

PAN AMERICAN SILVER CORP

Form 6-K

January 31, 2008

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
Washington, D.C. 20549  
FORM 6-K**

**REPORT OF FOREIGN PRIVATE ISSUER TO RULE 13A or 15D-16  
UNDER THE SECURITIES EXCHANGE ACT OF 1934**

**For the Month of: January, 2008**

**File No.: 000-13727**

**PAN AMERICAN SILVER CORP.**

(Translation of Registrant's Name into English)  
**Suite 1500, 625 Howe Street Vancouver British Columbia, Canada V6C 2T6**

(Address of Principal Executive Office)

Indicate by check mark whether the registrant files or will file annual reports under cover of Form 20F or Form 40F:  
Form 20F  Form 40F

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)

(1). Yes  No

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(7). Yes  No

Indicate by check mark whether the registrant by furnishing the information contained in this Form is also thereby furnishing the information to the Commission pursuant to Rule 12g3-2(b) under the Securities Exchange Act of 1934.  
Yes  No

If "Yes" is marked, indicate below the file number assigned to the registrant in connection with rule 12g-3-2(b): 82 -  
\_\_\_\_\_.

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**Submitted herewith:**

**1. Form 43-101 Technical Report for the Quiruvilca Property.**

**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

**PAN AMERICAN SILVER  
CORP.**

**Date: January 30, 2008**

*Robert Pirooz*

General Counsel

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**TECHNICAL REPORT  
FOR THE  
QUIRUVILCA PROPERTY  
LA LIBERTAD, PERU  
EFFECTIVE: JULY 31, 2007**

PREPARED BY:  
MARTIN WAFFORN, P.ENG  
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**1. Title Page**

This Technical Report has been prepared in accordance with the National Instrument 43-101 - *Standards of Disclosure for Mineral Projects* ( NI 43-101 ) and the contents herein are organized and in compliance with Form 43-101F1 Contents of the Technical Report ( Form 43-101 F1 ). The first two items are the Title Page and the Table of Contents presented previously in this report. They are mentioned here simply to maintain the specific report outline numbering required in Form 43-101F1.

**2. Table of Contents**

See discussion in Section 1

### **3. Summary**

#### **3.1 Background**

Pan American Silver Corp. ( PAS ) prepared this Technical Report in support of its disclosure of mineral reserve and mineral resource estimates as of July 31, 2007, as required under Section 4.2 of NI 43-101.

Mr. Martin Wafforn, P.Eng., Vice President of Mine Engineering of PAS, and Dr. Michael Steinmann, P.Geo., Senior Vice President of Exploration and Geology of PAS, are authors of this Technical Report. Each of Mr. Wafforn and Dr. Steinmann is a Qualified Person as that term is defined in NI 43-101.

#### **3.2 Property Ownership, Location and Description**

The Quiruvilca Mine is owned and operated by Pan American Silver S.A. Mina Quiruvilca ( PASQ ), a company in which PAS, indirectly through its subsidiaries, owns 100% of the outstanding voting shares and 99.93% of the total outstanding equity. Pan American Silver S.A.C. Mina Quiruvilca and Cia Minera Huaron merged to form PASQ effective January 2006.

The Quiruvilca Mine is located at latitude 8°1' south and longitude 78°21' west in the province of Santiago de Chuco, one of twelve provinces that make up the La Libertad Region in northwest Peru. The property is in the Andes mountain range at elevations ranging from 3,450 to 4,075m above sea level. The nearest major center is Trujillo, 76km west of the mine. Trujillo is the third largest city in Peru with a population of ~650,000 (according to a 2005 census) and is the economic center of northern Peru, acting as the central hub for agriculture. Trujillo also provides access to Salaverry, a large port, and is connected to Lima, the capital of Peru, via highways and daily flights.

The property consists of 140 concessions that span 3,565.6 ha of land. Mining is by underground methods and current developments extend over an area of 1,200 ha to a depth of 400 m. All of the concessions include the rights for mining, water and surface usage. All mining property concessions of the Quiruvilca Mine are registered in the name of PASQ, except 0.2 ha which are registered under the name of Corporacion Minera Nor Peru S.A (which was acquired by PAS). PASQ is responsible for paying the annual mining tenure tax. These payments were up to date as of July 31, 2007.

#### **3.3 Geology and Mineralization**

The Quiruvilca Mine is located on the west side of the Western Cordillera within the eastern edge of a major sequence of volcanic rocks, interpreted as part of the Calipuy Volcanic Formation of Mid-Miocene age. This volcanic formation, with a thickness of about 2,000 m, consists of andesite flows and flow breccias inter-layered with thin basalt flows and occasional tuffaceous lacustrine sediments.

The mineralization at Quiruvilca is contained in a series of narrow veins filling fractures and faults. Over 130 veins have been identified in the mine area. Although narrow, the veins at Quiruvilca tend to have an extensive lateral and vertical continuity with abundant splits, cymoid loops, pinch and swell structures. In some places, the veins show some thick ore shoots connected to thinner sub-economic to non-economic zones. The width varies from small stringers up to two metre wide veins.



The mineralization exhibits strong metal zoning. The central copper zone, some 700 metres by 2,800 metres in area, consists of predominately enargite-pyrite, with lesser chalcopyrite, tennantite, tetrahedrite, sphalerite and galena (the Enargite Zone ). The Enargite Zone is surrounded by a relatively narrow transition zone of tennantite, tetrahedrite, sphalerite and galena (the Transition Zone ). The Transition Zone is in turn surrounded by a zinc-lead zone of predominantly sphalerite and galena, which extends some 500 metres beyond the Transition Zone (the Zinc-Lead Zone ). In recent years a majority of the production has come from the Zinc-Lead Zone. An outer zone consists of stibnite, arsenopyrite and pyrite.

### 3.4 Exploration and Development

Exploration at the Quiruvilca property is conducted using a combination of diamond drilling and underground drifting. Two to three diamond drills are in continuous operation at the property, drilling holes between 50 m and 350 m in length. As at the end of September 2007, the Quiruvilca Mine drill hole database contains 1,327 drill holes equalling 172,455 m, dating back to 1926.

Channel samples are an important part of mine development, mineral resource estimates and production quality control. For stope sampling a channel sample is collected every 3 metres along strike, and for sublevels every 2 metres. Vertical development on veins are channel sampled in 1 metre intervals. As of July 31, 2007, the database contained 134,487 records of channel samples.

Quiruvilca's primary exploration objective is to extend known veins along their strike and depth extension as they have excellent potential to increase resources. There is also high potential of finding additional splits and sigmoidal loops branching off these veins. Exploration of resources at depth has led to the Mine Deepening Project. This project is focused on the exploitation of the Luz Angelica and Zoila Gata veins at and below the 400 level and is near production. Additional exploration done in 2006 confirmed the extension of the Elisa vein, including the Jose Godoy, Chimborazo, Jose Godoy Split, and Recuperada veins on the northwest portion of the property.

### 3.5 Mineral Resource And Reserves Estimates as at July 31, 2007

The mineral reserve estimate for Quiruvilca (Table 3-1) as at July 31, 2007 was prepared by, or under the supervision of Dr. Michael Steinmann, P.Geo., Senior Vice President Geology & Exploration, and Mr Martin Wafforn, P.Eng., Vice President Mine Engineering of PAS, who are both Qualified Persons ( QPs ) as the term is defined in NI 43-101. This mineral reserve estimate was calculated using a price of \$9.00 per ounce of silver, \$5,000 per tonne of copper, \$1,000 per tonne of lead, and \$2,100 per tonne of zinc.

**Table 3-1: Quiruvilca Mineral Reserves**

Reserve	Tonnes	Silver	Ag Content	Gold	% Copper	% Lead	% Zinc
		(g/t)	(ounces)	(g/t)			
Proven	988,075	168	5,350,351	0.58	0.64	1.12	3.41
Probable	492,093	152	2,402,414	0.47	0.76	1.21	4.05
Total	1,480,168	163	7,752,766	0.55	0.68	1.15	3.62

Notes:

PAS's share is 100% of the total mineral reserves.

Quiruvilca's mineral reserves have been estimated on the basis of blocks exposed by underground workings on one or more sides and having an in-place diluted value equal to or above the cut-off grade of \$27/tonne. Proven and probable mineral reserves are extrapolated between 15 and 30 metres down dip depending on vein continuity. The geological model employed for Quiruvilca involves geological interpretations on sections and plans derived from core drill hole information and channel sampling.

Mineral reserves have been estimated using the O'Hara dilution formula, which typically adds 20% to 50% dilution at zero grade depending on dip angle and vein width.

Mineral reserves have been estimated using a mining recovery of 90% with a further 5% subtracted for other mining losses.

The mining and processing rate is currently 1,150 tonnes per day.

Mineral reserves for the principal structures have been estimated with a 3 dimensional block model using Datamine software. Mineral reserves for minor structures have been estimated using polygonal methods on longitudinal sections.

Environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues are not expected to materially affect the above estimate of mineral reserves.

The measured, indicated and inferred mineral resources at the Quiruvilca Mine as at July 31, 2007 are estimated to be as shown in Table 3-2. This mineral resource estimate was calculated using a price of \$9.00 per ounce of silver, \$5,000 per tonne of copper, \$1,000 per tonne of lead, and \$2,100 per tonne of zinc, and was prepared under the supervision of and reviewed by Mr. Martin Wafforn, P. Eng. Vice President of Mine Engineering of PAS and Dr. Michael Steinmann, P. Geo. Senior Vice President of Exploration and Geology of PAS. Each of Mr. Wafforn and Dr. Steinmann is a Qualified Person as that term is defined in NI 43-101.

**Table 3-2: Quiruvilca Mineral Resources**

Resource		Silver	Ag Content	Gold			
Category	Tonnes	(g/t)	(ounces)	(g/t)	%	%	%
					Copper	Lead	Zinc
Measured	4,239,427	134	18,271,750	0.59	1.15	0.85	2.28
Indicated	1,018,488	175	5,739,868	0.48	0.73	1.29	3.72
Total M&I	5,257,915	142	24,011,618	0.57	1.07	0.93	2.56
Inferred	2,588,320	145	12,079,263	0.97	0.46	1.25	3.63

**Notes:**

PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.

PAS's share is 100% of the total mineral resources.

The geological model employed for Quiruvilca involves geological interpretations on sections and plans derived from core drill-hole information and channel sampling.

The mining and processing rate is currently 1,150 tonnes per day.

Mineral resources for the principal structures are estimated with a 3 dimensional block model using Datamine software. Mineral resources for minor structures are estimated using polygonal methods on longitudinal sections.

Environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues are not expected to materially affect the above estimate of mineral resources.

Mineral resources that are not mineral reserves do not have demonstrated economic viability.

The mineral resource estimate involved statistical and geostatistical interpolation. Composites and 3-dimensional models were constructed utilizing Data Mine®, commercial mine modeling software. Interpolations were done for silver, lead, zinc, and copper grades using the ordinary kriging (OK) estimation method, based on variographic analysis performed on 14 representative veins. Other veins that were not possible to associate were interpolated by inverse distance to the third power. The blocks have been classified as measured, indicated or inferred based on the radius of the search ellipse compared to the variographic range.

**3.6 Mining Operations**

The current life of mine (LOM) plan comprises a continuation of the current Cut and Fill Mining methods for the narrow vein deposits that have been mined at Quiruvilca Mine since the early 1900's. Overhand Cut and Fill mining methods are employed within Quiruvilca. Typically, nearby vertical blast holes are drilled from the hydraulic backfill in the stopes. Breasting (horizontal blast holes) is a less productive method that is utilized in areas of more difficult ground conditions where more control of the rock mass is required.

The Quiruvilca Mine extends over an area that is four kilometres east/west by three kilometres north/south and from an elevation of 4,050 m at the top of the mountain down to the 400 level (elevation 3,468 m). Access to the mine is from four adits driven into the side of the mountain at elevations ranging from 3,648 m to 3,870 m.

Battery locomotives are used to haul ore and waste in trains from the stopes and development headings to ore and waste passes. Ore from the upper levels of the mine is delivered to ore passes, which transfer it to the 220 main haulage level. Trolley locomotives with mine cars are used to transport ore from the ore passes on the 220 level to coarse ore bins at the crushing plant outside of the mine portal.

A 590 m long, 76 cm wide inclined conveyor belt is used to transport ore and waste from below the 220 level to a surface bin at the 220 level. The conveyor belt has a capacity of 150 tonnes per hour. The mine completed the extension of this conveyor belt down to the 340 level in August of 2005. Ore from the 400 level will be transported up to the 340 level in order to utilize the conveyor belt for haulage to surface. Ore from the 400 level Luz Angelica vein system will be trucked up a ramp, and ore from the Zoila Gata vein system will be hoisted via an inclined shaft. The haulage and access systems for the 400 level were started in 2006. The ramp system for the Luz Angelica vein is now completed and is in use. The ramp to the Zoila Gata vein is completed and is in use for vein development on the 400 level. The excavation works for the inclined shaft and associated infrastructure are almost complete and the mine is currently working on the civil, mechanical and electrical systems required for completion. The inclined shaft is projected to be completed by the end of 2007.

The processing plant (known as the Shorey mill) is operating at approximately 50% of its rated capacity. In 2006 daily throughput was 1,287 tonnes operating 24 hours per day, six days a week, and the current daily throughput in 2007 is 1,150 tonnes. The LOM plan is based on providing 1,050 tonnes per day ( TPD ) of ore to the mill and ramp down to 775 TPD by 2011. The LOM plan does not include mining of any inferred mineral resources. Processing consists of crushing, grinding and selective flotation. Actual average recoveries for the period from January 2007 to July 2007 were 83.26% for silver, 73.89% for copper, 81.26% for lead, and 81.77% for zinc.

### **3.7 Authors Conclusions**

Mr. Martin Wafforn, P.Eng., Vice President of Mine Engineering of PAS and Dr. Michael Steinmann, P.Geo., Senior Vice President of Exploration and Geology of PAS, both Qualified Persons, reviewed pertinent data from the Quiruvilca Mine regarding exploration data and methods, mineral resource and reserve estimates, metallurgy, and process performance. They determined that the estimates of mineral resources and mineral reserves as of July 31, 2007 are in accordance with NI 43-101, and as set forth in the Canadian Institute of Mining, Metallurgy and Petroleum's CIM Definition Standards for Mineral Resources and Mineral Reserves adopted by CIM Council on December 11, 2005 (the CIM Definition Standards ). The authors of this Technical Report generally conclude:

- (1) The geology and mineralization of a large polymetallic system with over 130 different veins on the mine property is well understood. Geological models appropriate to guide mineral resource estimates have been developed in a professional manner.
- (2) Exploration drilling, sampling, sample preparation, assaying, density measurements and drill-hole surveys have generally been carried out in accordance with industry standard practices and are suitable to support mineral resource estimates.
- (3) Mineral exploration and drilling programs are well-planned and executed and supply sufficient information for mineral resource estimates and mineral resource classification.
- (4) Sampling and assaying includes a QA/QC program, supervised by the geology department that includes external check samples and the routine submission of standards. For each batch of twenty, at least one internal duplicate and one internal standard is added. The responsible geologist will add one standard for every twenty samples and one duplicate for every fifty samples. Duplicate samples of diamond drill cores samples come from the remaining half core split to a quarter core. For channel samples, a duplicate is obtained by collecting a sample of equal weight from the same sampling location. The Quiruvilca Mine is currently contracting ALS Chemex, Lima to act as their external secondary lab.

- (5) The Quiruvilca deposit mineral resource model was developed using industry accepted methods. The authors of this Technical Report validated the mineral resource estimate and found it to be acceptable in both tonnage and grade.
- (6) Mine designs have been developed using industry standard practices and appropriate design criteria. Proven and probable mineral reserves were developed from measured and indicated resources with appropriate application of cost and design criteria. Mining methods, metallurgical performance and operating costs are well-established from a long history of production at the Quiruvilca Mine.
- (7) Mineral resources are classified as measured, indicated and inferred mineral resources. Mineral resource classification criteria are appropriate in terms of the confidence in grade estimates and geological continuity and meet the requirements of NI 43-101 and the CIM Definition Standards.
- (8) The economic analysis calculates the Net Present Value ( NPV ) of the project to be \$-5.08 million at a 10% discount rate and \$-3.16 million at a 15% discount rate. The undiscounted after tax cash flow is \$-11.97 million. The NPV calculation included the closure costs of the Quiruvilca Mine, which will be incurred regardless of continued operations. Without the closure cost included, the undiscounted NPV is calculated to be \$7.08 million. The average Quiruvilca Mine unit total operating costs is projected to be \$63.48 during 2008 to 2011.
- (9) The life of mine plan presented in this Technical Report is based solely on proven and probable mineral reserves. The life of mine plan extends until 2011.

### **3.8 Authors Recommendations**

The authors of this Technical Report recommend execution of the LOM Plan and Schedule at the Quiruvilca Mine operation.

#### **4. Introduction**

Pan American Silver Corporation, the parent company of Pan American Silver S.A Mina Quiruvilca, asked its qualified senior personnel to review mineral resource and reserve estimates for the silver-copper-lead-zinc deposit at the Quiruvilca Mine in Peru, and to prepare a Technical Report to support its disclosure of mineral reserve and mineral resource estimates as of July 31, 2007, as required under section 4.2 of NI 43-101. This Technical Report has been prepared in accordance with NI 43-101 and the format and contents of this report conform to Form 43-101 F1.

