample card along with a description of lithology, alteration, mineralization, and structure (see Figure 9-10).



SIENNA MINERALS S.A.C. N° 000001

Proyecto:	Tipo de Muestreo:	Alterac.:	N° 000001	N° 000001
Target:	Ubic. de Muestra:	(Miner.%)/Ocurrencia:		
Sector:	Canal: x m.	(Ox.%)/Ocurrencia:		
Fecha:	Litología:	(Sulf.%)/Ocurrencia:		
Geólogo:	Estilo de Miner.:			
Este:	Textura:	(Otros %)/Ocurrencia:		
Norte:	Azim./Buz.:			
Cota:	Fracturas:	Observaciones:		
Tipo de Muestra:	Estrías:			

FIGURE 9-10: SURFACE SAMPLE CARD

- A sketch is made on the reverse side of the sample card for reference purposes (see Figure 9-11).

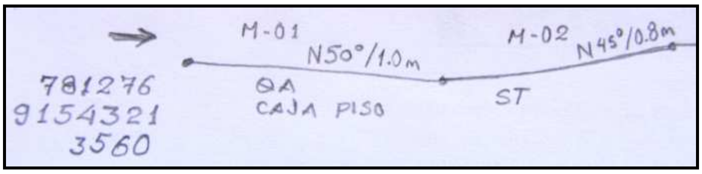


FIGURE 9-11: RESERVE SIDE OF SURFACE SAMPLE CARD

- The pre-numbered tag is inserted into the sample bag. The number is also written on the outside of the bag and then it is sealed (see Figure 9-12).

FIGURE 9-12: PRE-NUMBERED TAG

- The sample number is painted onto the outcrop and it is also marked using flagging tape and an aluminum marker tag (see Figure 9-13).

FIGURE 9-13: LABELLED OUTCROP SHOWING WHERE SURFACE SAMPLES HAVE BEEN TAKEN

Trench Samples

Trench sampling methodology for the current exploration program includes the following:

- Where outcrop exposure is limited or non-existent, trenches are used to gain access to collect rock samples. Trenches should be no less than 0.5 m wide and no more than 1 m deep. Any topsoil is retained and used for backfilling following the collection of samples.

- Using a GPS and compass, the trench is marked out and, for the most part on Igor, opened using hand shovels and pick axes (see Figure 9-14).

FIGURE 9-14: EXAMPLE OF A TYPICAL SURFACE TRENCH

- Under the supervision of the project geologist, the individual sample intervals are marked-up, taking into account structure, lithological variations, and other relevant factors (see Figure 9-15).

FIGURE 9-15: SAMPLE INTERVALS MARKED IN TRENCH

- Chip-channel samples are collected in the same way as described for surface outcrops (see previous section on surface samples).
- Once sampling is complete, the trenches are filled and every effort is made to return the area to its original state.
- Stakes with flagging tape and aluminum marker tags mark the locations of the samples (see Figure 9-16).

FIGURE 9-16: SAMPLE TAG IDENTIFYING SURFACE TREND SAMPLE LOCATION

Prior to 2008, work on the Igor project concentrated on the Domo and Tesoro areas on the eastern end of the concession. Since 2009, work has focused on the Callanquitas area on the western end of the Project.

In 2007, the Callanquitas area, and specifically the north-south trending structural zone of breccias and porphyry dykes, was identified by Dr. Warren Pratt (Pratt, 2007).

Mapping and sampling in 2009 and 2010 led to an initial drill campaign of 2,500 m. In late 2010, the campaign was extended and a total of 4,235.3 m was drilled. This, and subsequent drilling, is covered in greater detail in *Section 10*, but it is noteworthy that it was the 2009-2010 drilling that led to the confirmation of a north-south trending mineralized structural zone, now known at the *Callanquitas Structure*.

Work currently continues along and around the Callanquitas Structure with mapping (1:1000 scale), surface sampling, and trenching. The results are shown in Figures 9-17 to 9-19.

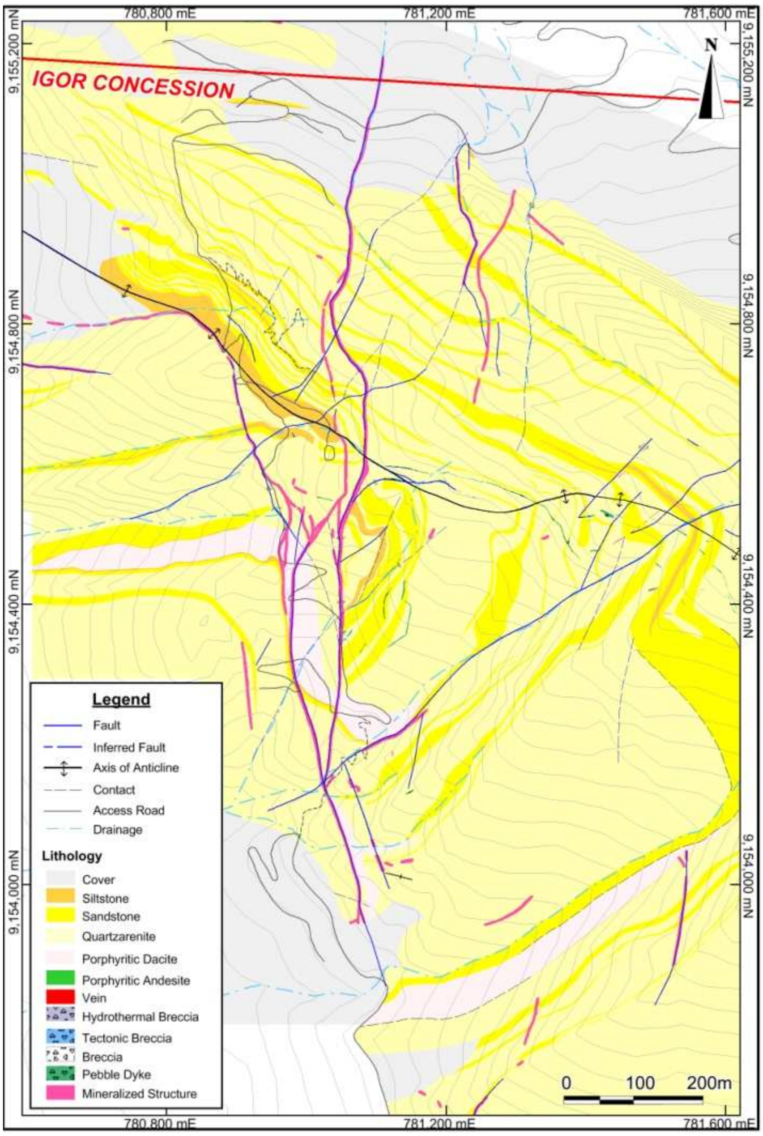


FIGURE 9-17: GEOLOGICAL MAP OF THE CALLANQUITAS AREA

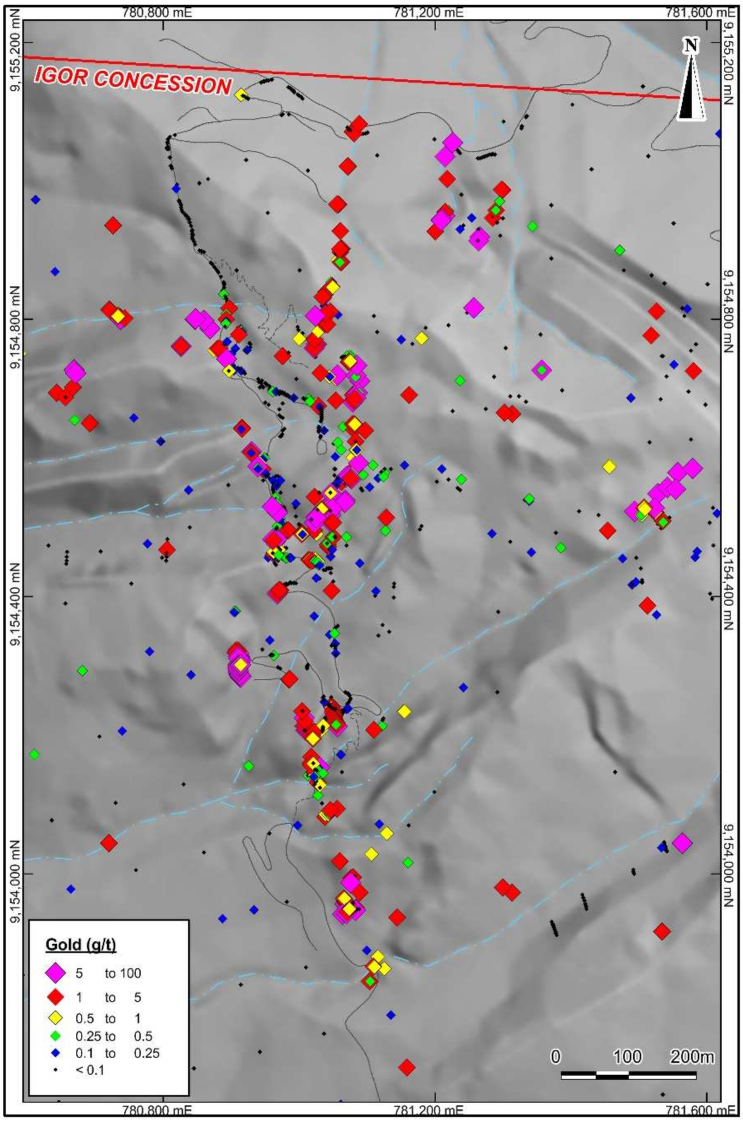


FIGURE 9-18: SURFACE GEOCHEMISTRY OF GOLD (G/T)

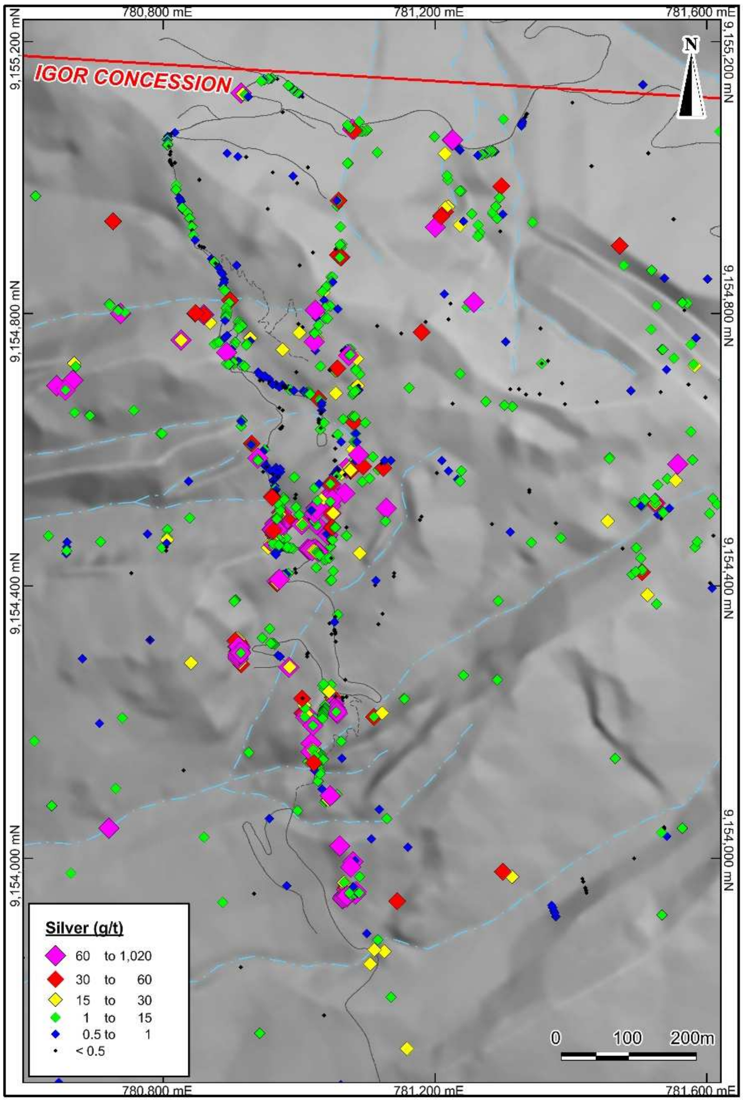


FIGURE 9-19: SURFACE GEOCHEMISTRY OF SILVER (G/T)

10 DRILLING

In 2007 and 2008, four holes were drilled in the Callanquitas area as part of a larger exploratory drilling campaign. Drill hole CA-1-08b gave the best results with 218.4 m at 0.6 g/t Au and 22.3 g/t Ag, but that hole was lost in mineralization, with evidence of phyllic alteration, due to poor ground conditions at 230.7 m.

In late 2010, a 2,500 m drilling campaign was started at Callanquitas to test the near surface epithermal mineralization in addition to the potential for porphyry-style mineralization at depth.

In the latter stages of drilling, it became clear, as predicted by Dr. Warren Pratt, that there was a very strong structural component to the mineralization at Callanquitas. It was also recognised that there is potential for deeper porphyry-style mineralization, but due to low grades and extreme depth, it has been rejected as a viable exploration target.

After the initial 2,500 m campaign, three additional holes, totaling 1,808.7 m, were drilled at Callanquitas. This confirmed the presence of a main mineralized structure that is at least 900 m long. A summary of collars, drill holes, traces, and mineralized intercepts is shown in plan view in Figure 10-1.

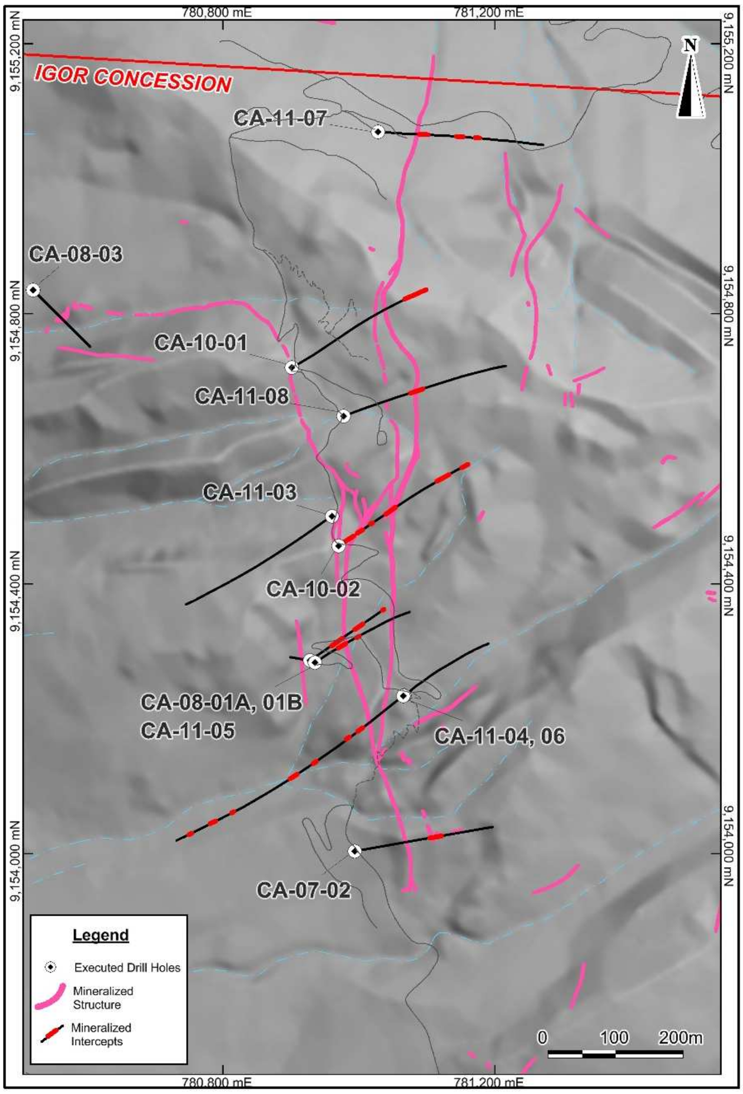


FIGURE 10-1: DRILL HOLE PLAN SHOWING MINERALIZED INTERCEPTS FROM 2007-2011 DRILLING

In late 2011, a 10,000-12,000 m drill program was designed to define the area shown in Figure 10-2 which would form the basis of an initial resource estimate at Callanquitas. Initially the drilling was planned on east-west oriented sections, spaced every 100 m along the Callanquitas Structure with 2-3 drill holes per section at 50 m intervals down the target structure.

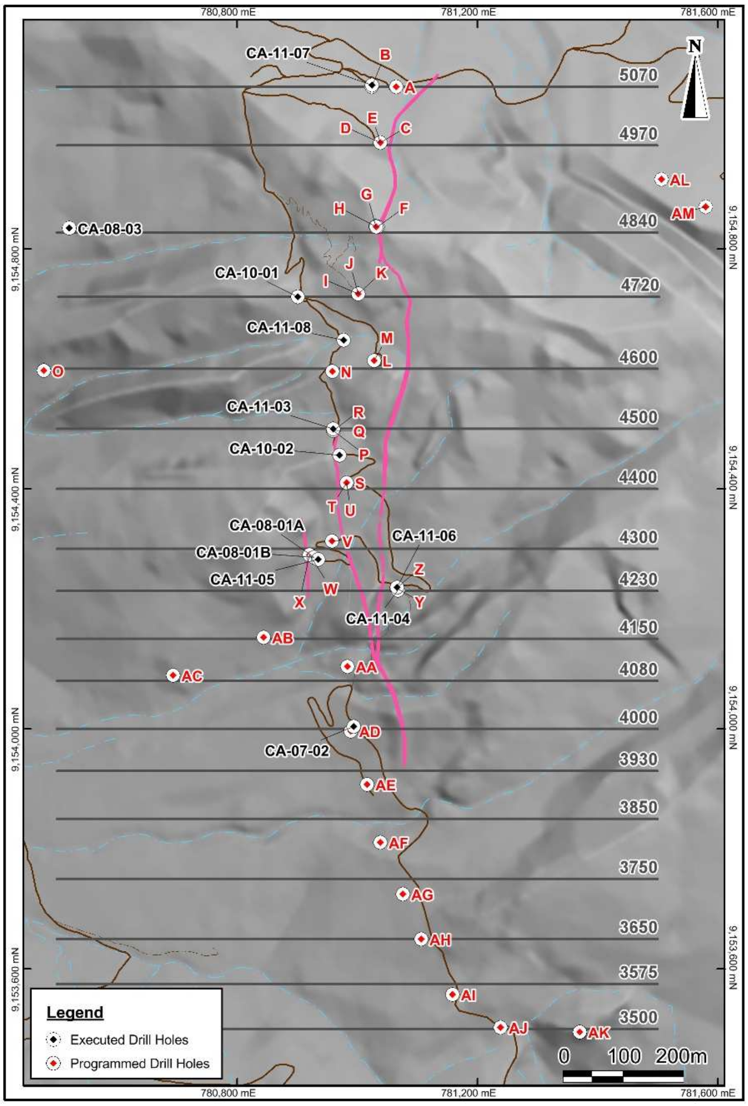


FIGURE 10-2: PLAN VIEW SHOWING INITIAL PLANNED 2011-2012 DRILL CAMPAIGN

It quickly became apparent that a higher density of drilling would be required in some areas to define the mineralization with sufficient confidence to support estimates of mineral resources. The presence of high grade mineralization shifted the focus to the south-central 600 m of strike length of the Callanquitas Structure, which has now been drilled to depths of between 250 m and 450 m below surface. The 2011-2012 campaign was completed in August 2012.

Table 10.1 lists the total metres and number of holes drilled at Callanquitas, and Figure 10-3 shows the drilling completed to date.

TABLE 10.1: DRILL HOLES AT CALLANQUITAS

Drilling Campaign	No. of Drill Holes	Drilling (m)
2007 – 2008	4	849.32
2010 – 2011	8	4,235.30
2011 – 2012	65	14,924.05
Total	**77**	**20,008.67**

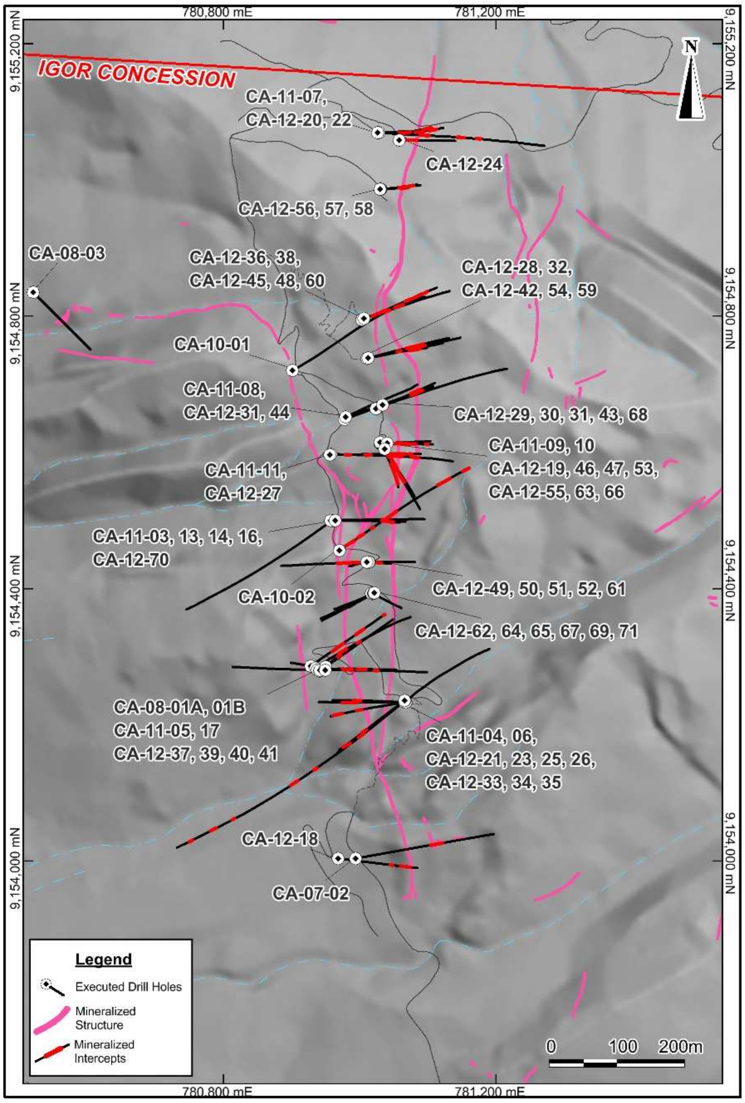


FIGURE 10-3: PLAN VIEW SHOWING DRILLING COMPLETED ON CALLANQUITAS STRUCTURE TO DATE

10.1 DRILLING PROCEDURES

In 2007–2008, drilling was done by Energold Drilling using a Hydrocore Series One portable rig.

In the subsequent two campaigns, the drilling contractors were AK Drilling and Bramsa (Bradley-MDH).

The largest share of the drilling was carried out by AK Drilling using the track-mounted, more powerful, Sandvik DE-710 shown in Figure 10-4.

FIGURE 10-4: SANDVIK DE-710 DRILL RIG

A Diamec 250 portable rig, operated by Bramsa, shown in Figure 10-5, was used where there was no road access and for shallow angled holes (< 50^{o} dip).

FIGURE 10-5: DIAMEC 250 DRILL RIG

All drill holes were diamond drill core and the core diameters varied with drilling conditions. A summary is presented in Table 10.2.

TABLE 10.2: DIAMOND DRILL CORE

Core Diameter	Drilling (m)
HQ (63.5 mm)	17,932.54
NQ (47.6 mm)	2,002.03
BQ (36.5 mm)	74.10
Total	**20,008.67**

Installation and setup of the drill rig was supervised by the geologist who used a GPS for location, and a compass and inclinometer to determine the correct azimuth and dip for the hole.

To-date, all drill holes from the 2010-2011 campaign were surveyed using a Reflex EZ-Trac down hole survey tool. Measurements of hole azimuth and dip were taken every 50 m and incorporated into the drill hole database.

Core recoveries average 93% and although there are local intervals with poor core recoveries, there is no apparent correlation between recovery and gold or silver grades. As a result, drilling recoveries do not appear to materially impact the accuracy and reliability of the results.

10.2 DRILLING RESULTS

A total of 74 drill holes have intersected the main Callanquitas Structure. Many of these drill holes also intersect other mineralized zones representing what are interpreted to be sub-parallel secondary structures. Some of the better results are shown in Figure 10-6. Note that these are core intervals, not true thicknesses. Some of the deeper holes have intersected the target structure at relatively shallow angles.

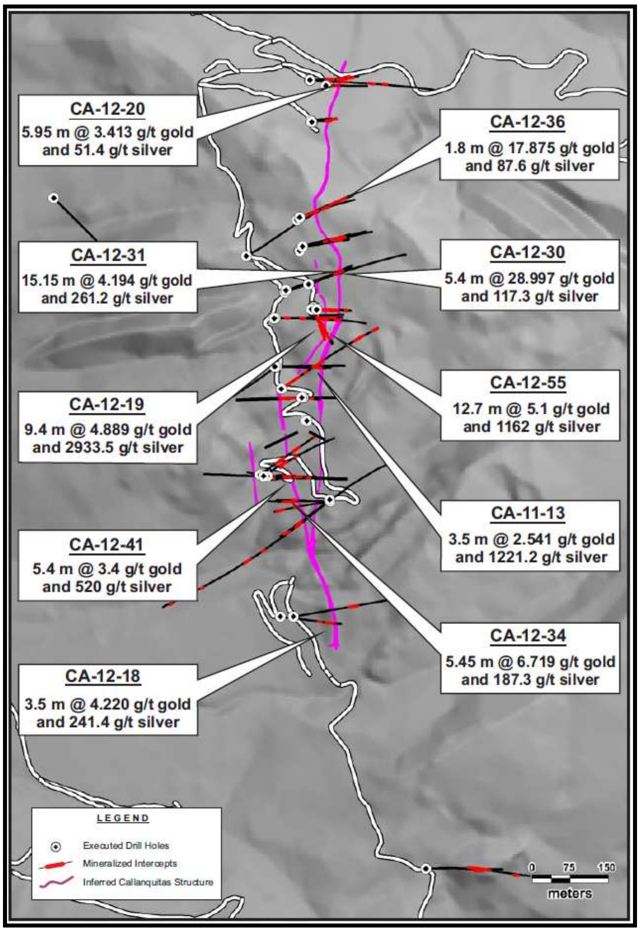


FIGURE 10-6: PLAN VIEW SHOWING THE DISTRIBUTION OF SOME OF THE BETTER DRILL INTERCEPTS AT CALLANQUITAS

A complete list of all mineralized intercepts is included in Table 10.3.

TABLE 10.3: SUMMARY OF DRILLING RESULTS

Drill Hole	From (m)	To (m)	Interval (m)	Gold (g/t)	Silver (g/t)
CA-10-01	404.00	411.90	7.90	0.02	35.1
CA-10-01	426.05	426.60	0.55	0.79	5.8
CA-10-02	12.00	47.00	35.00	0.57	16.4
Including	32.00	40.00	8.00	1.85	21.1
CA-10-02	77.30	79.00	1.70	1.20	1.5
CA-10-02	119.35	122.70	3.35	0.56	49.4
CA-10-02	188.20	204.00	15.80	0.69	56.6
Including	191.50	200.00	8.50	1.17	103.0
CA-10-02	392.50	396.00	3.50	0.47	42.1
CA-10-02	404.00	424.00	20.00	0.65	22.0
Including	406.90	414.10	7.20	1.42	46.4
CA-11-03	146.70	147.20	0.50	3.42	48.6
CA-11-03	460.00	464.00	4.00	0.34	3.7
CA-11-04	No significant intercepts				
CA-11-05	78.00	80.00	2.00	1.14	5.2
CA-11-05	100.50	168.00	67.50	0.35	88.1
Including	100.50	112.50	12.00	0.08	154.4
Including	126.00	150.00	24.00	0.81	134.9
Including	138.50	140.00	1.50	6.40	1360.0
CA-11-05	193.60	196.00	2.40	0.21	37.5
CA-11-05	206.00	209.45	3.45	0.07	38.1
CA-11-05	220.00	236.00	16.00	0.51	5.7
Including	223.50	228.00	4.50	1.46	12.3
CA-11-05	308.00	310.00	2.00	0.80	27.7
CA-11-06	142.00	183.30	41.30	1.26	16.9
Including	159.20	170.50	11.30	3.95	45.7
CA-11-06	208.60	223.80	15.20	0.02	23.4
CA-11-06	277.95	279.00	1.05	0.04	74.0
CA-11-06	317.70	327.00	9.30	0.11	23.4
CA-11-06	333.70	335.55	1.85	1.49	4.4
CA-11-06	390.60	423.25	32.65	0.26	18.1
CA-11-06	495.60	504.30	8.70	0.04	39.9

CA-11-06	564.50	565.20	0.70	1.43	20.1
CA-11-06	601.60	608.90	7.30	0.70	32.3
CA-11-06	622.30	624.75	2.45	0.26	20.5
CA-11-06	646.30	646.80	0.50	1.17	99.6
CA-11-06	660.90	674.40	13.50	0.46	30.0
Including	667.65	668.70	1.05	2.63	303.0
CA-11-06	729.70	738.50	8.80	0.30	0.5
Including	736.60	737.20	0.60	2.20	1.7
CA-11-07	129.60	155.00	25.40	1.99	17.1
Including	141.15	151.45	10.30	4.22	39.3
CA-11-07	244.00	268.50	24.50	0.14	25.4
Including	253.30	256.00	2.70	0.15	92.8
CA-11-07	315.00	316.85	1.85	0.32	34.4
CA-11-08	0.00	2.00	2.00	0.76	6.2
CA-11-08	135.70	145.70	10.00	0.01	19.7
CA-11-08	171.20	181.85	10.65	0.03	30.2
CA-11-08	206.75	241.80	35.05	1.61	243.1
Including	230.95	234.80	3.85	12.99	2099.4
CA-11-09	5.00	35.65	30.65	0.30	2.0
Including	11.90	13.40	1.50	1.49	17.4
CA-11-09	46.50	83.20	36.70	0.94	16.5
Including	77.95	81.20	3.25	4.75	25.9
CA-11-09	142.10	142.75	0.65	1.62	5.2
CA-11-10	8.25	18.90	10.65	0.71	5.1
Including	9.50	11.45	1.95	3.03	12.6
CA-11-10	98.65	131.75	33.10	2.18	4.8
Including	105.75	112.05	6.30	2.63	2.1
Including	113.55	115.10	1.55	1.43	6.6
Including	117.10	128.30	11.20	4.26	10.0
CA-11-10	162.85	179.45	16.60	0.72	9.6
Including	162.85	166.20	3.35	2.83	16.6
CA-11-11	45.40	48.50	3.10	0.50	2.7
CA-11-11	138.40	146.00	7.60	0.07	30.1
CA-11-11	171.00	210.00	39.00	0.42	230.3

Including	183.20	183.70	0.50	1.62	26.4
Including	189.10	190.35	1.25	1.08	5.9
Including	194.70	196.50	1.80	1.39	1833.7
Including	200.80	202.20	1.40	0.97	84.5
CA-11-11	240.40	256.20	15.80	0.28	266.2
Including	240.40	251.40	11.00	0.29	365.2
CA-11-11	265.00	267.00	2.00	0.01	25.2
CA-11-11	268.90	269.55	0.65	0.00	97.2
CA-11-12	4.15	17.20	13.05	0.62	59.7
Including	10.90	11.85	0.95	1.93	1.7
Including	14.90	15.80	0.90	4.17	822.0
CA-11-13	22.70	35.70	13.00	0.45	9.3
Including	26.30	27.50	1.20	2.13	6.3
CA-11-13	41.85	91.60	49.75	0.25	12.3
Including	84.55	85.40	0.85	0.07	232.0
Including	90.50	91.60	1.10	0.09	130.0
CA-11-13	118.30	128.45	10.15	0.99	434.9
Including	120.80	124.30	3.50	2.54	1221.2
Including	122.10	123.25	1.15	4.22	2119.0
CA-11-13	157.00	160.30	3.30	0.12	39.0
CA-11-14	17.60	34.50	16.90	0.49	10.7
Including	24.00	24.80	0.80	4.64	22.5
CA-11-14	50.90	66.60	15.70	0.48	5.0
Including	64.40	66.60	2.20	1.56	3.0
CA-11-14	160.00	176.00	16.00	0.37	8.0
CA-11-15	0.00	3.00	3.00	0.22	5.8
CA-11-15	15.40	17.50	2.10	0.30	43.3
Including	15.40	15.80	0.40	1.04	127.0
CA-11-15	275.00	277.20	2.20	1.04	106.7
Including	276.10	276.60	0.50	3.86	333.0
CA-11-15	429.25	429.75	0.50	0.58	34.8
CA-11-16	16.00	32.00	16.00	0.71	17.4
Including	29.00	29.95	0.95	5.54	13.0
CA-11-16	174.25	175.10	0.85	4.26	47.1

CA-11-16	231.00	233.00	2.00	0.96	500.0
CA-11-16	254.00	265.00	11.00	2.13	11.7
Including	255.40	259.10	3.70	5.30	14.0
Including	257.40	259.10	1.70	10.08	5.6
CA-11-17	17.90	18.70	0.80	4.28	61.2
CA-12-18	28.50	34.40	5.90	0.42	118.5
Including	30.50	32.00	1.50	0.33	448.0
CA-12-18	45.50	84.00	38.50	0.14	17.7
Including	47.40	47.90	0.50	1.22	15.1
CA-12-18	126.90	133.00	6.10	1.74	5.3
Including	129.70	131.20	1.50	6.51	9.9
Including	130.70	131.20	0.50	15.90	17.8
CA-12-18	152.00	159.30	7.30	2.16	122.9
Including	153.90	157.40	3.50	4.22	241.4
CA-12-18	164.00	174.60	10.60	0.32	5.3
CA-12-19	180.70	181.30	0.60	0.65	98.1
CA-12-19	232.00	348.00	116.00	1.25	487.3
Including	239.90	240.50	0.60	5.23	5026.0
Including	249.40	255.50	6.10	5.81	1628.7
Including	258.00	267.40	9.40	4.89	2933.5
Including	271.65	276.30	4.65	2.51	1482.6
Including	316.40	316.90	0.50	2.42	16.0
Including	322.60	323.60	1.00	0.65	384.0
Including	326.45	327.00	0.55	1.02	88.0
Including	329.00	329.80	0.80	1.74	77.7
CA-12-19	387.80	403.00	15.20	0.02	50.7
CA-12-19	411.40	414.20	2.80	0.56	187.3
Including	412.50	413.70	1.20	0.87	427.0
CA-12-20	6.00	8.00	2.00	0.01	75.8
CA-12-20	99.65	115.37	15.72	0.18	55.9
Including	101.65	103.75	2.10	0.11	267.9
CA-12-20	136.20	155.05	18.85	0.43	3.9
Including	142.30	143.00	0.70	3.53	6.5
CA-12-20	175.50	183.00	7.50	0.52	26.7