Mr. Martin Wafforn, P.Eng., PAS Vice President of Mine Engineering, serves as the Qualified Person with respect to the mineral reserve statements described herein and sections 1, 2, 3, 4, 5, 6, 7, 8, 17, 18, 20, 21, 22, 23, 24 and 25 and for all figures, tables, and graphs within those sections, contained in this Technical Report. Mr. Wafforn last visited the Quiruvilca Mine site from September 17<sup>th</sup> to September 19<sup>th</sup>, 2007.

Dr. Michael Steinmann, P.Geo., PAS Senior Vice President of Exploration and Geology, serves as the Qualified Person with respect to the mineral resource statements described herein and sections 1,2,3,4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 19, 21, 22, 23 and 24 and for figures, tables, and graphs contained in sections 9, 10, 11, 12, 13, 14, 15, and 19 contained in this Technical Report. Dr. Steinmann last visited the Quiruvilca Mine site from September 17<sup>th</sup> to September 19<sup>th</sup>, 2007.

Mr. Elmer Ildefonso, a consulting mining engineer to PAS, performed the mineral resource evaluation and modeling under the direct supervision of Dr. Steinmann.

Information and data for the preparation of the report were obtained from the Quiruvilca Mine operations personnel during site visits carried out between September 17<sup>th</sup> and September 19<sup>th</sup>, 2007 and were checked for accuracy by the authors of this Technical Report.

Sources of information and data contained in this Technical Report or used in its preparation are shown in Table 4-1.

**Table 4-1: References**

<b>Sources Of Information</b>	<b>Used In Section</b>
Mr. Martin Wafforn, P.Eng.	1, 2, 3, 4, 5, 6, 7, 8, 17, 18, 20, 21, 22, 23, 24, 25
Dr. Michael Steinmann, P.Geo.,	1,2,3,4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25
Mr. Elmer Idefonso (consultant)	19
Ignacio Couturier	24
Rodrigo, Elias & Medrano (legal)	6.2
SVS Ingenieros S.A (consultant)	25.5, 25.9

**Notes:**

PAS retained Estudios Mineros, an Engineering company based in Lima, Peru, to compile the land map, mining concessions and surface rights presented in this Technical Report.

PAS retained the Peruvian law firm of Rodrigo, Elias & Medrano to review the public register in Peru to ensure that the mining concessions and surface rights reported are held by PASQ.

The authors have reviewed the information contained in these documents and included in this Technical Report and determined in their professional judgment that such information is sound and confirm and approve of such information.

All tonnages stated in this Technical Report are dry metric tonnes ( dmt ) unless otherwise specified. Ounces pertaining to silver metal content are expressed in troy ounces. All dollar values stated in this report are U.S. dollars.

The authors of this Technical Report are responsible for all information in this Technical Report that was not prepared by a Qualified Person, other than otherwise set out in Section 5, Reliance on Experts .

**5. Reliance on Other Experts**

Mr. Martin Wafforn and Dr. Michael Steinmann, as authors of this Technical Report, have relied upon the references, opinions and statements contained within the references listed in Section 23. These reports, documents, and statements were found to be generally well organized and presented, and where applicable, the conclusions reached are judged reasonable.

It is assumed that technically qualified and competent persons prepared these reports and documents. It is the authors opinion that the materials referenced above are prepared and presented according to mining and engineering industry standards. The co-authors conclude that the contents are reasonably organized and presented and the conclusions reached are prudent.

The authors have relied upon the title opinion produced by Rodrigo, Elias & Medrano (a Peruvian law firm) dated November 15, 2007 and expressly disclaim responsibility for information derived from the opinion. Rodrigo, Elias & Medrano is a well known and established Peruvian law firm



## **6. Property Description and Location**

### **6.1 Property Description**

The Quiruvilca Mine is an underground mining operation located in the province of Santiago de Chuco, one of twelve provinces that make up the La Libertad Region in northwest Peru (see Figure 6-1). The nearest major center is Trujillo, 76 km west of the mine. Trujillo is the third largest city in Peru with a population of ~650,000 (according to a 2005 census) and is the economic center of northern Peru, acting as the central hub for agriculture. Trujillo also provides access to Salaverry, a large port, and is connected to Lima, the Capital of Peru, via highway and daily flights. The Quiruvilca Mine property is geographically centered at 8°1' S and 78°21' W in the Andes mountain range at elevations ranging from 3,450 to 4,075 m above sea level. The property consists of 140 concessions that span 3,565.6 ha of land. Mining is by underground methods and current developments extend over 1,200 ha to a depth of 400 m. The property boundaries, layout of the major infrastructure and significant land features are laid out in Figure 6-2. Within the boundaries of the mine property there are two small communities, the Town of Quiruvilca and Shorey Village. The milling facilities are located in Shorey, as well as worker camps. There are two major tailing impoundments on the property, the San Felipe Impoundment and the Santa Catalina Impoundment. The San Felipe Impoundment is the former tailings impoundment and is no longer used except for the storage of sludge from the water treatment plant.

Since operations began, over 130 veins have been identified in the mine area. At least three-quarters of these veins have been in production at some point in time. Figure 6-3 shows a plan view of mapped mineralized structures on the property. In addition, a series of figures detailing the mine workings by level have been included in Figure 6-4A to 6-4G.

Local lakes, rivers and streams provide process and potable water to the operations, the more significant ones being the La Merced Creek, just south of the Santa Catalina Impoundment, and the Los Angeles lake, to the east outside of Quiruvilca's boundaries.

### **6.2 Mineral Tenure**

PAS retained the Peruvian law firm of Rodrigo, Elias & Medrano Abogados to provide a legal opinion regarding the mining properties (including surface rights) held by PAS and PASQ for the Quiruvilca Mine. During the course of the review it was decided that reviewing all of the 140 properties was not required and the review was limited to those 77 properties belonging to the Quiruvilca Mine from which production is or has been obtained (the Mining Properties). The opinion on the Mining Properties was dated November 15, 2007 and the authors of this Technical Report have relied solely on information contained in the opinion.

The main legal features related to the requirements for maintaining the Mining Properties in good standing and a brief explanation of the main administrative requirements have been summarized from the opinion as follows:

- 1.1. Under Peruvian law, the right to explore for and exploit minerals is granted by way of concessions. Pursuant to the Uniform Test of Mining Law, approved by Supreme Decree No. 014-92-EM of June 4, 1992 (the Mining Law ), any local or foreign individual or legal entity is required to hold a specific concession granted by the Ministry of Energy and Mines ( MEM ) to carry out any mining activity other than: sampling, prospecting and/or trading in mining products or minerals of any type and condition. The exploration for and extraction of mineral substances from the ground or underground is governed by the Mining Law.
- 1.2. Under the Mining Law, the system of concessions includes:
  - Mining Concessions, which grant their holders the right to explore and exploit the mineral resources, whether metallic or non-metallic, within the area conferred by the concession;
  - Processing Concessions, which grant the right to process minerals;
  - General Service Concessions, which grant the right to render auxiliary services to one or more mining concessions; and
  - Mining Transportation Concessions, which grant the holders the right to operate a continuous massive transportation system of mineral products between one or more mining units.
- 1.3. A Peruvian mining concession is a property-related right, distinct and independent from the ownership of surface land on which it is located. The term of a concession is indefinite, provided that related annual fees are duly paid. The rights manifested in a mining concession are protected against third parties, transferable, chargeable and, in general, may be the subject of any transaction or contract. Mining concessions may be privately owned and no state participation is required. Buildings and other permanent structures used in a mining operation are considered real property accessories to the concession on which they are situated.
- 1.4. The concession grants to the concessionaire the right to perform, on an exclusive basis, certain mining activities within a duly determined area. All the concessions governed by the Mining Law should be registered with the Registry of Mining Rights, which forms part of the National System of Public Registers. They are also registered in the National Mining Cadastre, which is managed by the National Institute of Mining, Metallurgical and Geological Studies based on UTM coordinates.
- 1.5. The concessions are irrevocable as long as its holder complies with the annual payment of the validity fee (US\$3 per hectare) and penalties for not achieving a minimum production (US\$100 per hectare per year) within six years following the year in which the respective concession is granted. If said minimum production is not reached, as of the first semester of the seventh year, the holder of the concession shall pay a US\$6 penalty per hectare per year until such production is reached (the penalties increase to US\$20 as from the twelfth year). It is possible to avoid payment of the penalty if evidence is presented to the mining authorities that an amount equal to ten times the applicable penalty or more has been invested. Non-compliance with any of these obligations for two consecutive years will result in the extinction of the concession. Any payment made the year following a year of non-compliance will apply to the previous year.
- 1.6. To comply with the established work and production obligations, holders of more than one mining concession of the same type and nature may group them in economic administrative units, provided the concessions are located within the same 5 km surface radius, in the case of non-ferrous metallic minerals. To form such economic administrative units requires approval from the General Mining Directorate.



1.7. Concessions may be transferred, assigned and mortgaged, while any movable assets used in mining activities as well as minerals extracted and/or processed from such concessions that belong to the concessionaire may be pledged. Any and all of these transactions and contracts must be formalized through a public deed and registered before the Mining Public Registry for them to be enforceable against the State and third parties.