Including	179.50	181.70	2.20	1.39	72.8
CA-12-20	202.50	217.50	15.00	1.69	28.5
Including	210.00	215.95	5.95	3.41	51.4
CA-12-20	248.60	258.20	9.60	0.45	1.1
CA-12-20	273.05	275.00	1.95	0.26	50.2
CA-12-20	290.90	305.00	14.10	0.10	34.5
CA-12-21	136.10	147.00	10.90	0.26	15.9
CA-12-21	177.90	185.70	7.80	0.87	6.8
Including	177.90	179.10	1.20	4.91	4.7
CA-12-21	209.50	296.50	87.00	1.50	96.1
Including	228.00	245.60	17.60	4.67	403.0
Including	260.30	266.00	5.70	1.90	36.4
CA-12-21	314.40	317.50	3.10	0.45	2.5
CA-12-21	337.10	346.45	9.35	0.49	22.3
Including	342.20	343.10	0.90	1.48	12.7
CA-12-22	187.10	195.55	8.45	0.40	14.0
Including	187.10	188.30	1.20	1.39	85.1
CA-12-22	297.70	316.00	18.30	1.34	3.0
Including	297.70	306.00	8.30	2.34	3.5
Including	307.00	308.50	1.50	1.96	4.3
CA-12-22	328.00	353.50	25.50	0.89	19.4
Including	329.60	331.00	1.40	1.18	2.3
Including	339.20	342.00	2.80	4.48	48.6
CA-12-23	137.10	140.50	3.40	0.41	25.6
CA-12-23	155.50	183.40	27.90	0.79	24.0
Including	166.25	170.40	4.15	2.33	37.5
Including	175.60	177.30	1.70	2.28	135.0
CA-12-23	215.30	218.40	3.10	0.63	10.0
CA-12-24	32.20	53.20	21.00	0.65	14.6
Including	39.00	41.00	2.00	0.80	65.6
Including	47.30	49.00	1.70	2.67	6.8
CA-12-25	87.40	90.70	3.30	0.75	24.8
Including	87.40	88.40	1.00	1.45	68.3
CA-12-25	110.00	120.40	10.40	1.31	21.1

Including	112.00	115.70	3.70	2.13	29.0
CA-12-26	163.25	168.10	4.85	0.55	3.7
Including	167.60	168.10	0.50	1.93	15.9
CA-12-26	174.45	176.25	1.80	0.52	1.8
CA-12-26	249.00	277.50	28.50	0.70	4.1
Including	249.00	249.65	0.65	8.30	15.3
Including	260.50	266.05	5.55	1.39	7.4
Including	270.45	270.95	0.50	4.65	32.9
CA-12-26	303.50	306.75	3.25	0.16	28.0
CA-12-26	352.70	405.00	52.30	0.37	18.3
Including	367.90	371.00	3.10	1.05	101.8
Including	402.80	403.60	0.80	1.35	10.1
CA-12-27	88.50	91.25	2.75	0.33	20.5
CA-12-27	99.00	103.00	4.00	0.20	82.7
Including	101.05	103.00	1.95	0.00	144.0
CA-12-27	145.00	197.70	52.70	1.26	131.1
Including	156.90	174.50	17.60	3.08	251.7
Including	159.00	163.45	4.45	5.38	623.5
Including	196.60	197.70	1.10	1.59	10.9
CA-12-28	64.00	71.30	7.30	1.14	20.6
Including	70.70	71.30	0.60	4.11	148.0
CA-12-28	115.50	124.70	9.20	1.06	2.3
Including	117.10	118.70	1.60	2.41	2.5
CA-12-29	81.00	113.60	32.60	3.67	11.2
Including	90.30	108.00	17.70	6.44	17.7
Including	95.50	108.00	12.50	7.90	16.3
CA-12-30	133.00	139.00	6.00	0.23	2.0
CA-12-30	179.35	196.65	17.30	11.93	60.1
Including	184.70	190.10	5.40	29.00	123.7
Including	185.70	188.80	3.10	38.49	193.5
CA-12-31	258.50	260.60	2.10	0.54	13.4
Including	260.10	260.60	0.50	1.88	2.7
CA-12-31	272.50	276.50	4.00	0.04	48.2
CA-12-31	283.15	315.60	32.45	2.17	167.7

Including	297.35	312.50	15.15	4.26	259.9
Including	301.50	307.00	5.50	7.89	679.6
CA-12-32	61.80	65.70	3.90	0.51	9.4
Including	61.80	63.30	1.50	1.10	15.2
CA-12-32	101.50	145.00	43.50	0.60	17.8
Including	105.90	109.20	3.30	2.95	161.3
Including	114.90	116.20	1.30	1.42	18.3
Including	141.70	143.30	1.60	2.86	2.9
CA-12-33	132.85	135.00	2.15	0.65	4.6
CA-12-33	314.00	351.00	37.00	0.68	17.5
Including	327.30	335.00	7.70	2.53	49.8
Including	327.30	328.90	1.60	6.27	215.0
Including	334.30	335.00	0.70	4.78	10.4
CA-12-34	265.70	281.00	15.30	2.74	76.7
Including	273.00	278.45	5.45	6.72	187.3
Including	275.25	277.00	1.75	12.33	530.0
CA-12-34	315.00	317.00	2.00	1.79	1.1
CA-12-35	113.40	125.70	12.30	2.11	12.5
Including	118.70	123.40	4.70	4.97	26.3
Including	122.20	123.40	1.20	8.15	70.4
CA-12-35	130.10	133.50	3.40	0.13	3.9
CA-12-35	154.90	155.40	0.50	1.32	18.0
CA-12-36	56.00	62.00	6.00	0.42	14.0
CA-12-36	66.00	78.40	12.40	2.87	15.6
Including	74.80	76.60	1.80	17.87	87.6
Including	74.80	75.40	0.60	50.55	255.0
CA-12-36	87.70	91.90	4.20	0.23	3.9
CA-12-36	94.80	98.60	3.80	0.38	3.4
CA-12-37	2.30	8.90	6.60	0.18	10.1
CA-12-37	12.90	14.40	1.50	0.91	36.7
CA-12-37	83.00	85.00	2.00	0.41	7.7
CA-12-37	124.00	128.85	4.85	0.00	31.7
CA-12-37	139.50	146.50	7.00	0.01	20.7
CA-12-37	155.15	182.90	27.75	0.69	27.3

Including	156.95	160.40	3.45	3.03	80.5
Including	175.20	176.80	1.60	1.32	4.8
CA-12-37	210.05	218.00	7.95	0.21	19.9
CA-12-37	243.50	254.00	10.50	0.38	25.1
Including	251.10	252.15	1.05	1.01	37.5
CA-12-38	64.00	80.20	16.20	0.41	3.3
Including	76.00	78.00	2.00	1.22	0.8
CA-12-38	97.70	104.30	6.60	0.24	1.9
CA-12-38	131.00	142.00	11.00	0.21	20.3
CA-12-38	148.00	168.00	20.00	1.88	7.0
Including	149.60	154.20	4.60	5.64	16.8
Including	164.45	166.30	1.85	4.76	18.6
CA-12-38	174.40	228.00	53.60	0.78	34.4
Including	177.50	179.00	1.50	1.31	10.7
Including	196.20	200.10	3.90	3.41	6.2
Including	212.75	213.60	0.85	2.84	11.6
Including	215.40	216.35	0.95	2.00	21.5
CA-12-39	8.50	21.40	12.90	0.51	16.8
Including	19.40	21.40	2.00	2.25	62.5
CA-12-39	68.00	80.00	12.00	0.70	10.6
Including	68.00	70.00	2.00	2.84	43.2
CA-12-39	125.10	134.20	9.10	0.64	7.1
Including	131.40	132.40	1.00	2.97	17.7
CA-12-40	8.60	9.40	0.80	0.53	12.5
CA-12-40	15.40	17.85	2.45	0.92	29.9
CA-12-40	99.60	138.20	38.60	0.49	46.0
Including	99.60	100.50	0.90	9.97	1132.0
Including	131.30	133.20	1.90	1.05	54.3
CA-12-40	151.50	152.00	0.50	0.71	12.4
CA-12-40	156.00	196.35	40.35	0.87	18.6
Including	167.80	172.90	5.10	3.62	13.1
Including	188.70	190.00	1.30	2.66	10.0
CA-12-41	7.90	20.80	12.90	0.48	19.7
Including	11.50	14.40	2.90	1.62	49.3

CA-12-41	118.00	130.00	12.00	0.17	32.0
CA-12-41	162.90	193.00	30.10	0.83	103.1
Including	164.20	169.60	5.40	3.39	520.5
Including	168.20	169.60	1.40	9.73	1864.4
CA-12-41	227.70	236.00	8.30	1.17	20.8
Including	230.20	232.15	1.95	3.98	59.8
CA-12-42	99.10	100.60	1.50	1.14	8.2
CA-12-42	148.00	189.50	41.50	1.26	8.2
Including	157.40	157.90	0.50	1.98	8.6
Including	165.40	169.00	3.60	2.00	38.4
Including	175.70	182.20	6.50	5.50	21.1
Including	178.90	180.80	1.90	12.49	10.9
CA-12-43	123.00	128.90	5.90	0.39	1.2
Including	127.00	127.50	0.50	1.47	1.4
CA-12-43	135.50	149.40	13.90	2.11	5.4
Including	145.00	149.40	4.40	6.18	10.4
CA-12-43	154.20	159.00	4.80	0.44	2.4
Including	158.50	159.00	0.50	2.73	10.3
CA-12-44	336.70	383.10	46.40	0.71	45.4
Including	344.70	349.30	4.60	0.94	103.0
Including	363.50	370.70	7.20	2.49	107.8
CA-12-45	23.00	38.00	15.00	0.02	1.3
CA-12-45	63.00	72.00	9.00	0.25	10.6
CA-12-45	108.00	156.70	48.70	1.91	9.1
Including	134.80	154.40	19.60	4.49	19.1
Including	139.10	148.50	9.40	7.25	32.5
CA-12-46	11.00	56.70	45.70	0.28	1.2
CA-12-46	74.80	112.30	37.50	0.97	36.0
Including	98.70	103.15	4.45	6.06	176.4
CA-12-47	12.50	18.00	5.50	1.83	18.7
CA-12-47	35.20	53.30	18.10	0.19	2.6
CA-12-47	73.60	76.30	2.70	0.28	50.8
CA-12-47	120.00	139.00	19.00	0.06	48.0
Including	120.00	133.50	13.50	0.07	60.2

Including	129.00	130.40	1.40	0.17	310.0
CA-12-47	148.20	272.50	124.30	0.60	84.5
Including	162.00	218.10	56.10	0.64	154.4
Including	243.30	249.60	6.30	0.98	211.9
Including	262.00	269.00	7.00	2.73	26.3
CA-12-47	282.00	297.50	15.50	0.33	3.2
CA-12-48	43.30	43.90	0.60	8.48	42.5
CA-12-48	70.70	72.30	1.60	8.96	36.8
CA-12-48	81.00	85.60	4.60	2.12	8.5
Including	81.00	84.20	3.20	2.89	10.5
CA-12-48	133.20	136.90	3.70	1.03	4.8
Including	134.90	135.90	1.00	2.80	4.9
CA-12-48	141.90	171.20	29.30	0.33	2.5
Including	160.60	162.60	2.00	1.41	3.5
CA-12-48	220.00	250.40	30.40	1.02	5.4
Including	221.50	223.00	1.50	1.87	9.7
Including	238.05	246.15	8.10	2.55	9.2
Including	239.90	244.00	4.10	3.95	8.1
CA-12-48	273.00	301.00	28.00	2.05	79.1
Including	287.50	298.50	11.00	4.80	188.4
Including	292.60	298.50	5.90	7.01	321.1
CA-12-49	0.00	2.90	2.90	1.13	0.2
CA-12-49	86.00	99.00	13.00	0.05	78.0
Including	89.90	93.00	3.10	0.03	263.8
CA-12-50	25.60	34.70	9.10	0.33	24.9
CA-12-50	64.00	73.60	9.60	0.24	2.9
CA-12-50	85.40	95.70	10.30	0.25	30.2
Including	297.35	312.50	15.15	4.26	259.9
Including	301.50	307.00	5.50	7.89	679.6
CA-12-51	20.00	27.70	7.70	0.26	2.4
CA-12-51	32.25	56.10	23.85	0.69	30.9
Including	44.40	47.90	3.50	1.64	91.7
Including	52.80	54.10	1.30	2.36	74.6
CA-12-51	60.40	61.70	1.30	0.68	20.9

CA-12-51	63.80	70.00	6.20	0.75	12.4
CA-12-52	92.80	141.00	48.20	1.30	11.3
Including	92.80	94.00	1.20	1.17	3.0
Including	98.00	106.20	8.20	3.04	39.2
Including	116.90	117.90	1.00	6.00	13.8
Including	124.50	127.50	3.00	7.07	7.6
CA-12-53	94.50	157.40	62.90	1.58	49.3
Including	110.90	116.10	5.20	2.17	25.7
Including	120.25	138.50	18.25	4.60	79.2
CA-12-53	169.75	178.00	8.25	0.10	96.5
CA-12-54	219.10	242.40	23.30	0.41	2.7
Including	219.10	221.20	2.10	2.09	10.3
CA-12-54	251.60	276.20	24.60	0.99	9.0
Including	251.60	256.10	4.50	4.16	4.2
Including	265.20	268.80	3.60	0.27	33.3
CA-12-55	15.00	20.90	5.90	0.59	11.4
CA-12-55	156.00	159.50	3.50	0.39	69.2
CA-12-55	176.00	301.00	125.00	1.25	191.8
Including	178.40	184.00	5.60	1.25	382.4
Including	186.00	190.00	4.00	1.70	35.3
Including	194.60	207.30	12.70	5.13	1162.5
Including	221.40	223.00	1.60	1.01	3.2
Including	233.30	237.10	3.80	3.14	88.8
Including	244.20	248.20	4.00	1.67	180.3
Including	262.40	273.55	11.15	1.42	468.7
Including	277.05	282.00	4.95	2.33	24.2
CA-12-56	59.20	76.80	17.60	0.89	3.2
Including	69.40	73.20	3.80	2.75	2.2
Including	75.30	76.80	1.50	1.47	27.0
CA-12-57	103.90	112.80	8.90	0.83	2.0
Including	103.90	107.85	3.95	1.55	2.8
CA-12-57	116.10	133.00	16.90	0.18	55.3
Including	127.00	131.00	4.00	0.01	212.7
CA-12-57	142.50	171.20	28.70	0.48	4.9

Including	159.90	160.50	0.60	2.38	49.9
CA-12-58	0.00	1.00	1.00	0.08	108.0
CA-12-59	68.00	95.50	27.50	0.56	3.5
Including	72.50	75.00	2.50	1.77	3.0
Including	80.90	83.40	2.50	2.70	3.7
CA-12-60	52.00	60.70	8.70	0.71	3.1
Including	56.90	58.75	1.85	2.02	13.0
Including	60.10	60.70	0.60	2.32	2.7
CA-12-61	7.45	12.20	4.75	0.82	9.6
Including	8.50	10.00	1.50	2.05	15.2
CA-12-61	60.60	63.95	3.35	0.31	28.7
CA-12-61	72.15	123.00	50.85	0.40	3.9
Including	84.95	87.50	2.55	3.33	6.9
CA-12-61	143.20	211.10	67.90	0.78	34.9
Including	144.30	155.50	11.20	1.20	85.8
Including	160.70	162.30	1.60	2.79	47.9
Including	184.00	187.00	3.00	1.72	36.3
Including	195.10	204.50	9.40	1.64	59.1
Including	208.60	211.10	2.50	1.47	45.4
CA-12-62	24.00	26.00	2.00	0.28	22.7
CA-12-63	10.60	19.00	8.40	0.24	1.4
CA-12-63	45.10	48.30	3.20	1.72	3.7
Including	47.80	48.30	0.50	7.67	7.4
CA-12-63	64.10	65.50	1.40	0.04	53.1
CA-12-64	55.80	58.90	3.10	0.23	31.7
CA-12-65	68.60	88.00	19.40	2.18	31.9
Including	71.10	82.20	11.10	3.52	34.9
CA-12-66	37.50	43.00	5.50	0.24	0.6
CA-12-66	61.00	78.00	17.00	0.37	54.4
Including	62.50	69.70	7.20	0.57	89.6
Including	69.00	69.70	0.70	1.26	352.0
CA-12-67	73.50	88.50	15.00	0.30	26.8
CA-12-67	101.50	117.50	16.00	2.45	31.1
Including	104.30	112.00	7.70	4.77	48.8

Including	105.40	109.60	4.20	6.84	40.9
CA-12-67	122.50	136.00	13.50	0.37	53.3
Including	124.50	128.00	3.50	1.33	116.3
CA-12-68	1.50	8.80	7.30	1.27	34.3
Including	4.25	8.80	4.55	1.95	54.7
Including	7.50	8.80	1.30	3.42	134.0
CA-12-68	38.00	41.70	3.70	1.78	21.6
Including	39.60	40.35	0.75	8.28	97.7
CA-12-68	65.70	70.00	4.30	2.13	10.6
Including	68.10	70.00	1.90	3.88	12.0
CA-12-69	117.50	137.00	19.50	0.35	13.5
CA-12-69	167.10	170.25	3.15	0.74	29.1
Including	167.75	169.10	1.35	1.25	60.4
CA-12-70	0.00	16.65	16.65	0.69	57.2
Including	4.00	8.00	4.00	1.79	190.0
Including	4.00	6.00	2.00	2.19	338.0
Including	13.65	14.60	0.95	1.58	7.4
CA-12-70	27.30	42.70	15.40	0.24	3.4
CA-12-70	58.70	84.00	25.30	0.69	10.9
Including	58.70	59.80	1.10	1.30	1.8
Including	67.90	69.80	1.90	1.21	4.6
Including	75.80	82.25	6.45	1.54	36.2
CA-12-71	77.10	79.00	1.90	0.35	99.2
CA-12-71	86.40	121.30	34.90	0.76	4.0
Including	103.10	107.50	4.40	1.40	3.3
Including	113.75	116.35	2.60	3.26	21.5
Including	119.00	119.60	0.60	9.70	15.1
CA-12-71	136.60	148.00	11.40	0.77	35.8
CA-12-71	173.70	176.30	2.60	0.21	16.9
CA-12-71	191.70	206.90	15.20	0.10	49.0
Including	203.20	205.70	2.50	0.28	134.6
CA-12-72	27.60	32.10	4.50	1.23	25.0
Including	29.20	32.10	2.90	1.83	38.2
CA-12-72	44.30	45.60	1.30	1.44	62.3

CA-12-72	66.10	68.50	2.40	0.40	1.5
CA-12-73	25.80	26.80	1.00	5.06	15.0
CA-12-73	32.00	36.00	4.00	0.21	0.8
CA-12-73	45.00	48.60	3.60	2.35	22.6
CA-12-73	58.00	59.00	1.00	1.08	2.4
CA-12-73	91.00	94.10	3.10	0.24	3.2

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 CORE HANDLING, LOGGING, AND SAMPLING

Full core boxes are collected from the drill site, moved to the core shack, unloaded, and laid out for geological logging, as shown in Figure 11-1.

FIGURE 11-1: CORE BOXES BEING DELIVERED TO THE CORE SHACK

Basic information such as meterage per box, depth markers, and recoveries are reviewed, as shown in Figure 11-2.

FIGURE 11-2: INITIAL REVIEW TO CONFIRM ACCURACY OF CORE MEASUREMENTS AND RECOVERIES

11.2 GEOTECHNICAL LOGGING

Before the core is handled any further, geotechnical logging is conducted. Various types of information are recorded, including recovery, RQD, fracture frequency, weathering, alteration and joint classification. Point Load Testing (PLT) is conducted on ten metre intervals down each drill hole.

11.3 GEOLOGICAL LOGGING

Geological logging is conducted by the on-site geologist, as shown in Figure 11-3. The lithology, alteration, mineralization, and structural variations in the core are recorded on a standardized logging form; this information is eventually transferred into a digital database.

FIGURE 11-3: GEOLOGIC CORE LOGGING

After the core has been logged, it is marked-up by the geologist for sampling; the lithological contacts, alteration, structure, and the presence and quantity of mineralization is noted, as shown in Figure 11-4.

FIGURE 11-4: CORE SAMPLE MARK-UP

Sample intervals should be ≥ 0.5 m and ≤ 2.0 m.

In the case of poor or no recovery, samples are separated; in this case, samples > 2.0 m are permitted. A zone with poor recovery is never mixed with a zone of good recovery, as shown in Figure 11-5.

FIGURE 11-5: EXAMPLE OF SAMPLE INTERVAL WITH POOR CORE RECOVERY

After the sample interval has been defined, it is clearly marked on the core box along with the sample number, as shown in Figure 11-6.

FIGURE 11-6: SAMPLE INTERVAL RECORDED ON CORE BOX

Quality assurance and quality control samples are inserted every tenth sample: for every 9 samples, the tenth sample is a blank, standard, or a duplicate.

Duplicates are obtained by taking the halved core and cutting it again to produce two quarter piece of core to obtain two samples from the same interval.

Before the cut is made, the core is marked-up so that two symmetrical pieces are produced, as shown in Figure 11-7.

FIGURE 11-7: LINE MARKED ON CORE INTERVALS FOR CUTTING

The core is photographed. The information plate includes the drill hole ID, azimuth, dip, box number, and interval, as shown in Figure 11-8.

FIGURE 11-8: INFORMATION PLATE USED WHILE PHOTOGRAPHING CORE BOXES

The marked-up core is moved to the core cutting shack and boxes are laid out in order, as shown in Figure 11-9.

FIGURE 11-9: CORE SAWING SHACK

The core is cut along the control lines and care is taken to split the core symmetrically, as shown in Figure 11-10.

FIGURE 11-10: DIAMOND SAW USED TO SPLIT CORE SAMPLES

After the core has been cut, the two halves are replaced in the core box (heavily fractured or clay rich intervals are sampled using a spatula), and the core boxes are returned to the core logging shack.

In the core shack, the core boxes are organized and prepared for sampling, as shown in Figure 11-11.

FIGURE 11-11: BOX CONTAINING CUT CORE READY FOR SAMPLING

One-half of the pre-cut core is placed in the sample bag along with the corresponding pre-numbered sample tag and sealed using a zip tie. Heavy duty polythene sacks are used to hold the samples and sample numbers are clearly written on the outside of the bag in permanent marker. This process is shown in Figure 11-12.

FIGURE 11-12: BAGGING SPLIT CORE INTERVALS

After the samples are bagged, they are collected and placed in larger (rice) sacks; there are six individual samples per sack. The sacks are numbered, labelled with the sample numbers, and sealed, as shown in Figure 11-13.

FIGURE 11-13: LABELLING RICE BAG CONTAINING 6 INDIVIDUAL SPLIT CORE SAMPLES

Samples are shipped to Trujillo in lots of 72 samples each. A way bill accompanies each shipment to Trujillo where it is received at the office of the local analytical laboratory. Upon receipt, the lab checks that the included samples match the waybill; the lab signs for the shipment, and sends them to Lima for analysis.

11.4 PREPARATION AND ANALYTICAL METHODS

Sienna has used two different laboratories to process samples collected during the 7 years that they have been working on the Igor project: ALS Chemex (2006-2008 and 2010-11) and SGS (2006 and 2011-12). The laboratory codes for ALS Chemex and SGS, and a brief summary of preparation and analytical methods are presented in Tables 11.1 and 11.2, respectively.

TABLE 11.1: ALS CHEMEX SAMPLE PREPARATION AND ANALYTICAL METHOD

Laboratory Code	ALS Chemex Preparation and Analytical Method
LOG-22	Log sample into the tracking system and attach bar code label
CRU-31	Finely crush rock chip and drill samples to greater than 70% of the sample passing 2 mm
SPL-21	Split sample using riffle splitter
PUL-31	Pulverize a sample split (up to 250 g) to greater than 85% of the sample passing 75 microns
Au-AA23	30 g Fire Assay (FA) and Atomic Absorption Spectroscopy (AAS) finish1
ME-ICP41	34 Element Aqua Regia Digestion followed by Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP-AES)2,3
1. Au-GRA21	Analyze gold (>10 ppm) using Fire Assay (FA) 30 g with gravimetric (GRAV) finish
2. Ag-AA46	Analyze silver (> 100 ppm), copper, lead and zinc (>10,000 ppm) using Aqua Regia digest with atomic absorption finish
3. Ag-GRA21	Analyze silver (>1,500 ppm) using fire assay 30 g and gravimetric (GRAV) finish

TABLE 11.2: SGS SAMPLE PREPARATION AND ANALYTICAL METHOD

Laboratory Code	SGS Preparation and Analytical Method
PRP93	Receive, dry and crush sample > 90% to - 10 mesh. Split and pulverize sample > 95% to - 140 mesh.
Au-AA23	30 g Fire Assay with nitric and hydrochloric acid digestion and analysis by Atomic Absorption Spectroscopy. Lower limit 0.005ppm; upper limit 5 ppm 1
ME-ICP41	0.2 g sample was subject to Aqua Regia digest then analyzed for 39 elements by ICP-AES2,3
1. FAG303	Analyze gold (>10 ppm) using fire assay (FA) 30 g with gravimetric (GRAV) finish.
2. AA11B	Analyze silver (>100 ppm) and copper, lead and zinc (>10,000 ppm) using Aqua Regia digest with atomic absorption finish
3. FAG303	Analyze silver (>1,500 ppm) using fire assay 30 g with gravimetric (GRAV) finish.

Quality Assurance/Quality Control (QA/QC)

A rigorous QA/QC program has been implemented on the Igor project that includes the use of blind standards and blanks, as well as a periodic duplication of samples.

Every tenth sample, either drill core or surface sample, was assigned as a control. These controls consisted of blanks (coarse quartz) or duplicates (core sample was quartered, or a repeat sample was collected in the field), or the control was an officially certified standard.

The QA/QC results for a standard batch of 72 samples are shown in Table 11.3.

TABLE 11.3: DISTRIBUTION OF QA/QC SAMPLES IN A TYPICAL BATCH OF SAMPLES

Description	Quantity	%
Total number of samples	72	100.00%
Actual samples	63	87.50%
QA/QC Samples:	**9**	**12.50%**
Coarse quartz blank	4	5.56%
Standard (see Table 11.4)	3	4.17%
Duplicate	2	2.77%

Table 11.4 shows the distribution of QA/QC samples included in a series of nine batches of samples sent to the lab. The columns indicate the lot numbers assigned on the project. Standard samples are highlighted in red, duplicate samples in green, and blank samples in blue.

TABLE 11.4: QA/QC SAMPLES HIGHLIGHTED IN A SERIES OF SAMPLE BATCHES SENT TO THE LAB

Número	IGO-059-12	IGO-060-12	IGO-061-12	IGO-062-12	IGO-063-12	IGO-064-12	IGO-065-12	IGO-066-12	IGO-067-12
1	K155240	K156562	K156634	K156706	K156778	K156850	K156922	K156994	K157066
2	K155241	K156563	K156635	K156707	K156779	K156851	K156923	K156995	K157067
3	K155242	K156564	K156636	K156708	K156780	K156852	K156924	K156996	K157068
4	K155243	K156565	K156637	K156709	K156781	K156853	K156925	K156997	K157069
5	K155244	K156566	K156638	K156710	K156782	K156854	K156926	K156998	K157070
6	K155245	K156567	K156639	K156711	K156783	K156855	K156927	K156999	K157071
7	K155246	K156568	K156640	K156712	K156784	K156856	K156928	K157000	K157072
8	K155247	K156569	K156641	K156713	K156785	K156857	K156929	K157001	K157073
9	K155248	K156570	K156642	K156714	K156786	K156858	K156930	K157002	K157074
10	K155249	K156571	K156643	K156715	K156787	K156859	K156931	K157003	K157075
11	K155250	K156572	K156644	K156716	K156788	K156860	K156932	K157004	K157076
12	K156501	K156573	K156645	K156717	K156789	K156861	K156933	K157005	K157077
13	K156502	K156574	K156646	K156718	K156790	K156862	K156934	K157006	K157078
14	K156503	K156575	K156647	K156719	K156791	K156863	K156935	K157007	K157079
15	K156504	K156576	K156648	K156720	K156792	K156864	K156936	K157008	K157080
16	K156505	K156577	K156649	K156721	K156793	K156865	K156937	K157009	K157081
17	K156506	K156578	K156650	K156722	K156794	K156866	K156938	K157010	K157082
18	K156507	K156579	K156651	K156723	K156795	K156867	K156939	K157011	K157083
19	K156508	K156580	K156652	K156724	K156796	K156868	K156940	K157012	K157084
20	K156509	K156581	K156653	K156725	K156797	K156869	K156941	K157013	K157085
21	K156510	K156582	K156654	K156726	K156798	K156870	K156942	K157014	K157086
22	K156511	K156583	K156655	K156727	K156799	K156871	K156943	K157015	K157087
23	K156512	K156584	K156656	K156728	K156800	K156872	K156944	K157016	K157088
24	K156513	K156585	K156657	K156729	K156801	K156873	K156945	K157017	K157089
25	K156514	K156586	K156658	K156730	K156802	K156874	K156946	K157018	K157090
26	K156515	K156587	K156659	K156731	K156803	K156875	K156947	K157019	K157091
27	K156516	K156588	K156660	K156732	K156804	K156876	K156948	K157020	K157092
28	K156517	K156589	K156661	K156733	K156805	K156877	K156949	K157021	K157093
29	K156518	K156590	K156662	K156734	K156806	K156878	K156950	K157022	K157094
30	K156519	K156591	K156663	K156735	K156807	K156879	K156951	K157023	K157095
31	K156520	K156592	K156664	K156736	K156808	K156880	K156952	K157024	K157096
32	K156521	K156593	K156665	K156737	K156809	K156881	K156953	K157025	K157097
33	K156522	K156594	K156666	K156738	K156810	K156882	K156954	K157026	K157098
34	K156523	K156595	K156667	K156739	K156811	K156883	K156955	K157027	K157099
35	K156524	K156596	K156668	K156740	K156812	K156884	K156956	K157028	K157100
36	K156525	K156597	K156669	K156741	K156813	K156885	K156957	K157029	K157101
37	K156526	K156598	K156670	K156742	K156814	K156886	K156958	K157030	K157102
38	K156527	K156599	K156671	K156743	K156815	K156887	K156959	K157031	K157103
39	K156528	K156600	K156672	K156744	K156816	K156888	K156960	K157032	K157104
40	K156529	K156601	K156673	K156745	K156817	K156889	K156961	K157033	K157105
41	K156530	K156602	K156674	K156746	K156818	K156890	K156962	K157034	K157106
42	K156531	K156603	K156675	K156747	K156819	K156891	K156963	K157035	K157107
43	K156532	K156604	K156676	K156748	K156820	K156892	K156964	K157036	K157108
44	K156533	K156605	K156677	K156749	K156821	K156893	K156965	K157037	K157109
45	K156534	K156606	K156678	K156750	K156822	K156894	K156966	K157038	K157110
46	K156535	K156607	K156679	K156751	K156823	K156895	K156967	K157039	K157111
47	K156536	K156608	K156680	K156752	K156824	K156896	K156968	K157040	K157112
48	K156537	K156609	K156681	K156753	K156825	K156897	K156969	K157041	K157113
49	K156538	K156610	K156682	K156754	K156826	K156898	K156970	K157042	K157114
50	K156539	K156611	K156683	K156755	K156827	K156899	K156971	K157043	K157115
51	K156540	K156612	K156684	K156756	K156828	K156900	K156972	K157044	K157116
52	K156541	K156613	K156685	K156757	K156829	K156901	K156973	K157045	K157117
53	K156542	K156614	K156686	K156758	K156830	K156902	K156974	K157046	K157118
54	K156543	K156615	K156687	K156759	K156831	K156903	K156975	K157047	K157119
55	K156544	K156616	K156688	K156760	K156832	K156904	K156976	K157048	K157120
56	K156545	K156617	K156689	K156761	K156833	K156905	K156977	K157049	K157121
57	K156546	K156618	K156690	K156762	K156834	K156906	K156978	K157050	K157122
58	K156547	K156619	K156691	K156763	K156835	K156907	K156979	K157051	K157123
59	K156548	K156620	K156692	K156764	K156836	K156908	K156980	K157052	K157124
60	K156549	K156621	K156693	K156765	K156837	K156909	K156981	K157053	K157125
61	K156550	K156622	K156694	K156766	K156838	K156910	K156982	K157054	K157126
62	K156551	K156623	K156695	K156767	K156839	K156911	K156983	K157055	K157127
63	K156552	K156624	K156696	K156768	K156840	K156912	K156984	K157056	K157128
64	K156553	K156625	K156697	K156769	K156841	K156913	K156985	K157057	K157129
65	K156554	K156626	K156698	K156770	K156842	K156914	K156986	K157058	K157130
66	K156555	K156627	K156699	K156771	K156843	K156915	K156987	K157059	K157131
67	K156556	K156628	K156700	K156772	K156844	K156916	K156988	K157060	K157132
68	K156557	K156629	K156701	K156773	K156845	K156917	K156989	K157061	K157133
69	K156558	K156630	K156702	K156774	K156846	K156918	K156990	K157062	K157134
70	K156559	K156631	K156703	K156775	K156847	K156919	K156991	K157063	K157135
71	K156560	K156632	K156704	K156776	K156848	K156920	K156992	K157064	K157136
72	K156561	K156633	K156705	K156777	K156849	K156921	K156993	K157065	K157137

The standards are shown in Table 11.5.

TABLE 11.5: CERTIFIED STANDARDS USED AT CALLANQUITAS

Standard	Au g/t	Standard Deviation	Coefficient Interval	Laboratory	Date of Certification	Observations
SE29	0.597	0.016	+-0.007	ROCKLABS	New Zelanda, 6 de setiembre del 2006	Used in holes CA-10-01 to CA-11-08 and in lots IGO-001-11, IGO-001A-11, IGO-001B-11, IGO-002-11, IGO-003-11, IGO-004-11, IGO-005-11, IGO-006-11, IGO-007-11, IGO-008-11, IGO-009-11
SE58	0.607	0.019	+-0.006	ROCKLABS	New Zelanda, 29 de Noviembre del 2010	Used in lots IGO-010-11 (CA-11-14) and IGO-006A-12 (CA-12-42)
OxJ80	2.331	0.042	+-0.014	ROCKLABS	New Zelanda, 7 de abril del 2010	Used in lots 67, 68, 69, 71, 72, 73, 75 76, 77, 79, 80, 81, 83, 84, 85, 87, 88, 89, 91, 92, 93, 95, 96, 97, 98, 99 and in lots 7A, 8A, 9A, 11A, 12A, 13A, 15A, 16A, 17A, 18A, 19A, every third standard.
SL51	5.909	0.136	+-0.047	ROCKLABS	New Zelanda, 19 dejunio del 2009	
OxF100	0.804	0.019	+-0.006	ROCKLABS	New Zelanda, 7 de marzo del 2012	Used in lots 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 y desde el lote 13A, 14A, 15A, 16A, 17A, 18A, 19A.
TR 11209	0.663	0.024		SMEE & ASSOCIATES CONSULTING LTD	Peru, junio del 2011	Used in lots 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85 y desde el lote 7A, 8A, 9A, 10A, 11A, 12A.
PAL-11	2.050	0.110		SMEE & ASSOCIATES CONSULTING LTD	Peru, abril del 2012	

11.5 RESULTS OF QA/QC WORK

The author conducted a detailed review of the 2011-2012 QA/QC drill program data provided by Sienna. Results of this work are summarized here.

Approximately one in ten control samples are submitted over the period of the drill programs. This provides sufficient control to insure the accuracy and precision of the sample assays.

Field duplicate samples are taken to check the geological variability of the sample size. Field duplicate results for gold show erratic reproducibility. This indicates that the high variability seen in field duplicate results may be due to geological variability (also known as the *nugget effect*).

Sienna used six different standard reference materials for gold. All quality control samples plotted within control limits of the accepted values at less than the prescribed rate. Consequently, there are no significant issues with the gold analyses. No reference material for silver was specifically used, but the silver results for the gold standards indicate consistent results for standards; no problems with silver analysis for silver are suspected. An example control chart is shown in Figure 11-14.