1.8. It is important to note that the concept of overlapping with predecessor mineral titles is not uncommon in Peru. Such overlapping is common with regard to Peruvian mineral title as a result of a change to the Peruvian official system of granting mining concessions implemented in 1991 and which is based on UTM coordinates.

1.9. Administrative requirements include the Filing of a document in which information on the activities performed on the mining property during the previous year is provided to the mining authorities.

As mentioned above, property boundaries are located by UTM co-ordinates and are not marked physically in the field. In order to confirm and assess the 77 Mining Properties, the information from the following sources was gathered and analyzed by Rodrigo, Elias & Medrano Abogados:

1.1. The status of the Mining Properties at the computerized system of the INGEMMET (Instituto Nacional Geológico Minero y Metalúrgico);

1.2. In detail, the Public Registry records for each one of the Mining Properties.

1.3. The official list of mining rights updated to December 31, 2006 ( Padrón Minero ), published by the INGEMMET.

1.4. Information and documentation provided by PASQ.

The opinion provided by the law firm of Rodrigo, Elias & Medrano Abogados is summarized as follows:

1. All the 77 Mining Properties plus one beneficiation concession are in good standing.

2. Mining concession titles have been granted with respect to all Mining Properties.

3. All Mining Properties titles have been registered with the Public Registry. There are two properties with minor name changes that need to be duly recorded.

4. Quiruvilca is the current registered titleholder of all the Mining Properties. In the case of three of the mining concessions, there is a registered interest that a number of third parties appear to have over them.

Due to the time elapsed since such rights were granted more than 50 years and the lack of documentation available, it is not possible to determine whether or not such interests are valid and/or enforceable to date. PASQ has confirmed these concessions are on the outskirts of the Quiruvilca Mine property and no longer contain mining operations and are as follows:

- a) Berta 8.0015 Hectares: Pan American Silver S.A.C. Mina Quiruvilca 91.666666% and third party 8.333333%.
- b) Colorado 2.8228 Hectares: Pan American Silver S.A.C. Mina Quiruvilca 93.6%, and third parties the remainder.
- c) La Amorosa 1.6919 Hectares: Pan American Silver S.A.C. Mina Quiruvilca 72.5%, and third parties the remainder.

In the event the third parties claim and obtain recognition of their interests, the current mine regulations would require a legal mining partnership. PASQ would retain the controlling interest in all of these concessions.

5. Although all Mining Properties are currently free from any kind of lien and/or encumbrance in favor of third parties, almost all of them are subject to a mining mortgage agreement in favor of Pan American Silver Peru SAC for an amount of US\$2,000,000, which was granted as a consequence of the execution of the Transfer Agreement by means of which PASQ acquired such Mining Properties from Pan American Silver Peru SAC their previous owner. In addition, almost all the Mining Properties maintains registration of a Mining Assignment Agreement granted for a ten-year term, starting on January 1, 2000, by Pan American Silver Peru SAC in favor of Corporación Minera Nor Perú S.A (which is the former name of PASQ and therefore is their current owner) that also includes a NSR Mining Royalty of 4.6% in Pan American Silver Peru SAC's favor.
6. The mining properties Acumulación Quiruvilca 1, Acumulación Quiruvilca 4 and CMNP 2A are subject to an agreement executed on June 28, 2004 between PASQ and Minera Barrick Misquichilca SA ( Minera Barrick ). These properties are in the process of being divided so that the areas not required for the operation of the Quiruvilca Mine are transferred to Minera Barrick.
7. There is a large degree of overlapping between the Mining Properties and a small degree of overlapping with third parties' mining rights. It is quite common for Peruvian mineral properties to overlap with third party mining concessions. In these cases, the older concessions have senior rights over the overlapped concessions.

Mining concessions are a real property right different and independent from surface land property. Consequently, pursuant to Peruvian legislation, title over these concessions does not grant its holder ownership or a possession title over the surface land; this should be negotiated with the corresponding landowners.

PASQ has a large number of public and private documents establishing surface rights that date back in some cases to the 1930 s. In this respect, although upon review of the documentation provided, PASQ appears to be the legal holder and/or owner of the corresponding lands with both valid and binding documents, there are a number of lands where registration either does not exist or is no longer in force. Although registration is not a requirement, it has been recommended.

A complete list of all of the mining concessions held by PASQ are shown in Table 6-1.

**Table 6-1: List of mining concessions held by PASQ with respect to the Quiruvilca Mine**  
**CONCESSIONS HELD BY PAN AMERICAN SILVER S.A.C. QUIRUVILCA MINE**  
**UPDATED AS OF SEPTEMBER 2007**

N°	CODE	CONCESSION	HECTARES	LETTER	ZONE	TITLE TO PAN AMERICAN SILVER S.A.C. MINA	DATE RECEIVED	D_STATE
1	15000415Y01	ACAJUTLA	10.0011	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	6/7/1923	D.M. Titulado D.L. 109
2	15010733X01	1 ACUMULACION QUIRUVILCA	361.1400	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/22/1989	Acumulación D.M. Titulada
3	15010754X01	3 ACUMULACION QUIRUVILCA	31.9233	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	7/18/1989	Acumulación D.M. Titulada
4	15010757X01	4 ACUMULACION QUIRUVILCA	746.0718	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	7/24/1989	Acumulación D.M. Titulada
5	15010760X01	5 ACUMULACION QUIRUVILCA	213.1768	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	7/31/1989	Acumulación D.M. Titulada
6	15002201X01	ADA	0.2287	17-G	17	QUIRUVILCA	10/9/1957	D.M. Titulado D.L. 109
7	15000334Y01	ADELINA	2.8153	17-G	17	PAN AMERICAN SILVER S.A.C.	2/13/1919	D.M. Titulado D.L. 109

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8	15001584X01	AGRIPINA	0.2203	17-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	6/28/1922	D.M. Titulado D.L. 109
9	15000447X01	AMELIA	1.5734	16-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/30/1909	D.M. Titulado D.L. 109
10	15002200X01	ANA	0.1869	17-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	10/9/1957	D.M. Titulado D.L. 109
11	15000179Y01	ANA MARIA	2.2925	16-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/26/1906	D.M. Titulado D.L. 109
12	15001092X01	ANDRES	1.1281	17-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/20/1916	D.M. Titulado D.L. 109
13	15001526X01	ATABOY	0.1000	16-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/13/1921	D.M. Titulado D.L. 109
14	15001250X01	ATAHUALPA	10.0019	16-G	MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	9/8/1918	D.M. Titulado D.L. 109
15	15003626X01	AVA	0.2229	17-G	MINA QUIRUVILCA	7/7/1960	D.M. Titulado D.L. 109
16	15001088X01	BERTA	8.0015	17-G	17	12/18/1916	



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					PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA		D.M. Titulado D.L. 109
17	15000912X01	BOER	4.0007	17-G	17QUIRUVILCA	3/1/1910	D.M. Titulado D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
18	15001532X01	BRIAND	0.2189	16-G	17QUIRUVILCA	1/7/1922	D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
19	15000133Y01	BRONCE	2.0526	17-G	17QUIRUVILCA	1899-08-02	D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
20	15000203Y01	CABALLO DE OROS	4.8095	17-G	17QUIRUVILCA	12/2/1907	D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
21	15001463X01	CARPENTIER	5.1728	17-G	17QUIRUVILCA	7/12/1921	D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
22	15001686X01	CENTENARIO	3.9687	16-G	17QUIRUVILCA	9/15/1924	D.L. 109
					PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado
23	15001270X01	CERRO DE PASCO	1.7045	16-G	17QUIRUVILCA	12/12/1918	D.L. 109
24	15000135Y01	CHIMBORACITO	5.6458	17-G	17 PAN	1899-08-02	D.M. Titulado D.L. 109
					AMERICAN SILVER		

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25	15000150Y01	CHIMBORAZO	8.0012	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/30/1906	D.M. Titulado D.L. 109
26	15000193Y01	CHIMBORAZO N° 1	8.0014	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1/4/1908	D.M. Titulado D.L. 109
27	15001089X01	CLARA	0.5089	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/20/1916	D.M. Titulado D.L. 109
28	010090196A	CMNP-2A	100.0000	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	3/20/1996	D.M. Titulado D.L. 708
29	010140996	CMNP-4 DE QUIRUVILCA	800.0000	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/10/1996	D.M. Titulado D.L. 708
30	15000132Y01	COLORADO	2.8228	17-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1899-08-02	D.M. Titulado D.L. 109
31	15000295Y01	CON NOMBRE	0.5651	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/2/1916	D.M. Titulado D.L. 109
32	15000216Y01	CUBA	1.9264	16-G	S.A.C. MINA QUIRUVILCA	5/19/1908	D.M. Titulado D.L. 109