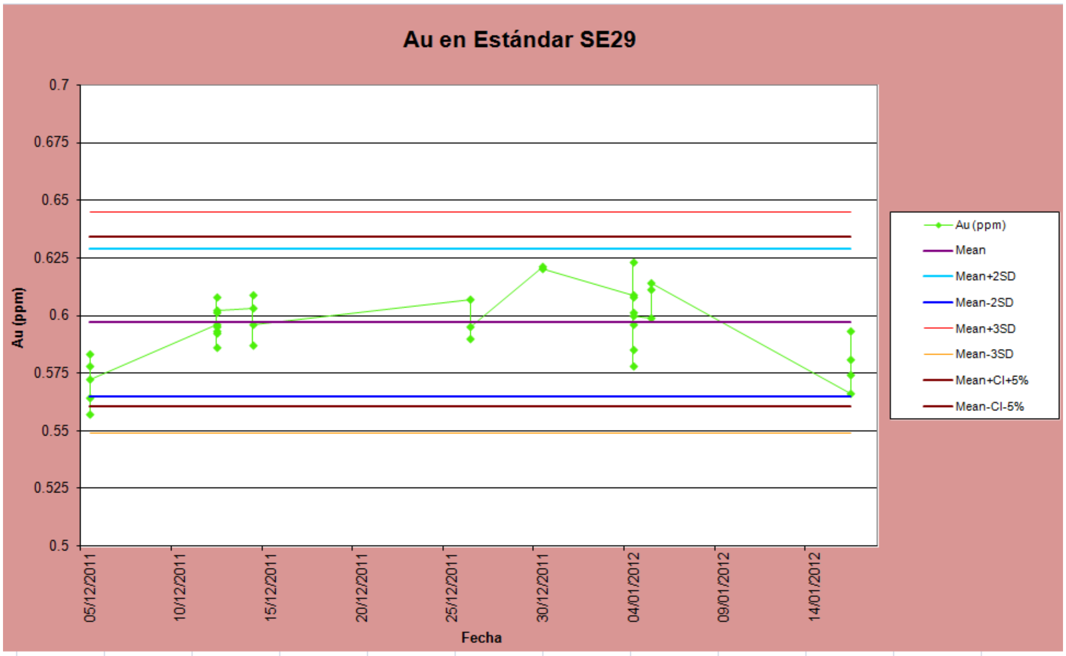


FIGURE 11-14: EXAMPLE CONTROL CHART FOR GOLD IN STANDARD SE29

Blank results for gold are considered acceptable. There were three spikes that were most likely the result of random error, as shown in Figure 11-15. The failures are not thought to affect batch sample assays to any significant extent.

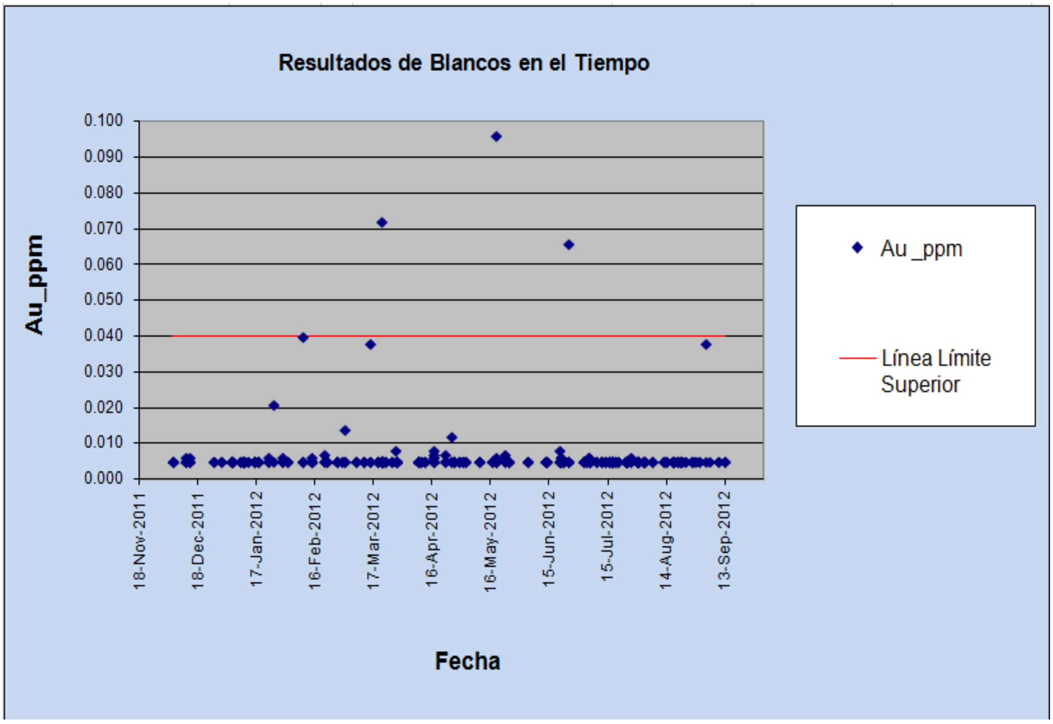


FIGURE 11-15: BLANK GOLD PERFORMANCE

Results for the inter-laboratory check samples indicate that there are erratic values that generate large relative differences; however, the average differences for gold and silver are only about one percent. The erratic duplicate results are consistent with the large relative nugget effects shown in the correlograms. The duplicates show there is an intrinsic variability in the mineralization, but the pair results suggest the original assays are an unbiased reflection of the contained metal. The relative differences for gold and silver duplicates are shown in Figures 11-16 and 11-17, respectively.

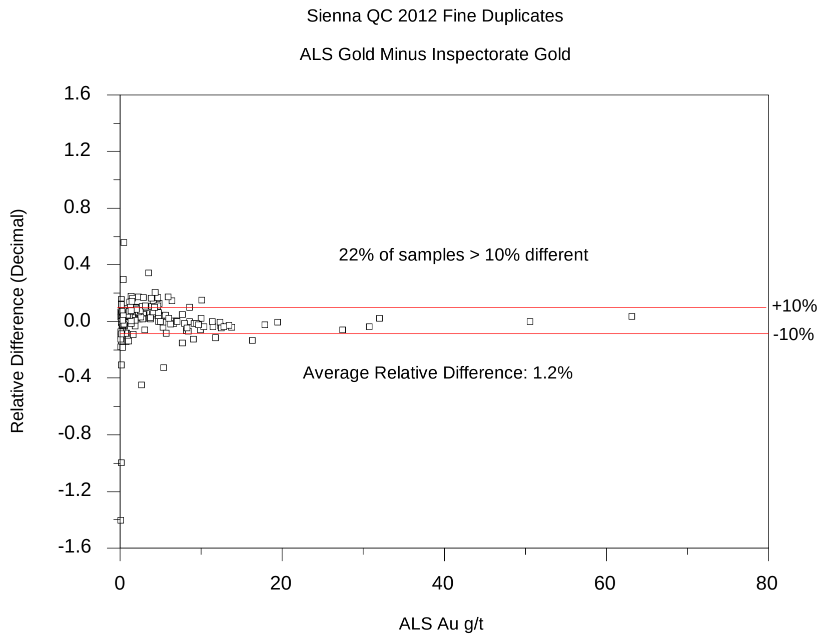


FIGURE 11-16: RELATIVE DIFFERENCES FOR GOLD DUPLICATES

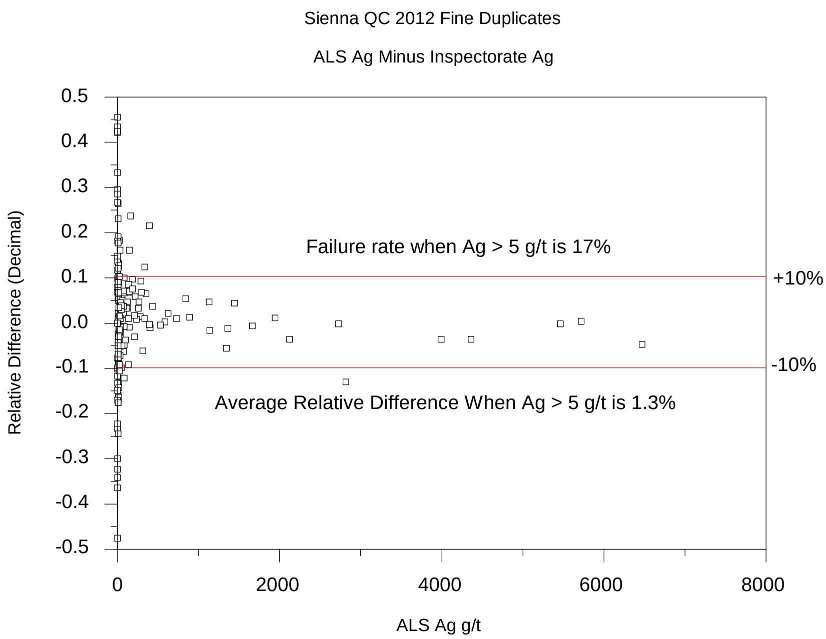


FIGURE 11-17: RELATIVE DIFFERENCES FOR SILVER DUPLICATES

11.6 CONCLUSIONS

Results from Standard Reference Material indicate that the gold assay procedures are producing reliable assay data. Blank results indicate that there are no significant problems with contamination.

Variation in field duplicate data for gold indicates a high geological variability (or nugget effect). Interlab duplicates validate both gold and silver values in the primary assays.

In the authors' opinion, Sienna's drill core sampling protocols at Callanquitas are similar to industry standard procedures. On average, core recoveries tend to be quite good, but, locally, recoveries can be poor in the structural zones. There is no apparent correlation between core recoveries and gold or silver grades that could materially impact the reliability of the sample results.

The authors do not view any of the preceding conclusions to be sufficiently significant to make the results unreliable for publication.

12 DATA VERIFICATION

12.1 SITE VISIT VALIDATION

Robert Sim visited the Callanquitas project site during the period of July 17-18, 2012, and observed exploration activities associated with the project. He visited a series of drill sites via pickup truck and on foot. Drill collars were marked with casing or cement monuments. He also observed several areas where trenching and channel sampling has occurred. The drill hole collar locations, access roads, and surface sample locations correlate with topographic features and the overall distribution of drilling and mapping in the digital database.

Drilling and core handling/sampling procedures were also reviewed (as described in *Section 11* of this report). Procedures follow accepted industry practices and Sienna personnel appear to be well trained and conduct their work in an organized, consistent, and meticulous manner.

During the site visit, Robert Sim took two randomly selected pieces of drill core from core intervals identified as belonging to the Callanquitas structure. These were transported back to Canada and submitted to ALS Chemex in Vancouver for analysis. The results show gold grades similar to those obtained by Sienna for these sample intervals.

Robert Sim was not able to visit the Domos or Tesoros occurrences during the site visit. These areas are currently occupied by local miners who are extracting gold from these zones without Sienna's permission. This is an illegal practice and there have been periodic hostilities between these miners and the local police forces. Due to the potential hazards present, the author was not able to validate the previous work done at these locations. There are no indications that the information previously associated with these zones is suspect, but it could not be independently verified by the author during his site visit.

12.2 DATABASE VALIDATION

Seven drill holes, representing approximately 10% of the data, were randomly selected from the database and the collar; down-hole survey data and assay results were manually checked back to the original sources. The only errors identified during this process were a handful of differences in the third decimal place for gold grades compared to the certified values. These "errors" are the result of Sienna's practice of averaging the results of two samples, where the lab had performed duplicate analyses as part of their internal QA/QC program. Although this does not bias the database to any significant degree, this practice is not recommended as it results in a database with varying sample sizes. Duplicate analyses are intended to confirm the accuracy and precision of the process. Once confirmed, the initial assay result should be retained in the database. As stated previously, this practise does not materially affect the database in a way that could potentially bias the resource estimate; however, it is not recommended. Sienna has subsequently corrected this issue in their database; however, this was not done prior to the generation of the resource model described in this report.

Conclusions

Observations during the site visit confirm the physical presence of the drilling activities that have taken place on the property. Drilling and sampling procedures followed by Sienna personnel adhere to accepted industry standards. The interpretation of the Sienna's geologic model is supported by observations made during the author's site visit. Independent samples confirm the presence of gold in the rocks in quantities similar to those stated by Sienna. Manual validation of a representative selection from the database shows it to be essentially error free. The database has been monitored through an appropriate QA/QC program ensuring the accuracy and precision of the results.

The results of the data verification indicate that the database is sound and reliable for the purposes of mineral resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

In 2006-07, Peruvian Metallurgist, Mr. Juan Zegarra was contracted to undertake some preliminary test work on material from the nearby Domos and Tesoros zones. A sample weighing 1,185 grams was composited from material retained from previous drilling and underground sampling. This composite sample was preferentially selected from high-silver samples, averaging 4.59grams per tonne gold and 7.84 ounces per tonne silver (243.8 grams per tonne). Size fraction analysis showed that approximately 50% of the gold and silver were present in the -400 mesh size fraction. A series of preliminary tests were carried out on this composite sample and Mr. Zagarra concluded that metallurgical processes exist to economically recover gold and silver from the high-silver Igor ores.

There has been no metallurgical test work conducted on material from the Callanquitas zone. The silver-rich composite sample from Domos/Tesoros is not considered to be representative of typical resources from the nearby Callanquitas zone. However, it is likely that the general nature of these deposits would be similar. Additional test work is required to better understand the metallurgical characteristics of Callanquitas.

The Callanquitas deposit is similar in nature to numerous other epithermal gold deposits and, as a result, it is assumed that a viable metallurgical process will be identified for the Callanquitas zone. Much of the deposit appears to be moderately to intensely oxidized and may be amenable to low-cost leaching.

14 MINERAL RESOURCE ESTIMATE

14.1 INTRODUCTION

This report summarizes the generation of a mineral resource estimate for the Callanquitas deposit located in northern Peru. The mineral resource estimate was prepared under the direction of Robert Sim, P.Geo, SIM Geological Inc. with the assistance of Bruce Davis, FAusIMM, BD Resource Consulting, Inc. Mr. Sim is the independent "qualified person" (QP) within the guidelines of National Instrument 43-101 (NI 43-101) and for the purposes of the mineral resource estimate contained in this report.

Estimations are calculated using three-dimensional block models based on geostatistical applications, and created using commercial mine planning software (MineSight® v7.50). The project limits are based on the UTM coordinate system, Zone 17 South, Provisional South American Datum 1956. A nominal block size of 3 x 5 x 5 m (X x Y x Z) is appropriate, considering the distribution of sample data and the scale and type of deposit. Although exploration on the property dates back to the late 1500s, drilling and sampling on the Callanquitas Structure began in 2007; most of the drilling was conducted in 2011-12. The surface topography in the area of the deposit is extremely rugged and access to this area is challenging. As a result, access roads have been constructed and, at times, drilling machines have been carried, by hand, to the area in an effort to gain proper access to the mineralized zone. The majority of the drilling is conducted with fans of holes initiated from strategically-placed surface setups. Pierce points are designed to intersect the target horizon on nominal 50 m grid spacings. During the most recent program, several setups could not be accessed and, as a result, there are several gaps in the sample information.

The resource estimate was generated using drill hole sample assay results and the interpretation of a geologic model that relates to the spatial distribution of gold and silver. Interpolation characteristics were defined based on the geology, drill hole spacing, and geostatistical analysis of the data. The resources were classified according to their proximity to the sample locations and are reported, as required by NI 43-101, according to the CIM standards on Mineral Resources and Reserves (CIM, 2010).

14.2 GEOLOGIC MODEL, DOMAINS AND CODING

Callanquitas is interpreted as a structurally hosted, high-level, epithermal deposit that contains appreciable amounts of gold and silver. Mineralization is hosted in a series of north-south, sub-vertically oriented structures that have been tracked with surface mapping for a distance of approximately 1.2 km and to depths of more than 450 m below surface. The mineralized domains have been interpreted using a combination of geologic logging and mapping, including the distribution of gold equivalent grades derived from the sample data. Gold equivalent grades are calculated on a gross metal value basis and assume a gold (Au) price of US$1,500/oz and a silver (Ag) price of $25/oz. The formula for gold equivalent grades is as follows:

$$AuEq\ (g/t) = Au\ g/t + (Ag\ g/t * 0.017)$$

Interpretation of the mineralized domain comprises a Main Zone which is a sub-vertical structure with a north-south strike length of about 900 m. To the south, the Main Zone merges with another sub-parallel zone with strike length of about 500 m; this is referred to as the Western Zone. The thicknesses of the mineralized domains range from several metres to greater than 35 m, and it averages about 15 m wide. Several isometric views of the shape and extent of the mineralized domains are shown in Figures 14-1, 14-2, and 14-3.

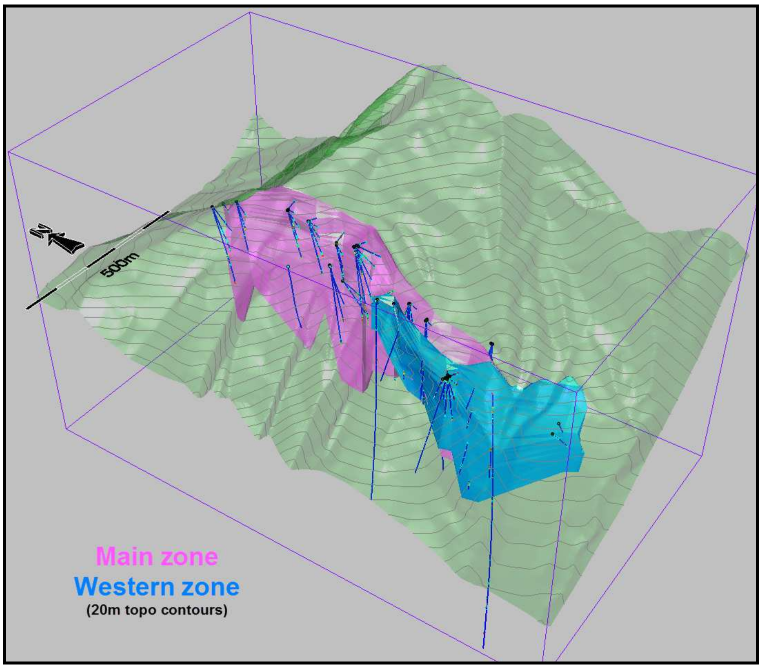


FIGURE 14-1: ISOMETRIC VIEW OF MINERALIZED ZONE I

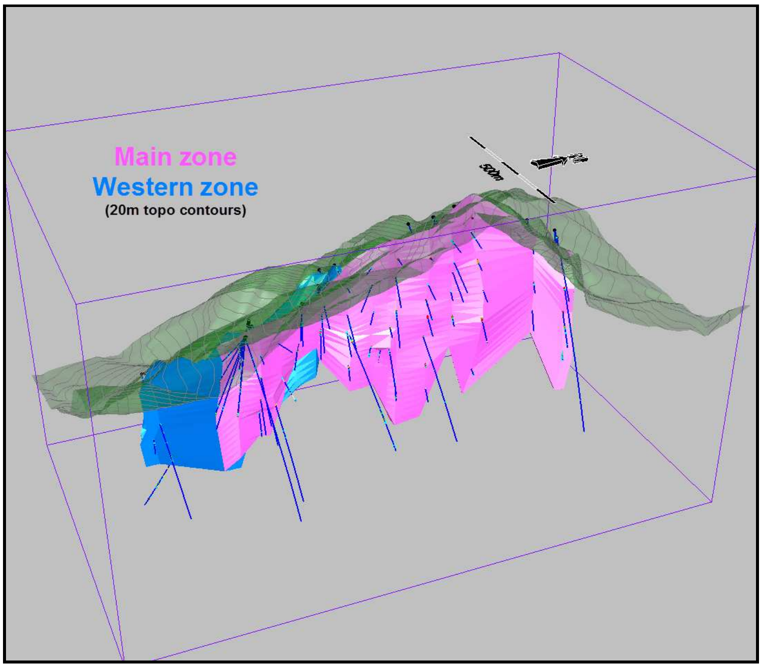


FIGURE 14-2: ISOMETRIC VIEW OF MINERALIZED ZONE II

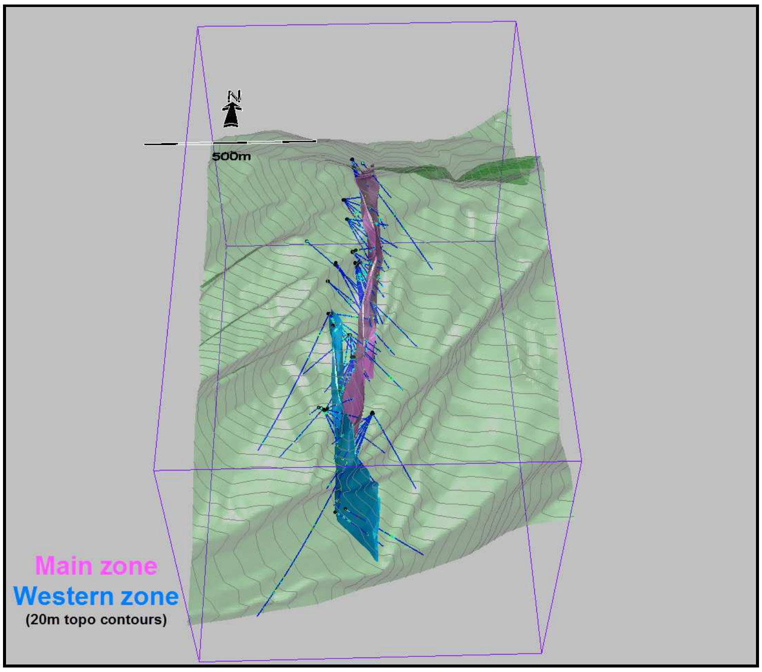


FIGURE 14-3: ISOMETRIC VIEW OF MINERALIZED ZONE III

There is no need to separate the oxidized and primary material. The deposit occurs within a large topographic high which appears to be well above the surrounding water table. All core intervals have intersected oxidized rocks.

14.3 AVAILABLE DATA

There are a total of 111 individual drill holes in the project database; 74 of these holes have been designed to test the Callanquitas Structure. The remaining 37 holes test other proximal exploration targets or are located in the nearby Domos and Tesoros Zones. None of these 37 drill holes influence the resource estimate in the Callanquitas Structure.

Drilling access is hindered by the rugged surface topography in the area of the deposit. The majority of the drilling is conducted with fans of holes initiated from strategically-placed surface setups. Pierce points intersect the target horizon at intervals ranging from 50 m to 70 m. During the most recent program, several setups could not be accessed and, as a result, there are gaps in the sample information: a 200 m gap in the south at 9154100N and a 150 m gap at 9154900N in the north).

At the end of each drilling campaign, the drill hole collar locations are surveyed using a hand-held GPS. The XY accuracy is +/- several metres with this method. The Z-values of the drill hole collars are adjusted to correlate with the LiDAR topographic surface. The authors believe that this approach provides more accurate Z-values that better correlate across the project area.

Samples are processed with a standard 46-element, ICP package, including fire assay for gold and atomic absorption for silver. The gold and silver data have been imported for use in the development of the resource block model. The ICP data is not used in the development of the resource block model.

Table 14.1 lists a statistical summary of the gold and silver sample data available at Callanquitas.

TABLE 14.1: STATISTICAL SUMMARY OF SAMPLE ASSAY DATA

Element	# Samples	Total Length (m)	Min	Max	Mean (1)	Std Dev
Gold (g/t)	11,659	18,730	0	63.13	0.204	1.077
Silver (g/t)	11,661	18,733	0.1	6,475.0	13.1	131.08

(1) Statistics are weighted by sample length.

Additional available data includes lithologic designations obtained during the geologic logging of the drill core. Surface mapping has provided the location of the structures on surface. A topographic digital terrain surface was provided by Sienna Gold Inc. in .dxf format. This surface was derived from stereographic satellite (GeoEye) imagery and has been generated from 5 m grid points with elevation accuracy of +/- 2m.

Individual sample intervals at Callanquitas range from 0.2 m to 5.4 m long and average 1.6 m.

Bulk density measurements have been made on 84 samples selected from the mineralized zones.

Drill core recovery data is available for 60 of the 74 drill holes at Callanquitas. The overall average recovery is 95% with 74% of intervals having 100% recovery. 94% of samples have recoveries greater than 70% and less than 3% of samples have recoveries below 50%. There is no apparent correlation between gold or silver grade and core recoveries. As a result, there have been no adjustments or omissions to the database in response to core recoveries.

14.4 COMPOSITING

Compositing drill hole samples standardizes the database for further statistical evaluation. This step eliminates any effect the sample length may have on the data.

To retain the original characteristics of the underlying data, a composite length that reflects the average original sample length is selected; a too long composite can sometimes result in a degree of smoothing that can mask certain features of the data. The average sample interval is 1.6 m, and the majority of samples were taken at intervals that range between 1-2 m and a standard composite length of 1.5 m was used to develop the resource block model at Callanquitas.

Drill hole composites are length-weighted and are generated *down-the-hole*, meaning composites begin at the top of each hole and are generated at 1.5 m intervals down the length of the hole. Composites honour the mineralized domain contacts (in other words, individual composites begin and end at the point where a drill hole crosses the domain boundary). Several holes were randomly selected and the composited values were checked for accuracy. No errors were found.

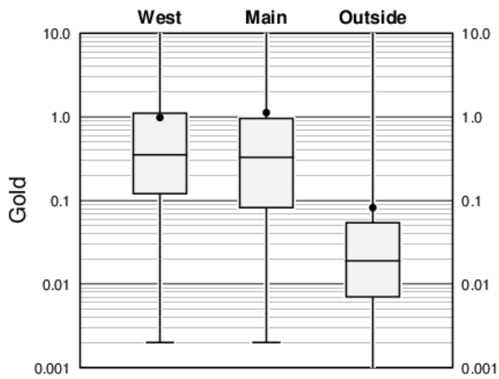
14.5 EXPLORATORY DATA ANALYSIS

Exploratory data analysis (EDA) involves statistically summarizing the database to better understand the characteristics of the data that may control grade. One of the main purposes of EDA is to determine if there is evidence of spatial distinctions in grade; this would require the separation and isolation of domains during interpolation. The application of separate domains prevents unwanted mixing of data during interpolation and the resulting grade model will better reflect the unique properties of the deposit. However, applying domain boundaries in areas where the data is not statistically unique may impose a bias in the distribution of grades in the model.

A domain boundary, which segregates the data during interpolation, is typically applied if the average grade in one domain is significantly different from another. A domain boundary may also be applied where a significant change in the grade distribution exists across the contact.

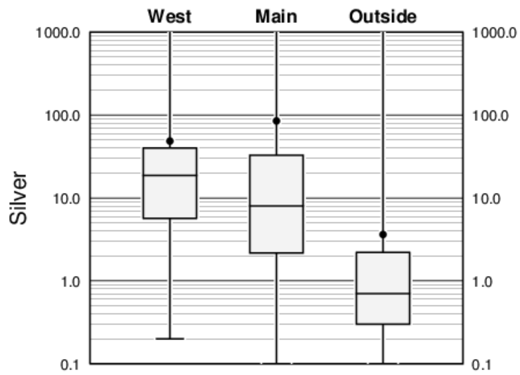
14.5.1 BASIC STATISTICS BY DOMAIN

Summary statistics are evaluated using a series of boxplots; these boxplots compare the mineralized zone domains to the surrounding areas. Examples are shown in Figures 14-4 and 14-5. The nature of distributions of both gold and silver are similar in the Main and Western Zones. The surrounding areas tend to have much lower grades than the mineralized domains, but local high-grade samples are present. These are interpreted to represent narrow proximal structures, but they are not well understood at this stage of the project.



	West	Main	Outside
Number of data	503	1288	13762
Mean	0.985	1.126	0.082
Variance	2.605	6.315	0.133
Skewness	3.221	6.855	16.004
Coef of Variation	1.639	2.233	4.443
Maximum	13.364	39.509	14.11
Upper quartile	1.109	0.961	0.054
Median	0.353	0.329	0.019
Lower quartile	0.121	0.082	0.007
Minimum	0.002	0.002	0.0

FIGURE 14-4: BOXPLOT OF GOLD BY DOMAIN



	West	Main	Outside
Number of data	503	1288	13762
Mean	48.661	84.977	3.624
Variance	16434.0	112015.0	860.102
Skewness	7.363	7.571	81.003
Coef of Variation	2.634	3.939	8.093
Maximum	1484.4	4285.1	3007.3
Upper quartile	40.107	32.825	2.2
Median	18.787	7.993	0.7
Lower quartile	5.7	2.175	0.3
Minimum	0.2	0.1	0.1

FIGURE 14-5: BOXPLOT OF SILVER BY DOMAIN

14.5.2 CONTACT PROFILES

Contact profiles evaluate the nature of grade trends between two domains; they graphically display the average grades at increasing distances from the contact boundary. Those contact profiles that show a marked difference in grade across a domain boundary indicate that the two datasets should be isolated during interpolation. Conversely, if a more gradual change in grade occurs across a contact, the introduction of a *hard* boundary (in other words, segregation during interpolation) may result in much different trends in the grade model; in this case, the change in grade between model domains is often more abrupt than the trends seen in the raw data. Finally, a flat contact profile indicates that there are no grade changes across the boundary; in this case, *hard* or *soft* domain boundaries will produce similar results in the model.

A series of contact profiles were generated to evaluate the change in gold and silver grades across the mineralized domain boundaries. Examples are shown in Figures 14-6, 14-7, and 14-8. There is little to no difference in the gold or silver grade between the Main and Western Zones; this suggests that they could be combined for estimation purposes. However, there is a distinct change in grade when crossing the contact between the mineralized domain and the surrounding areas (Figure 14-8). This shows that the domains are distinct and that they should be used to segregate gold and silver sample data during block grade estimates.

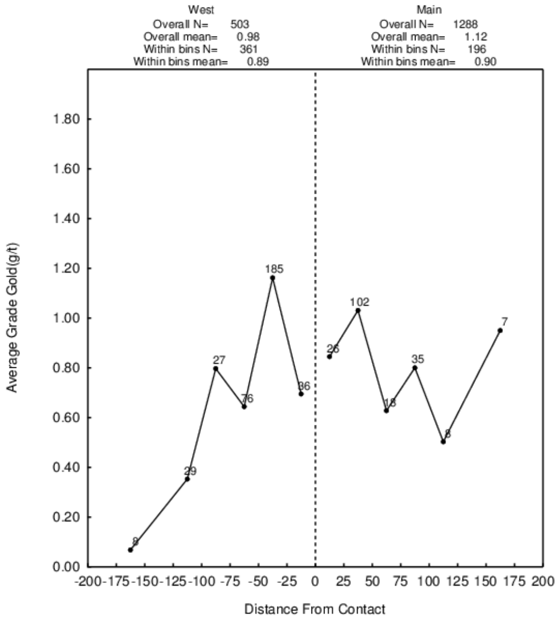


FIGURE 14-6: CONTACT PROFILE FOR GOLD BETWEEN MAIN AND WESTERN ZONES

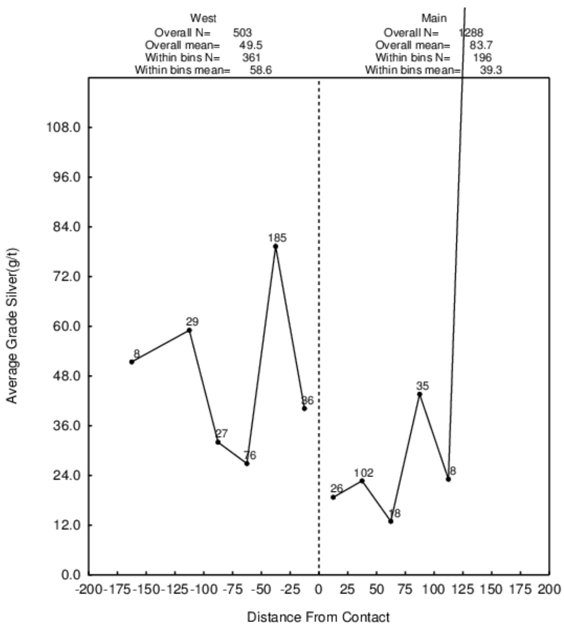


FIGURE 14-7: CONTACT PROFILE FOR SILVER BETWEEN MAIN AND WESTERN ZONES

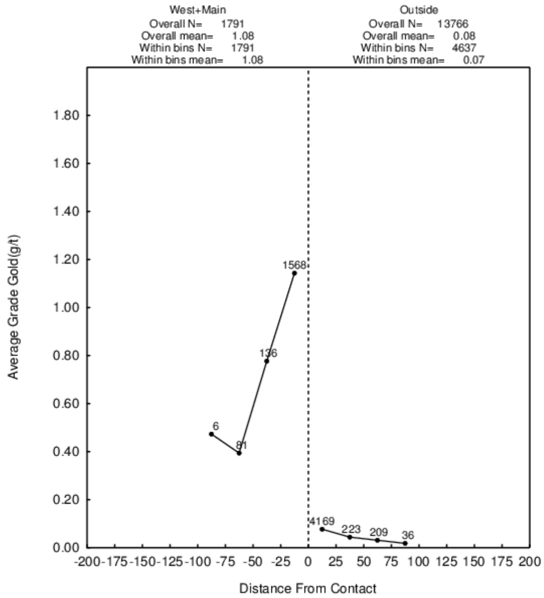


FIGURE 14-8: CONTACT PROFILE BETWEEN MAIN AND WESTERN ZONES, AND SURROUNDING AREAS

14.5.3 MODELING IMPLICATIONS

Boxplots show similarities between the Main and Western Zones which are much higher grade than the surrounding samples. These trends are supported by the contact profiles. Overall, the results suggest that the Main and Western domains are similar and include sample data that is distinct from surrounding samples.

Yet following a review of the sample data, it was decided to segregate the Main and Western domains from each other during block grade estimates. These are two distinct structures that merge together at a relatively shallow angle near southern end of the deposit. Each structure is unique and it would not be appropriate to mix data across zones during block grade interpolation.

14.5.4 CONCLUSIONS

The two mineralized domains are separated with hard boundaries during the development of the model. Although drilling has intersected some narrow, high-grade structures outside of the Main and Western Zones, the nature and extent of these satellite zones is not well understood at this time. As a result, there have been no attempts to estimate resources outside of the two interpolated mineralized domains. With the benefit of additional drilling, these outside "hits" may develop into something that can be modeled in the future with confidence.

The domains are summarized in Table 14.2.

TABLE 14.2: SUMMARY OF ESTIMATION DOMAINS

Zone Domain	Comments
Main Zone	More extensive than the Western Zone. Sub-vertical zone, north-south oriented structure.
Western Zone	Sub-vertical zone with strike of ~350 degrees. Merges with Main Zone
Surrounding Areas	Generally low-grade halo around mineralized domains. Rare high-grade hits not well understood. No resource estimates calculated in this area.

14.6 BULK DENSITY DATA

A total of 84 bulk density measurements were taken by SGS Laboratory using their displacement method (wax seal water displacement method for specific gravity). Samples represent solid pieces of drill core, that measure 10 x 15 cm in length; they were sealed with paraffin wax, weighed in air and then weighed again under water.

The bulk density is calculated using the following formula:

Bulk density = weight in air / (weight in air - weight in water)

Although there are only 84 measurements for SG in the database, these samples were selected from the mineralized zone and are relatively evenly distributed throughout the length and depth of the deposit. Values range from 2.05 t/m^3 to 3.24 t/m^3, with an average value of 2.54 t/m^3. Selecting pieces of solid core from an often fractured and blocky structural zone, as seen at Callanquitas, could conclude in misleading results. However, in this case, the range and average values are considered to be reasonable and representative for this deposit. Therefore, based on these results, an average bulk density of 2.55 t/m^3 was used to estimate resource tonnages.