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33	15000110X01	DOCE DE JULIO	16.0024	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	7/12/1906	D.M. Titulado D.L. 109
34	15000220Y01	DON RICARDO	12.0018	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	7/24/1909	D.M. Titulado D.L. 109
35	15001466X01	EL ARCO	5.6504	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	7/12/1921	D.M. Titulado D.L. 109
36	15001318X01	EL MILAGRO III	2.6210	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	4/4/1917	D.M. Titulado D.L. 109
37	15000097Y01	EL TINGO	3.1508	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	9/1/1917	D.M. Titulado D.L. 109
38	15000392Y01	EL VERONES	0.0327	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	7/12/1921	D.M. Titulado D.L. 109
39	15003862X01	ELE	1.2744	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	5/8/1961	D.M. Titulado D.L. 109
40	15002122X01	ELENA	1.0001	17-G	17QUIRUVILCA	6/13/1957	D.L. 109
41	15000153Y02	ELEODORA	4.0006	16-G	17 PAN AMERICAN SILVER	8/10/1906	D.M. Titulado D.L. 109

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42	15000180Y01	ELISA	8.0017	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	10/13/1906	D.M. Titulado D.L. 109
43	15000185Y01	ELVIRA	12.0018	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/30/1906	D.M. Titulado D.L. 109
44	15000189Y01	ELVIRA GRACIELA	12.0015	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/30/1906	D.M. Titulado D.L. 109
45	15000192Y01	ELVIRA N° 1	16.0023	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1/4/1908	D.M. Titulado D.L. 109
46	15000191Y01	ELVIRITA	2.0004	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1/4/1908	D.M. Titulado D.L. 109
47	15000152Y01	EMMA	0.2684	17-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	8/9/1906	D.M. Titulado D.L. 109
48	15022198X01	ENA	1.0002	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	17QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	10/9/1957	D.M. Titulado D.L. 109
49	15000138Y01	ESPERANZA	2.8230	16-G	S.A.C. MINA QUIRUVILCA	17QUIRUVILCA	1899-08-02	D.M. Titulado D.L. 109

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50	15000199Y01	ETELVINA	4.9682	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	11/10/1908	D.M. Titulado D.L. 109
51	15000137Y01	FE	2.8229	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	1899-08-02	D.M. Titulado D.L. 109
52	15009183X01	FEDERAL N° 6	3.7443	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	11/11/1981	D.M. Titulado D.L. 109
53	15003867X01	FELIX	0.4758	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	5/16/1961	D.M. Titulado D.L. 109
54	15003868X01	FELIX QUINTA	0.3836	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	5/16/1961	D.M. Titulado D.L. 109
55	15000247Y01	FELIX SEGUNDA	20.3411	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	3/10/1916	D.M. Titulado D.L. 109
56	15002032X01	FELIX TERCERA	1.0002	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	1/26/1957	D.M. Titulado D.L. 109
57	15000485Y01	FERMIN	48.0072	16-G	17QUIRUVILCA	9/28/1926	D.L. 109
58	15001319X01	FORTUNATO	2.8468	17-G	17 PAN AMERICAN SILVER	11/15/1916	D.M. Titulado D.L. 109

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59	15000137X01	GAUDENCIA	0.8518	17-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	9/3/1906	D.M. Titulado D.L. 109
60	15000471Y01	HABANA	0.0034	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	4/26/1929	D.M. Titulado D.L. 109
61	15001529X01	HARDING	0.7173	17-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1/7/1922	D.M. Titulado D.L. 109
62	15000134Y01	HUASCO	6.5972	17-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1899-08-02	D.M. Titulado D.L. 109
63	15001531X01	HUGHES	2.7717	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	1/7/1922	D.M. Titulado D.L. 109
64	15005348X01	IRMA	1.0001	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	9/6/1967	D.M. Titulado D.L. 109
65	15000437Y01	IVAN	3.8877	16-G	S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	9/30/1927	D.M. Titulado D.L. 109
66	15000470Y01	IVANCITO	0.8567	16-G	S.A.C. MINA QUIRUVILCA	4/26/1929	D.M. Titulado D.L. 109

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67	15000976X01	JESUS	0.0679	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	1889-01-12	D.M. Titulado D.L. 109
68	15002302X01	JOSE GODOY	20.0033	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	4/10/1946	D.M. Titulado D.L. 109
69	15000149Y01	JOSEFINA	2.0004	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	5/30/1906	D.M. Titulado D.L. 109
70	15001535X01	KATO	0.2400	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	1/7/1922	D.M. Titulado D.L. 109
71	15001273X01	LA ALEGRIA	1.0696	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	12/12/1918	D.M. Titulado D.L. 109
72	15000143Y01	LA AMOROSA	1.6919	17-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	1899-08-16	D.M. Titulado D.L. 109
73	15001271X01	LA AVISPA	0.2155	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	12/12/1918	D.M. Titulado D.L. 109
74	15007467X01	LA CODICIADA	2.2999	16-G	PAN AMERICAN SILVER S.A.C. MINA 17QUIRUVILCA	3/29/1979	D.M. Titulado D.L. 109
75	15000928X01	LA ESPERANZA	4.0005	17-G	17 PAN AMERICAN SILVER	3/16/1916	D.M. Titulado D.L. 109

S.A.C.  
MINA  
QUIRUVILCA



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N°	CODE	CONCESSION	HECTARES	LETTER	ZONE	TITLE TO	DATE RECEIVED	D_STATE
76	15000178Y01	LA INGRATITUD	0.8663	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	7/8/1907	D.M. Titulado D.L. 109
77	15001111X01	LA JUSTICIA	1.9590	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	2/12/1917	D.M. Titulado D.L. 109
78	15001472X01	LA MONITA	0.2171	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	7/14/1921	D.M. Titulado D.L. 109
79	15001269X01	LA QUEBRADA	1.5654	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	12/12/1918	D.M. Titulado D.L. 109
80	15000186Y01	LA RATONERA	4.0005	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	10/15/1907	D.M. Titulado D.L. 109
81	15000197Y01	LA RECUPERADA	1.5398	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	12/11/1945	D.M. Titulado D.L. 109
82	15001992X01	LA RESTAURADORIA	0.0017	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/15/1945	D.M. Titulado D.L. 109
83	15000195Y01	LA VENGANZA	2.0005	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	11/4/1905	D.M. Titulado D.L. 109
84	15000345X01	LABERINTO	3.7182	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	1/4/1908	D.M. Titulado D.L. 109

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						QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA		D.M. Titulado D.L.
85	15000515X01	LEALTAD	6.9717	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	7/1/1911	109
86	15001268X01	LOS ARREGLOS	2.0002	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/12/1918	D.M. Titulado D.L. 109
87	15000238Y01	LOS DOS AMIGOS	4.9043	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	5/12/1914	D.M. Titulado D.L. 109
88	15001832X01	LUCHO	1.3471	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	10/30/1928	D.M. Titulado D.L. 109
89	15001585X01	LUISA	0.7242	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	6/28/1922	D.M. Titulado D.L. 109
90	15001019X01	LUZ ANGELICA	0.6231	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	8/23/1916	D.M. Titulado D.L. 109
91	15000442Y01	MAINE	4.7656	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	9/30/1927	D.M. Titulado D.L. 109
92	15002283X01	MANUELITA	2.2298	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	2/22/1958	D.M. Titulado D.L. 109
93	15005544X01	MARIA ISABEL	3.4530	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	6/13/1968	D.M. Titulado D.L. 109
94	15000253Y01	MARIA VIOLETA	0.4907	17-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	7/17/1916	D.M. Titulado D.L. 109

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95	15000927X01	MARINA	6.0011	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	3/16/1916	D.M. Titulado D.L. 109
96	15001534X02	MEDIO PENIQUE	1.0048	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	1/7/1922	D.M. Titulado D.L. 109
97	15000141Y01	MERCED	1.3979	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	1890-08-29	D.M. Titulado D.L. 109
98	15000913X01	MI MEME	30.0040	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	12/7/1906	D.M. Titulado D.L. 109
99	15000184Y01	MOROCOCHA	6.0013	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	11/8/1906	D.M. Titulado D.L. 109
100	15000423X01	N.P. N° 47	1.0001	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	7/1/1950	D.M. Titulado D.L. 109
101	15001272X01	NO MAS MULAS	2.9945	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	12/12/1918	D.M. Titulado D.L. 109
102	15002584X01	NORTE PERU N° 24	0.3246	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/18/1949	D.M. Titulado D.L. 109
103	15002585X01	NORTE PERU N° 25	9.4888	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/18/1949	D.M. Titulado D.L. 109
104	15002587X01	NORTE PERU N° 27	2.0481	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/18/1949	D.M. Titulado D.L. 109
105	15002604X01		8.0010	16-G	17		5/23/1949	