14.7 EVALUATION OF OUTLIER GRADES

Histograms and probability plots showing the distribution of gold and silver in the Main and Western Zones were reviewed to identify the existence of anomalous outlier grades in the composited sample database. Although there are 11 individual samples in the database that exceed a grade of 20g/t gold, these tend to be rather short intervals (6 of these samples are 0.5m or less in length) and the potential magnitude of these are diminished once composited to standard 1.5m intervals. For example, there are only two (1.5m) composites that exceed a grade of 20g/t gold. As a result, there are relatively few composite samples that appear to be potentially anomalous with respect to gold.

In the Main Zone, composite samples begin to deviate from a log-normal trend above a grade of 15g/t gold, representing a frequency of 99.5%. The physical locations of these potentially anomalous samples were reviewed in relation to the surrounding data. It was found that high grades tend to cluster and, as a result, it was decided that these potential outlier samples could be controlled through the use of outlier limitations during block grade interpolation. An *outlier limitation* approach limits samples above a defined threshold to a maximum distance of 50 m influence during grade estimates. The gold grades tend to be lower in the Western zone and composite samples above 5g/t gold are limited to a maximum distance of influence of 50m during grade interpolation.

High grade, potentially anomalous, silver grades are present in the composited samples in both the Main and Western Zones. A combination of traditional top-cutting and outlier limitations is used to control the influence of these samples on the resource estimate.

Those limits and the resulting effects on the model are listed in Table 14.3.

TABLE 14.3: SUMMARY OF OUTLIER GRADE CONTROLS

Domain / Element	Maximum (g/t)(1)	Top-cut Limit	Outlier Limitation (2)	% Metal Lost in Model (3)
Gold				
Main Zone	39.509	n/a	15 g/t	- 8.8%
Western Zone	13.364	n/a	5 g/t	
Silver				
Main Zone	4285.1	3000 g/t	1500 g/t	-19.7%
Western Zone	1484.4	700 g/t	500 g/t	

(1) Samples composited to 1.5 m intervals.
(2) Samples above threshold limited to maximum 50 m influence during grade interpolation.
(3) Loss in metal determined in Inferred class blocks in combined Main and Western zones.

An 8.8% reduction of gold metal in the model is considered reasonable for this deposit at this stage of evaluation. The relatively high reduction in silver metal of almost 20% is due to the skewed database and the presence of several very high-grade samples. Additional drilling is required to better delineate these zones and improve the overall understanding of the nature of the higher grade parts of the deposit.

14.8 VARIOGRAPHY

The degree of spatial variability and continuity in a mineral deposit depends on both the distance and direction between points of comparison. Typically, the variability between samples is proportionate to the distance between samples. If the variability is related to the direction of comparison, then the deposit is said to exhibit *anisotropic* tendencies which can be summarized by an ellipse fitted to the ranges in the different directions. The semi-variogram is a common function used to measure the spatial variability within a deposit.

The components of the variogram include the nugget, the sill, and the range. Often samples compared over very short distances (including samples from the same location) show some degree of variability. As a result, the curve of the variogram often begins at a point on the y-axis above the origin; this point is called the *nugget*. The nugget is a measure of not only the natural variability of the data over very short distances, but also a measure of the variability which can be introduced due to errors during sample collection, preparation, and assaying.

Typically, the amount of variability between samples increases as the distance between the samples increase. Eventually, the degree of variability between samples reaches a constant or maximum value; this is called the *sill*, and the distance between samples at which this occurs is called the *range*. The variogram parameters for each zone are summarized in Table 14.4.

The spatial evaluation of the data was conducted using a correlogram instead of the traditional variogram. The correlogram is normalized to the variance of the data and is less sensitive to outlier values; this generally gives cleaner results.

Correlograms were generated for the distribution of gold and silver in the mineralized domains using the commercial software package Sage 2001© developed by Isaacs & Co. Due to a lack of available information, sample data from the Main and Western Zones was combined to generate correlograms. Multidirectional correlograms were generated from composited drill hole samples and the results are summarized in the Table 14.4. Note that the correlograms have been generated using distances relative to a plane representing the general trend of the mineralization. This feature is described in more detail in *Section 14.10* of this report.

TABLE 14.4: GOLD AND SILVER VARIOGRAM PARAMETERS ADJUSTED TO UTM COORDINATE SYSTEM

				1st Structure			2nd Structure		
Element	**Nugget**	**S1**	**S2**	**Range (m)**	**AZ**	**Dip**	**Range (m)**	**AZ**	**Dip**
Gold	0.250	0.599	0.151	91	44	0	461	97	0

	Spherical			5	134	0	65	7	0
				5	0	90	10	0	90
Silver	0.153	0.688	0.159	139	10	0	365	137	0
	Spherical			10	100	0	58	47	0
				5	0	90	10	0	90

Note: Correlograms were conducted using 1.5 m composite DH data.

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14.9 MODEL SETUP AND LIMITS

A block model was initialized in MineSight® and the dimensions are defined in Table 14.5. The selection of a nominal block size, measuring 3 x 5 x 5 m, is considered appropriate with respect to the current drill hole spacing and the smallest selective mining unit (SMU) size is considered appropriate for a deposit of this type and scale. The short axis (3 m) is oriented across the strike of the deposit. The block model is not rotated.

TABLE 14.5: BLOCK MODEL LIMITS

Direction	Minimum	Maximum	Block Size (m)	# Blocks
East	780600	781500	3	300
North	9153800	9155300	5	300
Elevation	2800	3700	5	180

Using the domain wireframes, blocks in the model are assigned zone code values on a majority basis. During this stage, blocks that have more than 50% of their volume inside the wireframe domain are assigned a unique zone code value.

The proportion of blocks within the mineralized zone domains is also calculated and stored within the model as individual percentage items. These values are used as a weighting factor to determine the in-situ resources of the deposit.

14.10 INTERPOLATION PARAMETERS

The block model grades for gold and silver were estimated using Ordinary Kriging (OK). Estimations were validated using the Hermitian (Herco) polynomial change of support model, also referred to as the Discrete Gaussian correction. This method is described in detail in *Section 14.11*. The OK models are generated with a relatively limited number of samples to match the change of support, or Herco grade distribution. This approach reduces the amount of smoothing (also known as averaging) in the model and, while there may be some uncertainty on a localized scale, this approach produces reliable estimations of the recoverable grade and tonnage for the overall deposit.

The interpolation parameters are summarized by domain in Table 14.6.

TABLE 14.6: INTERPOLATION PARAMETERS

Element	Search Ellipse Range (m) (1)			# Composites			Other
	X	Y	Z	Min/block	Max/block	Max/hole	
Gold	300	300	5	1	12	4	
Silver	300	300	5	1	20	5	1 DH per quadrant

(1) Search ellipse is oriented X=NS, Y=EW and Z is vertical distance relative to the “trend” plane of each zone domain.

During grade estimations, search orientations were designed to follow a mineralization *trend* surface interpreted as representing the general trend of the mineralization in the Main and

Western Zone domains. The distance from this trend plane is assigned to all composited drill hole samples and model blocks. Using these relative distances during the grade estimations ensures that the grades in the model replicate the banded nature of the deposit and account for the local undulations that are present. Note that the correlogram results listed in Table 14.4 were generated using these relative elevations and not the true sample elevations.

14.11 VALIDATION

The results of the modeling process were validated through several methods: a thorough visual review of the model grades in relation to the underlying drill hole sample grades; comparisons with the change of support model; comparisons with other estimation methods; and, grade distribution comparisons using swath plots.

Visual Inspection

A detailed visual inspection of the block model was conducted in both section and plan to ensure the desired results following interpolation. This included confirmation of the proper coding of blocks within the respective zone domains. The distribution of block grades was compared relative to the drill hole samples to ensure the proper representation in the model.

Model Checks for Change of Support

The relative degree of smoothing in the block model estimates were evaluated using the *Discrete Gaussian Correction* which is also referred to as the *Hermitian Polynomial Change of Support* method (Journel and Huijbregts, Mining Geostatistics, 1978). With this method, the distribution of the hypothetical block grades can be directly compared to the estimated (OK) model through the use of pseudo-grade/tonnage curves. Adjustments are made to the block model interpolation parameters until an acceptable match is made with the Herco distribution. In general, the estimated model should be slightly higher in tonnage and slightly lower in grade when compared to the Herco distribution at the projected cut-off grade. These differences account for selectivity and other potential ore-handling issues which commonly occur during mining.

The Herco (*Her*mitian *co*rrection) distribution is derived from the declustered composite grades which have been adjusted to account for the change in support, moving from smaller drill hole composite samples to the larger blocks in the model. The transformation results in a less skewed distribution but with the same mean as the original declustered samples.

An example of the gold model is shown in Figure 14-9 and a good example of the silver model is shown in Figure 14-10. Overall correspondence between the models is relatively good. Variations between model types tend to result from a relative lack of sample data and the narrow and banded nature of the mineralization in the deposit. The results indicate that the gold model is a conservative estimate, and the silver model shows good correlation with the Herco model.

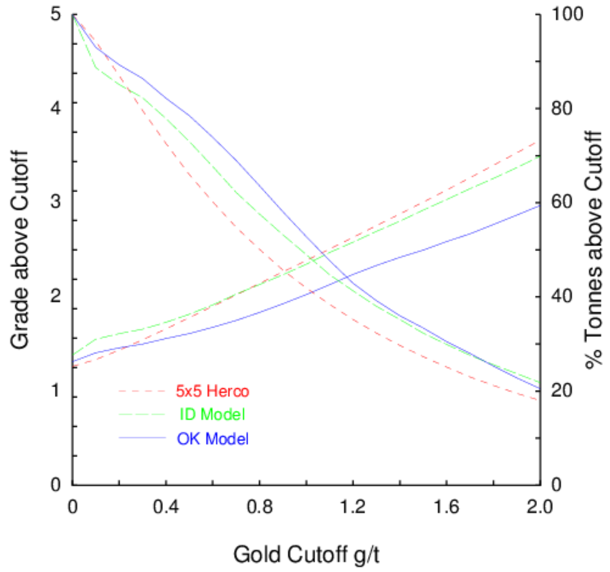

FIGURE 14-9: GRADE/TONNAGE DISTRIBUTION OF HERCO, OK, AND ID^2 GOLD MODELS

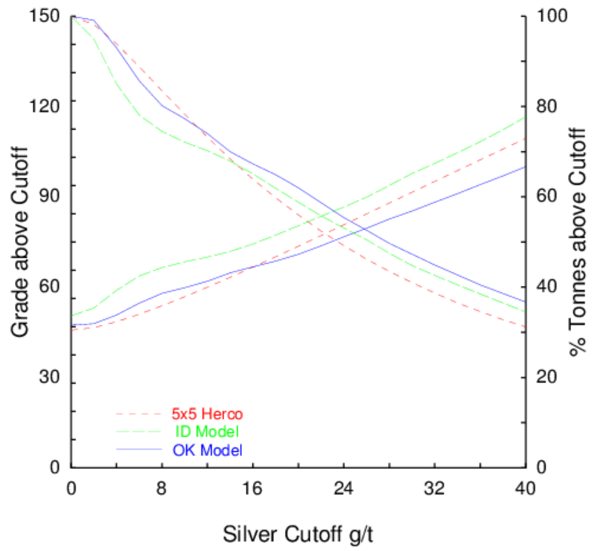

FIGURE 14-10: GRADE/TONNAGE DISTRIBUTION OF HERCO, OK AND ID^2 SILVER MODELS

Comparison of Interpolation Methods

For comparison purposes, additional grade models were generated using both the inverse distance weighted (ID^2) and nearest neighbour (NN) interpolation methods. The NN model was created using data composited to 5 m intervals. The results of these models are compared to the OK models at various cut-off grades in a series of grade/tonnage graphs shown in Figures 14-11 and 14-12. Overall, there is relatively good correlation between the models. As stated previously, variations can exist between model types because of a lack of sample data and the narrow and banded nature of the mineralization in the deposit. Reproduction of the model using different methods tends to increase the confidence in the overall resource.

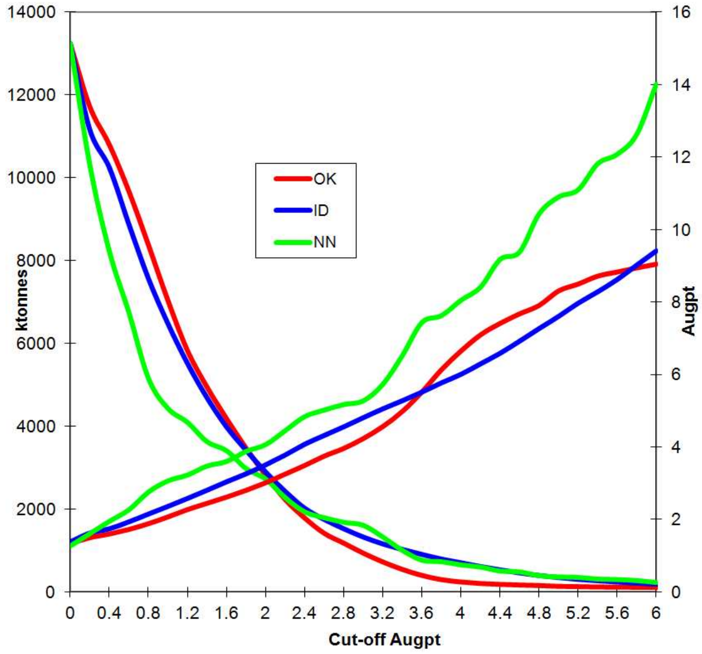

FIGURE 14-11: COMPARISON OF OK, ID^2, AND NN GOLD MODELS

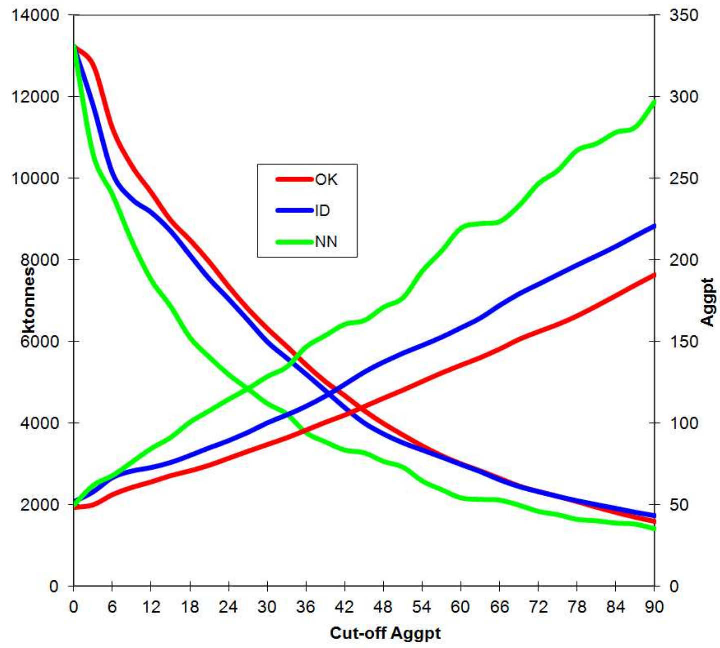

FIGURE 14-12: COMPARISON OF OK, ID^2, AND NN SILVER MODELS

Swath Plots (Drift Analysis)

A swath plot is a graphical display of the grade distribution derived from a series of bands, or swaths, generated in several directions through the deposit. Using the swath plot, grade variations from the OK model are compared to the distribution derived from the declustered (NN) grade model.

On a local scale, the NN model does not provide reliable estimations of grade, but, on a much larger scale, it represents an unbiased estimation of the grade distribution based on the underlying data. Therefore, if the OK model is unbiased, the grade trends may show local fluctuations on a swath plot, but the overall trend should be similar to the NN distribution of grade.

Swath plots were generated in three orthogonal directions that compare the OK and NN estimates for gold and silver. Examples showing W-E oriented swaths are shown in Figures 14-13 and 14-14.

There is good correspondence between the models. The degree of smoothing in the OK model is evident in the peaks and valleys shown in the swath plots. It is interesting to note the relatively restricted high gold area at 9154660N compared to the more extensive high silver area centred about 9154560N.

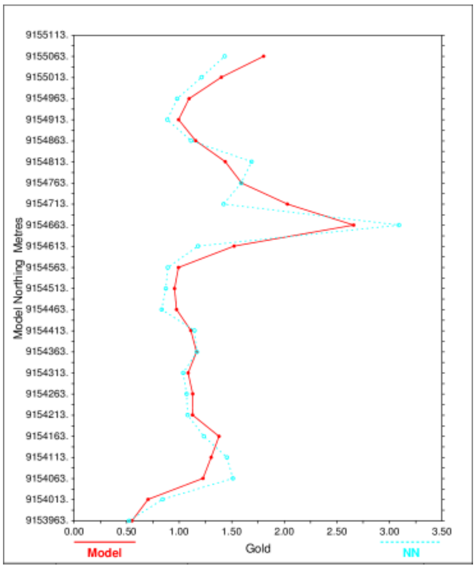

FIGURE 14-13: SWATH PLOT BY NORTH – GOLD

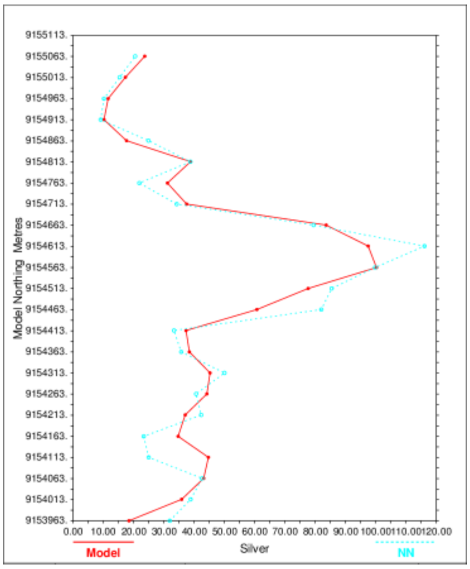

FIGURE 14-14: SWATH PLOT BY NORTH – SILVER

14.12 RESOURCE CLASSIFICATION

The mineral resources at the Callanquitas have been classified in accordance with the *CIM Definition Standards - For Mineral Resources and Mineral Reserves* (CIM, 2010). The classification parameters are defined relative to the distance between sample data and are intended to encompass zones of reasonably continuous mineralization exhibiting the desired degree of confidence. At this relatively early stage of evaluation by drilling, some assumptions have to be made using the available data. Due to the fact that the majority of the potential value at Callanquitas is due to the gold content, the classification parameters are primarily based on the nature of gold in the deposit.