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		NORTE PERU N° 38				PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN		D.M. Titulado D.L. 109
106	15002605X01	NORTE PERU N° 39	8.0014	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	5/23/1949	D.M. Titulado D.L. 109
107	15002718X01	NORTE PERU N° 50	1.1141	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	12/19/1958	D.M. Titulado D.L. 109
108	15004168X01	OLGA	5.0456	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	12/23/1961	D.M. Titulado D.L. 109
109	15000451Y01	OLVIDADO	0.1553	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	6/28/1922	D.M. Titulado D.L. 109
110	15004338X01	ORION	0.0631	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	10/4/1962	D.M. Titulado D.L. 109
111	15000346X01	PAPELILLO	2.8230	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	1886-09-22	D.M. Titulado D.L. 109
112	15001749X01	PERU	0.7287	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	2/20/1926	D.M. Titulado D.L. 109
113	15000145Y01	PORVENIR	5.8076	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN	7/23/1909	D.M. Titulado D.L. 109
114	15000621X01	PRECISA	2.4120	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	8/21/1913	D.M. Titulado D.L. 109
115	15001678X01	PRINZAPOLCA	6.0049	16-G	17	QUIRUVILCA	6/7/1923	

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						PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA		D.M. Titulado D.L. 109
116	15000140Y01	PROGRESO	8.4682	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	1899-08-02	D.M. Titulado D.L. 109
117	15007469X01	PUERTO ARTURO	1.4676	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	3/29/1979	D.M. Titulado D.L. 109
118	15000802Y01	RAQUEL	1.0002	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	9/6/1967	D.M. Titulado D.L. 109
119	15001933X01	RENATA	3.8927	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	11/22/1933	D.M. Titulado D.L. 109
120	15001112X01	REYNA MORA	0.3394	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	2/12/1917	D.M. Titulado D.L. 109
121	15000920X01	RICARDITO	12.0021	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	3/10/1916	D.M. Titulado D.L. 109
122	15001586X01	RIGHT NUMBER ONE	0.0787	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	6/28/1922	D.M. Titulado D.L. 109
123	15000254Y01	SALCHICHA	3.1577	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	3/20/1916	D.M. Titulado D.L. 109
124	15000380X01	SAN ANDRES	0.5776	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	9/25/1909	D.M. Titulado D.L. 109
125	15000196Y01		2.0001	16-G	17		1/16/1909	

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		SAN JUAN				PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA		D.M. Titulado D.L. 109
126	15000139Y01	SAN MARCELO	0.1717	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	1899-08-02	D.M. Titulado D.L. 109
127	1500784AY01	SAN MARTIN N° 28-A	1.0456	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	10/19/1962	D.M. Titulado D.L. 109
128	15000194Y01	SAN MIGUEL	1.5209	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/13/1908	D.M. Titulado D.L. 109
129	010188697A	SANTA CATALINA	400.0000	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/2/1997	D.M. Titulado D.L. 708
130	15000172Y01	SEGURIDAD	2.0002	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	10/13/1906	D.M. Titulado D.L. 109
131	15003869X01	SEXTA	0.3302	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	5/16/1961	D.M. Titulado D.L. 109
132	P0100302	SHOREY	261.0006	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA		Planta de Beneficio
133	15000368X01	SIN NOMBRE	0.3594	16-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	7/1/1908	D.M. Titulado D.L. 109
134	15000171Y01	SOTA DE OROS	6.0008	17-G	17	PAN AMERICAN SILVER S.A.C. MINA QUIRUVILCA	10/13/1906	D.M. Titulado D.L. 109
135	030013303		100.0000	16-G	17		3/13/2003	

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		TAMARA X				COMPRADA A JAIME ANTONIO HORNA BANCES EN PROCESO DE TRANSFERENCIA A PAS PAN AMERICAN SILVER S.A.C. MINA			D.M. Titulado D.L. 708
136	15000177Y01	TOTOROTA	2.1885	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	4/27/1907	109	D.M. Titulado D.L. 109
137	15000444Y01	WEDGE	0.3128	16-G	17	QUIRUVILCA PAN AMERICAN SILVER S.A.C. MINA	12/13/1921	109	D.M. Titulado D.L. 109
138	15001846X01	ZAMBITA	0.5127	17-G	17	QUIRUVILCA CORPORACION MINERA NOR PERU S.A.	9/14/1916	109	D.M. Titulado D.L. 109
139	1500301AY01	CLARA-A	0.0564	16-G	17	PERU S.A.	12/20/1916	109	D.M. Titulado D.L. 109
140	1500299AY01	REYNA MORA-A	0.1448	17-G	17	CORPORACION MINERA NOR PERU S.A.	2/12/1917	109	D.M. Titulado D.L. 109

The list of Mining Properties that were reviewed by Rodrigo, Elias & Medrano, Lima, Peru are shown in Table 6-2:  
Table 6-2: List of mining concessions held by PASQ reviewed (the Mining Properties )

No.	Mining Property	Code	Area (Hectares)	Debts regarding validity fees	Penalties
1	ACUMULACION QUIRUVILCA 1*	15010733X01	942.2558	All paid up to 2007	No pending debt
2	ACUMULACIÓN QUIRUVILCA 4*	15010757X01	985.9382	All paid up to 2007	No pending debt
3	ADELINA	15000334Y01	2.8153	All paid up to 2007	No pending debt
4	AGRIPINA	15001584X01	0.2203	All paid up to 2007	No pending debt
5	ANA MARIA	15000179Y01	2.2925	All paid up to 2007	No pending debt
6	ATABOY	15001526X01	0.1	All paid up to 2007	No pending debt
7	ATAHUALPA	15001250X01	10.0019	All paid up to 2007	No pending debt
8	BERTA	15001088X01	8.0015	All paid up to 2007	No pending debt
9	BRONCE	15000133Y01	2.0526	All paid up to 2007	No pending debt
10	CABALLO DE OROS	15000203Y01	4.8095	All paid up to 2007	No pending debt
11	CENTENARIO	15001686X01	3.9687	All paid up to 2007	No pending debt
12	CERRO DE PASCO	15001270X01	1.7045	All paid up to 2007	No pending debt
13	CHIMBORAZO	15000150Y01	8.0012	All paid up to 2007	No pending debt
14	CHIMBORAZO N° 1	15000193Y01	8.0014	All paid up to 2007	No pending debt
15	CLARA	15001089X01	0.5089	All paid up to 2007	No pending debt
16	CMNP-2A*	010090196A	34.0768	All paid up to 2007	No pending debt
17	COLORADO	15000132Y01	2.8228	All paid up to 2007	No pending debt
18	CUBA	15000216Y01	1.9264	All paid up to 2007	No pending debt
19	DOCE DE JULIO	15000110X01	16.0024	All paid up to 2007	No pending debt
20	ELE	15003862X01	1.2744	All paid up to 2007	No pending debt
21	ELENA	15002122X01	1.0001	All paid up to 2007	No pending debt



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				All paid up to 2007	No pending debt
22	ELEODORA	15000153Y02	4.0006	All paid up to 2007	No pending debt
23	ELVIRA	15000185Y01	12.0018	All paid up to 2007	No pending debt
24	ELVIRA GRACIELA	15000189Y01	12.0015	All paid up to 2007	No pending debt
25	ELVIRA N° 1	15000192Y01	16.0023	All paid up to 2007	No pending debt
26	ELVIRITA	15000191Y01	2.0004	All paid up to 2007	No pending debt
27	EMMA	15000152Y01	0.2684	All paid up to 2007	No pending debt
28	ESPERANZA	15000138Y01	2.823	All paid up to 2007	No pending debt
29	FELIX	15003867X01	0.4758	All paid up to 2007	No pending debt
30	FELIX QUINTA	15003868X01	0.3836	All paid up to 2007	No pending debt
31	FELIX SEGUNDA	15000247Y01	20.3411	All paid up to 2007	No pending debt
32	FELIX TERCERA	15002032X01	1.0002	All paid up to 2007	No pending debt
33	GAUDENCIA	15000137X01	0.8518	All paid up to 2007	No pending debt
34	HABANA	15000471Y01	0.01	All paid up to 2007	No pending debt
35	HUASCO	15000134Y01	6.5972	All paid up to 2007	No pending debt
36	HUGHES	15001531X01	2.7717	All paid up to 2007	No pending debt
37	IRMA	15005348X01	1.0001	All paid up to 2007	No pending debt
38	IVAN	15000437Y01	3.8877	All paid up to 2007	No pending debt

No.	Mining Property	Code	Area (Hectares)	Debts regarding	
				validity fees	Penalties
39	IVANCITO	15000470Y01	0.8567	All paid up to 2007	No pending debt
40	JESÚS	15000976X01	0.0679	All paid up to 2007	No pending debt
41	KATO	15001535X01	0.24	All paid up to 2007	No pending debt
42	LA ALEGRÍA	15001273X01	1.0696	All paid up to 2007	No pending debt
43	LA AMOROSA	15000143Y01	1.6919	All paid up to 2007	No pending debt
44	LA JUSTICIA	15001111X01	1.959	All paid up to 2007	No pending debt
45	LA MONITA	15001472X01	0.2171	All paid up to 2007	No pending debt
46	LA QUEBRADA	15001269X01	1.5654	All paid up to 2007	No pending debt
47	LA RATONERA	15000186Y01	4.0005	All paid up to 2007	No pending debt
48	LABERINTO	15000345X01	3.7182	All paid up to 2007	No pending debt
49	LEALTAD	15000515X01	6.9717	All paid up to 2007	No pending debt
50	LOS ARREGLOS	15001268X01	2.0002	All paid up to 2007	No pending debt
51	LUISA	15001585X01	0.7242	All paid up to 2007	No pending debt
52	LUZ ANGÉLICA	15001019X01	0.6231	All paid up to 2007	No pending debt
53	MAINE	15000442Y01	4.7656	All paid up to 2007	No pending debt
54	MANUELITA	15002283X01	2.2298	All paid up to 2007	No pending debt
55	MARÍA VIOLETA	15000253Y01	0.4907	All paid up to 2007	No pending debt
56	MEDIO PENIQUE	15001534X02	1.0048	All paid up to 2007	No pending debt
57	MOROCOCHA	15000184Y01	6.0013	All paid up to 2007	No pending debt
58	NORTE PERÚ N° 39	15002605X01	8.0014	All paid up to 2007	No pending debt
59	PAPELILLO	15000346X01	2.823	All paid up to 2007	No pending debt

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60	PERU	15001749X01	0.7287	All paid up to 2007	No pending debt
61	PORVENIR	15000145Y01	5.8076	All paid up to 2007	No pending debt
62	PRECISA	15000621X01	2.412	All paid up to 2007	No pending debt
63	PRINZAPOLCA	15001678X01	36.0049	All paid up to 2007	No pending debt
64	REYNA MORA	15001112X01	0.3394	All paid up to 2007	No pending debt
65	RIGHT NUMBER ONE	15001586X01	0.0787	All paid up to 2007	No pending debt
66	SAN ANDRES	15000380X01	0.5776	All paid up to 2007	No pending debt
67	SAN JUAN	15000196Y01	2.0001	All paid up to 2007	No pending debt
68	SAN MARCELO	15000139Y01	0.1717	All paid up to 2007	No pending debt
69	SAN MIGUEL	15000194Y01	1.5209	All paid up to 2007	No pending debt
70	SEGURIDAD	15000172Y01	2.0002	All paid up to 2007	No pending debt
71	SOTA DE OROS	15000171Y01	6.0008	All paid up to 2007	No pending debt
72	TAMARA X	30013303	30.8252	All paid up to 2007	No pending debt
73	TOTOROTA	15000177Y01	2.1885	All paid up to 2007	No pending debt
74	WEDGE	15000444Y01	0.3128	All paid up to 2007	No pending debt
75	ZAMBITA	15001846X01	0.5127	All paid up to 2007	No pending debt
76	REYNA MORA-A	1500299AY01	0.1448	All paid up to 2007	No pending debt
77	CLARA-A	1500301AY01	0.0564	All paid up to 2007	No pending debt

### **6.3 Property Ownership**

The Quiruvilca Mine is owned and operated by PASQ, a company in which PAS, indirectly through its subsidiaries, owns 100% of the outstanding voting shares and 99.93% of the total outstanding equity. Pan American Silver S.A.C. Mina Quiruvilca and Cia Minera Huaron merged to form PASQ effective January 2006.

PAS is the continuing corporation of Pan American Energy Corporation, which was incorporated under the *Company Act* (British Columbia) on March 7, 1979. PAS underwent two name changes by way of amendment to its memorandum, the last occurring on April 11, 1995, when the present name was adopted. Amendments to the memorandum of PAS to date have been limited to name changes and capital alterations. In May of 2006, PAS obtained shareholder approval to amend its memorandum and articles including the increase in the authorized share capital of PAS from 100,000,000 to 200,000,000 common shares in connection with PAS required transition under the *Business Corporations Act* (British Columbia).

PAS head office is situated at 1500 625 Howe Street, Vancouver, British Columbia, Canada, V6C 2T6 and its registered and records offices are situated at 1200 Waterfront Centre, 200 Burrard Street, Vancouver, British Columbia, Canada, V7X 1T2. PAS web site can be found at [www.panamericansilver.com](http://www.panamericansilver.com).

### **6.4 Agreements**

To the best of PAS knowledge, the Quiruvilca property is not subject to any royalties or encumbrances other than the Peruvian mining royalty tax. In June 2004, Peru's congress approved a bill that allows royalties to be charged on mining projects based on net smelter returns. The progressive rates are as followed:

1.0% for companies with sales up to \$60 million

2.0% for companies with sales between \$60 to \$120 million

3.0% for companies with sales greater than \$120 million

From 2004 to 2006 Quiruvilca was in the lower bracket of 1% and paid an approximate amount of \$0.7 million in 2006, \$0.2 million in 2005 and \$0.1 million in 2004. The royalty payments are tax deductible in the Peruvian tax regime.

## 6.5 Permits

There are no citations or orders outstanding regarding the Quiruvilca Mine property. All permits required for the conduct of Quiruvilca mining operations are currently in good standing. These permits are:

**The Industrial Liquid Effluent Discharge Permit**, granted through the Dirección General de Salud Ambiental (DIGESA), a subsection of the Ministerio del Salud, was renewed in 2007 and is valid for a two year period, at which time it will require renewal.

**The Municipal Liquid Effluent Discharge Permit**, granted through DIGESA, was renewed in August 2006 and does not require renewal unless a change to the disposal method or flows is anticipated.

**The Domestic Landfill Permit**, granted by DIGESA, was renewed in 2007, and is valid for a two year period. Prior to expiry, the mine will need to identify and construct a new area for a landfill as the existing area will reach its storage capacity.

**The Domestic and Industrial Water Use Permit**, granted by the Instituto de Recursos Naturales (INRENA) is valid and does not require renewal unless a change to the water requirements is identified.

**The Operating Permit**, granted by the Peruvian Ministry of Energy and Mines (MEM) was granted in 1980 for processing throughputs of up to 2,000 tonnes per day and does not require renewal unless an increase of the maximum throughput is planned.

**The Waste Storage Permits**, granted by MEM, are valid and the stability assessments for the impoundments have been approved. These do not require renewal unless a change is proposed to the impoundments not previously identified in the stability assessment reports.

## 6.6 Liabilities

Quiruvilca's largest liability relates to its future closure and remediation. In 2006, assisted by SVS Ingenieros S.A, a certified third party consultant, PAS completed and submitted a closure plan to the MEM. The cost estimate associated with the closure plan carried a present value of \$14.3 million for future reclamation and asset retirement and has since been updated to \$15.6 million. Review of the closure plan by MEM is still in progress. In each of 2005 and 2006, \$0.8 million was spent on reclamation activities.

A summary of details regarding the closure plan are included under Environmental Considerations in section 0.

The most significant current environmental issues and sources of potential liabilities associated with the Quiruvilca Mine are metal-laden acid water discharged from the mine, acid rock drainage from the mine's tailings and waste rock deposit areas and the containment and stability of mine tailings ponds. All acid water discharged from the Quiruvilca Mine is either treated at the mine's High Density Sludge plant, or by passive systems. All streams permitted to receive discharged effluents are monitored and reported. PASQ has been very diligent and throughout 2006 did not have any reportable incidents where discharge limits were exceeded.

## **7. Accessibility, Climate, Local Resources, Infrastructure and Physiography**

### **7.1 Accessibility**

Access to the property is via a 137 km road from Trujillo. While the first 65km are paved, the remaining 72km is via gravel roads. However, a project to upgrade the remaining stretch of gravel to asphalt is proposed for 2007-2008, with the majority of the proposed work being paid for by Barrick Gold Corporation ( Barrick ) to provide access to their Alto Chicama mine.

### **7.2 Climate And Physiography**

The relief at the mine site is hilly and uneven with local slopes of more than sixty degrees, typical of the Peruvian Andes (Photograph 1). Natural vegetation is mainly grasses which form meadows. These meadows have permitted development of varied livestock operations.

The climate at the mine site is classified as cold climate or boreal . Average minimum and maximum temperatures in the region range from 5.7 to 14.8 degrees Celsius. One of the characteristics of this climate is wet summers (highest rainfall occurs from January to April) and dry winters. The Quiruvilca Mine operates throughout the entire year.

The Quiruvilca Mine property is geographically centered at 8°1' S and 78°21' W in the Andes mountain range above the tree line at elevations ranging from 3,450 to 4,075 m above sea level.

Photograph 1: Landscape looking north from the Shorey Milling Facility, taken September 2007.

### **7.3 Local Resources and Infrastructure**

#### **7.3.1 Manpower**

As of December 31, 2006, PASQ employed 890 persons (375 permanent and 515 temporary) in connection with the operation of the Quiruvilca Mine. Approximately 278 of the workers employed by PASQ are members of either the Sindicato de Trabajadores de Pan American Silver S.A.C. Mina Quiruvilca (Quiruvilca Union) or the Sindicato de Trabajadores de Shorey y Anexos (Shorey Union).