Studies of indicator variogram ranges of sample intervals above a grade threshold of 1g/t gold suggest that relatively continuous zones of mineralization can be delineated with a reasonable degree of confidence at distances up to approximately 75 m. This criterion was used as a basis to manually interpret Inferred resources with a three-dimensional wireframe domain. This allows for some generalization in the criteria resulting in a more continuous and consistent distribution of resource classification. It should be noted that there are two sections that were not drilled during the 2012 program (located at 9154100N and 9154900N). The surrounding results indicate that the mineralized zone continues through these areas and, as a result, they have been included within the Inferred class domain. In the authors' opinion, there is reasonable likelihood that the resource is continuous through these gaps in the current database.

At this stage of the project, none of the resource exhibits the level of understanding required to be defined in the Indicated or Measured categories. Additional drilling is required to achieve this confidence level.

Inferred resources are defined as those model blocks that are within a maximum distance of 75 m from a drill hole and exhibit some reasonable degree of geologic continuity. .

14.13 MINERAL RESOURCES

Under the requirements of NI 43-101, a mineral resource estimate must exhibit reasonable prospects for economic extraction. The deposit forms relatively continuous, sub-vertical zones of gold and silver mineralization that could have the potential for economic viability using underground mining methods. With a maximum depth of approximately 500 m below surface, it is probable that any part of the resource block model could be accessed through underground mining. As a result, the deposit exhibits reasonable prospects for economic extraction through underground mining methods and there is no reason to exclude any portion of the block model from the resource estimate.

Estimated mineral resources are summarized in Table 14.7 showing a series of gold equivalent cut-off grades for comparison purposes. The base case cut-off threshold of 1.5 g/t AuEq is based on assumptions derived from other deposits of similar type, scale, and location. The distribution of base case resources is shown in Figures 14-15 and 14-16.

There are no known factors related to environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues which could materially affect the mineral resource.

TABLE 14.7: ESTIMATED INFERRED MINERAL RESOURCE

Cut-off Grade AuEq g/t	ktonnes	Au g/t	Ag g/t	AuEq g/t	Au koz	Ag Moz	AuEq koz
0.5	11,291	1.474	53.8	2.388	535.0	19.5	866.9
1	9,486	1.668	60.5	2.695	508.6	18.4	822.1
1.5	**7,189**	**1.940**	**71.8**	**3.160**	**448.5**	**16.6**	**730.5**
2	5,460	2.191	83.7	3.613	384.6	14.7	634.3
2.5	3,992	2.446	98.2	4.115	313.9	12.6	528.1

Note: Base case cut-off limit of 1.5g/t AuEq is bolded in the table.

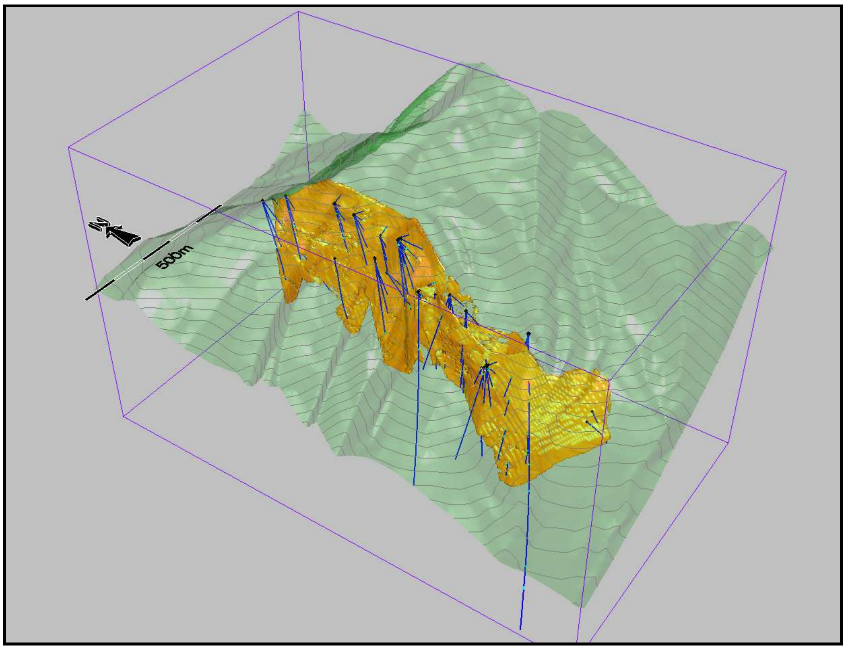

FIGURE 14-15: ISOMETRIC VIEW OF THE DISTRIBUTION OF BASE CASE RESOURCES

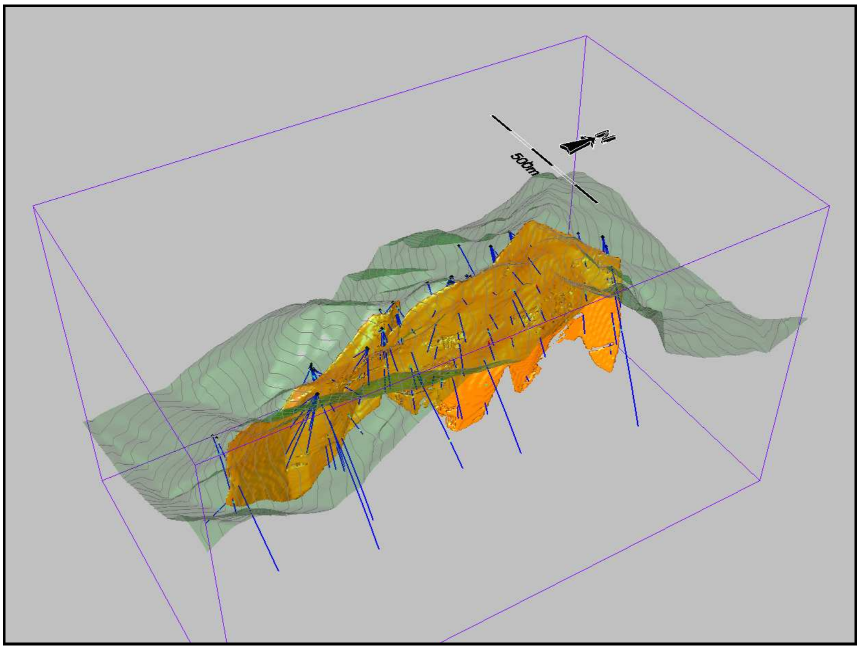

FIGURE 14-16: ISOMETRIC VIEW OF THE DISTRIBUTION OF BASE CASE RESOURCES

14.14 EXPLORATION POTENTIAL

Mineral resource estimates were conducted for the Domos and Tesoros areas as described in *Updated Technical Report and Resource Estimate of the Igor Mine Project* (Henkle and Lytle, 2008). As stated previously in this report, the author was unable to visit these sites (Domos and Tesoros) during his visit because the area was illegally occupied by local miners, and the situation had been and continued to be potentially unsafe. The author has reviewed the description of the 2008 mineral resource estimate and finds that the Technical Report lacks sufficient detail to properly understand Henkle and Lytle's estimation and classification processes for their 2008 resource estimates.

It is likely however, because historic and current mining is occurring in these areas, that potentially economic gold mineralization is present at Domos and Tesoros. But, due to the author's inability to validate the underlying sample data, and a general lack of underlying support of the previous 2008 mineral resource estimate, it is the author's opinion that the mineralization present in these areas exhibits *exploration potential* rather than mineral resources, until further evaluation work can be conducted.

It is the author's opinion, based on a review of the available sample data, that with further exploration results, the combined Domos and Tesoros areas exhibit the potential to contain between 500,000 and 1.0 Mtonnes of mineralization at gold grades averaging between 3-4 g/t and silver grades averaging between 60-80 g/t. Based on these projections, these combined areas could contain between 50,000-130,000 ounces of gold and between 1.0-2.5 million ounces of silver. It must be stressed that: these projections of potential quantity and grade are extremely conceptual in nature; there has been insufficient exploration to define a mineral resource in these areas; and, it is uncertain if further exploration will result in the ability to estimate mineral resources at Domos or Tesoros.

15 MINERAL RESERVE ESTIMATE

This section is not applicable.

16 MINING METHODS

This section is not applicable.

17 RECOVERY METHODS

This section is not applicable.

18 PROJECT INFRASTRUCTURE

This section is not applicable.

19 MARKET STUDIES AND CONTRACTS

This section is not applicable.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 DRILLING PERMITS

Drilling permits in Peru vary by name and the amount of work being done.

In 2006, the first permit (Declaración Jurada, or DJ) was approved and included one platform and one drill hole at Callanquitas. In 2007, the second permit (DJ) was approved, again for one platform and one drill hole.

In 2009, a more extensive permit, EIAsd (Estudio de Impacto Ambiental Semi Detallado), was approved for six drill holes from five platforms. EIAsd permits can then be modified as drilling progresses and evolves. In 2011, the first EIAsd modification was approved for 21 drill holes from 16 platforms; this permit is valid until the end of 2013.

The second EIAsd is currently being modified to cover recent and planned drilling.

20.2 ENVIRONMENTAL MONITORING

As part of the necessary permits for the project, the following environmental monitoring is required:

- water quality - 13 stations every three months
- air quality- 3 stations every six months
- noise pollution - 2 stations every six months
- hydro-biology (plankton, benthic organisms) - 9 stations every six months

In addition to these obligatory monitoring requirements, Sienna operates a weather station that records data to be used as part of its Environmental Impact Assessment.

20.3 WATER PERMITS

Sienna has a water permit that expires in November 2013.

20.4 COMMUNITY RELATIONS

In November 2007, Sienna secured its first year-long agreement with the community of Callanquitas. In January 2011, a new two-year agreement was signed, and negotiations are currently underway for a renewed agreement. Sienna enjoys excellent relations with the community and the authors believe there will be no problems securing an agreement.

In Peru, the law does not vest surface rights to those with existing mineral rights; therefore, Sienna has purchased eight surface claims on the Igor concession. Six of these surface claims cover an area of 233.8 ha in and around Callanquitas.

21 CAPITAL AND OPERATING COSTS

This section is not applicable.

22 ECONOMIC ANALYSIS

This section is not applicable.

23 ADJACENT PROPERTIES

This section is not applicable.

24 OTHER RELEVANT DATA AND INFORMATION

This section is not applicable.

25 INTERPRETATION AND CONCLUSIONS

The following conclusions are based on Sienna Gold Inc.'s recent drilling at the Igor project by Sienna Gold Inc.:

- The level of understanding of the geology at Callanquitas is relatively good.
- The practices used during the drilling campaigns were conducted in a professional manner and adhered to accepted industry standards.
- There are no known factors that would lead one to question the integrity of the database.
- Drilling to date has outlined an Inferred mineral resource estimate: 7.2 Mtonnes at 1.94 g/t Au and 71.8 g/t Ag which equates to 3.16 g/t gold equivalent (AuEq) using a cut-off grade of 1.5 AuEq g/t, which contains 448.5 koz contained Au and 16.6 Moz contained Ag.
- The Callanquitas structure remains open along strike and at depth.
- Nearby occurrences, Domos and Tesoros, exhibit the potential to host additional mineral resources; however, additional exploration is required and recommended for these areas.

26 RECOMMENDATIONS

The following actions are recommended for the Igor project:

- Continued exploration using a combination of geologic mapping, geochemistry, and geophysics to search for additional satellite deposits on the property. Budget: US$500,000.

- In addition to the current resource at Callanquitas, another 7 km of veins and mineralized structures have been identified on the property including those at Domo and Tesoros and in new areas such as Portachuelo. Figure 26.1 shows the distribution of gold in surface samples and the location of additional structures on the property. Step-out exploratory drilling will be required to extend the Callanquitas Structure to the south towards the Portachuelo target. Additional exploration drilling is recommended in the Domos and Tesoros areas to evaluate the resource potential for these areas. Exploration drilling along structures at an initial spacing of 100 m to 150 m is also recommended. Drilling in the vicinity of known mineralization at Domos and Tesoros should be conducted with holes on a nominal 50 m pattern. Estimated 10,000 m of diamond drilling. Budget: US$3,000,000.

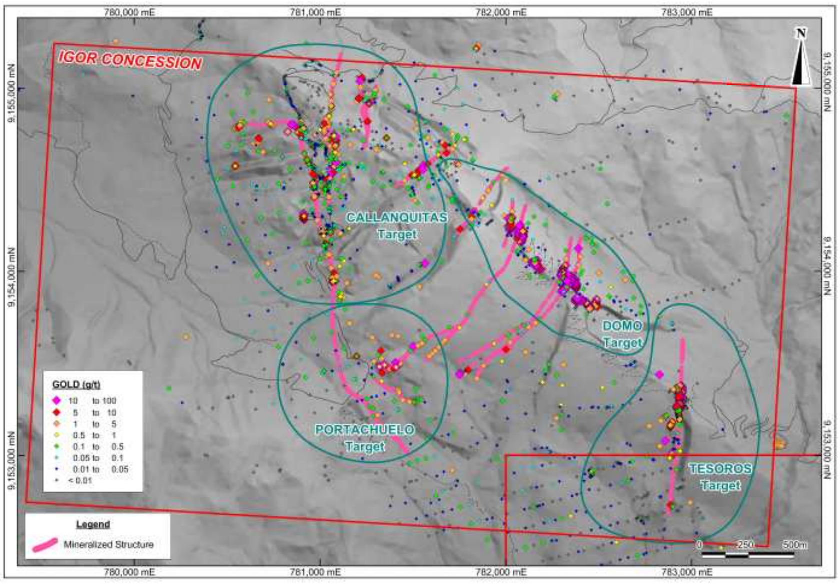

FIGURE 26-1: PLAN VIEW SHOWING GOLD IN SURFACE SAMPLES & MAPPED STRUCTURAL ZONES

- Additional drilling to continue delineation in the area of the current Callanquitas resource. Drill holes targeted on 50 m spacing would largely focus on previously undrilled sections along the structure and the high grade gold and silver mineralization around Section 9,154,600N. Estimated 4,000 m of diamond drilling. Budget: US$1,200,000.

- Preliminary studies to evaluate the metallurgical characteristics of the mineralization. Budget $100,000.

- Preliminary engineering studies to evaluate the viability of potential mining methods that could be used. Budget $100,000.

- Continued environmental baseline studies. Budget: US$50,000.

27 REFERENCES

CIM. (2010). *CIM Definition Standards - For Mineral Resources and Mineral Reserves.* Retrieved from http://web.cim.org/UserFiles/File/CIM_DEFINITION_STANDARDS_Nov_2010.pdf.

Davis, B. M. (1997). *Some Methods of Producing Interval Estimates for Global and Local Resources.* SME Preprint 97-5.

Henkle, R. a. (February 8, 2008). *Updated Technical Report and Resource Estimate of the Igor Miner Project.* Department of La Libertad, Peru.

Huijbregts, A. G. (1978). *Mining Geostatics.* London: Academic Press.

Pratt, W. (September 2008). *Exploration Summary, Igor Copper Gold Project.* La Libertad, Peru.

28 CERTIFICATE OF QUALIFIED PERSONS

BRUCE DAVIS, FAUSIMM, BD RESOURCE CONSULTING, INC.

I, Bruce Davis, FAusIMM, do hereby certify that:

1. I am an independent consultant of BD Resource Consulting, Inc., located at 4253 Cheyenne Drive, Larkspur, CO, U.S.A., 80118, and incorporated January 18, 2008.
2. I graduated with a Doctor of Philosophy degree from the University of Wyoming in 1978.
3. I am a fellow of the Australasian Institute of Mining and Metallurgy, Registration Number 2111185.
4. I have practiced my profession continuously for 33 years and have been involved in geostatistical studies, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Section 11 of the Technical Report titled "Technical Report on the Callanquitas Structure, Igor Mine Project, Northern Peru, South America" dated December 14, 2012 (amended September 27, 2013), with an effective date of November 13, 2012 (the "Technical Report"). I have not visited the property.
7. I have had no prior involvement with the property that is the subject of the Technical Report.
8. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.
9. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
10. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to make the Technical Report not misleading.
11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report

Dated this 27th day of September, 2013.

Bruce M. Davis, FAusIMM

ROBERT SIM, P.GEO, SIM GEOLOGICAL INC.

I, Robert Sim, P.Geo, do hereby certify that:

1. I am an independent consultant of:

SIM Geological Inc.
6810 Cedarbrook Place
Delta, British Columbia, Canada V4E 3C5

2. I graduated from Lakehead University with an Honours Bachelor of Science (Geology) in 1984.
3. I am a member, in good standing, of the Association of Professional Engineers and Geoscientists of British Columbia, License Number 24076.
4. I have practiced my profession continuously for 28 years and have been involved in mineral exploration, mine site geology and operations, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
6. I am responsible for the preparation of the technical report Technical Report on the Callanquitas Structure, Igor Mine Project, Northern Peru, South America, dated December 14, 2012 (amended September 27, 2013), with an effective date of November 13, 2012 (the “Technical Report”).
7. I visited the property on July 17-18, 2012.
8. I have not had any prior involvement with the property that is the subject of the Technical Report.
9. As of as of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
10. I am independent of the issuer applying all of the tests in Section 1.5 of NI 43-101.
11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 27th day of September, 2013.

“original signed”

Robert Sim, P.Geo.

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