#### **7.3.2 Infrastructure**

The mine is accessed by four adits driven into the side of the mountain at elevations ranging from 3,648m to 3,870m. An operating shaft services the workings above the 220 level. Ore and waste from these upper levels is gravity fed down ore and waste passes to the 220 level.

Construction of a mine deepening program is underway to develop major veins in the southern area of the property to the 400 and 460 levels. This program includes the development of an inclined shaft between the 400 level and the 340 level. Another shaft accesses ore below the 220 level in the North Zone, this shaft has been flooded to the 220 level since 2003; however, the hoist room is above the current water table and the hoist is kept on a care and maintenance basis.

The milling facilities are located in Shorey, a small community centered at approx. 77,650E and 33,100N (local mine coordinates) as shown in Figure 6-2. Major components of the mill were installed in the 1950 s and 1960 s, with the exception of the primary grinding circuit that was installed in 1981. The components have been well maintained and other minor upgrades have been added. There are no major capital investments planned in the mill for the next three years.

The mill flow sheet consists of three-stage-crushing, ball mill grinding and selective flotation of the ore to produce copper, lead and zinc concentrates, followed by thickening and filtering of the concentrates.

In 2006, daily treatment averaged 1,287 tonnes and the current daily throughput in 2007 is 1,150 tonnes, with the mill working six days a week. In 2006, the concentrator plant processed 370,115 tonnes of ore.

There is extensive piping that collects acidic water from mine workings and various surface run-offs to the mine s High Density Sludge neutralization plant, located at the entrance of the Almirvilca tunnel. The treatment plant capacity is being upgraded from a capacity of 400 m<sup>3</sup>/hr to 550 m<sup>3</sup>/hr, with an approximate capital expenditure of \$225,000. Sediments collected from this process are either sent to tailings, used as hydraulic backfill in old mine workings, or are used in the ongoing concurrent reclamation program.

The final tailings from the mill are pumped to the Santa Catalina tailings impoundment. The capacity of this dam is being expanded and is projected to be completed by the end of 2007 to ensure the life of mine requirements presented in this Technical Report can be met. The old San Felipe impoundment receives sludge from the High Density Sludge plant and a small raise in dam height is planned for 2008.

The primary source of power for the Quiruvilca Mine is the Peruvian national power grid via a 138 kV line from the city of Trujillo to the Motil substation. A 33 kV line connects the mine site to the Motil substation. PASQ owns and operates a diesel generating system, which provides a back up source of power for the Quiruvilca Mine.

### **7.3.3 Water Supply**

Quiruvilca draws its process water from several sources, which vary seasonally depending on reservoir levels.

**La Merced Creek:** The cheapest and cleanest fresh water supply is located directly south of the Santa Catalina tailings impoundment. It is gravity fed over a relatively short distance; however, the creek does not run during the dry season.

**Purida River:** This river feeds the Shorey water tanks that feeds the mill and camps. There is a pump station close to where the river passes underneath the road, right before Shorey Village.

**Santa Catalina Tailings Impoundment:** Reclaim water is pumped from the toe of the main dam during the dry season.

**Almiranta Reservoir:** The reservoir collects water in its catchment area during the rainy season and feeds the mine and town of Quiruvilca by gravity. A project to increase the height of the retaining structure is planned by PASQ in 2008 pending confirmation of surface rights from Barrick, who holds the surface rights for this area.

**Los Angeles Lake:** This lake is pumped via a steel pipeline to the Almiranta Reservoir during the dry season as the reservoir empties. There is a capital request to replace this pipeline in 2008.

Mr. Martin Wafforn, P.Eng, one of the authors of this Technical Report, has verified that the water quality and water supply is sufficient for the Quiruvilca mining operation.



## **8. History**

### **8.1 Discovery**

Mineralization was first reported in the area of the Quiruvilca Mine in 1789 as part of the Porcon Farm. Small-scale silver mining in the area was carried on from the 1870 s until 1924. However, some workings may be observed on the surface that were typical of the Spanish and Portuguese during the Viceregal Years (ie, during the 1540 s).

### **8.2 ASARCO Incorporated**

From 1925 to 1995, the Quiruvilca property was mined by Northern Peru Mining and Smelting Co ( NPMS ), a wholly own subsidiary of ASARCO Incorporated ( ASARCO ). Initially, mining by NPMS focused on the copper bearing veins, but gradually, focus was shifted to veins in the Zinc-Lead Zone.

Operations were shut down in 1931 and re-opened in 1940 with the construction of a flotation plant. By March 1967, the mill started to treat complex ores producing copper, lead and zinc concentrates.

### **8.3 Pan American Silver**

#### ***8.3.1 Pan American Acquisition of Quiruvilca Mine***

The Quiruvilca Mine was PAS first producing mine.

During August 1995, PAS acquired 80% of the outstanding voting shares (representing a 53.3% total equity interest) in the Quiruvilca Mine from NPMS, and between September 1995 and March 1996, it increased its interest to 100% of the outstanding voting shares and 99.7% of the total outstanding equity.

When PASQ first purchased Quiruvilca, ASARCO was granted a 20% royalty on net profit, which was purchased by Coeur d Alene Mines Corp in 1999. PAS purchased the royalty in 2000 for 140,000 common shares, 100,000 share purchase warrants exercisable for three years at \$5 per share, and \$50,000 cash.

Since 1995, PAS has undertaken a program of capital and non-operating expenditures at the Quiruvilca Mine to improve its operations, ensure compliance with its Program for Environmental Remediation and Management ( PAMA ), and reduce operating costs.

By the end of 1996, PAS had flattened the Quiruvilca Mine management structure, reducing the original six levels of management between the Mine Superintendent and the front line supervisors or shift bosses to a maximum of three levels, to streamline the organization and improve communication in the management structure. PAS also improved the mine s geology department, so that stopes were mapped and sampled after every blast to provide a better understanding of vein width and grade variation and to make reserve calculation a more relevant tool for mine planning. Since September 1995, PAS has increased the size of this department from two to five full-time geologists. The mine s geology department now provides a full grade control function.

On March 25, 2004, PASQ sold 6,839 hectares of mining concessions and surface rights in the vicinity of the Quiruvilca Mine to Barrick for \$3,582,575 and for the assumption of \$67,425 of payments owing in respect of these mining concessions.

During 2006, capital expenditures were approximately \$1.9 million and consisted of equipment replacement and improvements totalling \$0.5 million, mine development and deepening to the 400 level totalling \$0.5 million, and definition drilling in the north zone of the mine totalling \$0.9 million. An additional \$0.8 million was allocated towards ongoing closure expenditures.

PAS has a budgeted capital program totalling \$4.5 million for 2007 at the Quiruvilca Mine consisting primarily of \$1.7 million for mine development and equipment, \$0.2 million in the mill, \$0.9 million for maintenance, \$0.1 million towards safety, and \$1.6 million for other projects, including the expansion of the Santa Catalina tailings dam. A further \$0.3 million is planned for ongoing reclamation.

Total production at the Quiruvilca Mine, from 1990 to 2006, is reported in Table 8-1.

**Table 8-1: Production history since 1990 at the Quiruvilca Mine**

**MILL PRODUCTION AT QUIRUVILCA MINE**

	<b>Tonnes</b>	<b>Silver</b>	<b>Copper</b>	<b>Lead</b>	<b>Zinc</b>	<b>Tonnes of Concentrate</b>		
	<b>Milled</b>	<b>(ounces)</b>	<b>(tonnes)</b>	<b>(tonnes)</b>	<b>(tonnes)</b>	<b>Copper</b>	<b>Lead</b>	<b>Zinc</b>
<b>2006</b>	370,115	2,105,457	1,334	2,574	8,712	6,665	4,669	15,649
<b>2005</b>	362,192	2,234,838	1,307	2,761	9,697	7,017	5,109	17,347
<b>2004</b>	381,237	2,536,030	1,081	3,797	11,709	6,357	6,710	20,639
<b>2003</b>	442,093	2,493,909	1,811	4,361	12,509	7,153	7,495	22,230
<b>2002</b>	508,352	2,509,691	1,108	6,469	17,853	4,715	11,020	30,770
<b>2001</b>	568,451	3,259,372	1,204	8,358	21,008	5,489	13,963	36,146
<b>2000</b>	615,382	3,612,156	1,215	8,735	24,461	6,067	1,484	41,928
<b>1999</b>	652,584	3,237,887	1,098	7,325	23,334	5,404	12,064	39,922
<b>1998</b>	537,705	3,111,472	1,058	6,124	2,238	5,626	10,265	38,415
<b>1997</b>	580,560	2,834,166	1,281	5,581	22,597	6,174	9,148	38,793
<b>1996</b>	459,660	2,617,645	1,152	5,231	19,457	5,988	8,414	34,603
<b>1995</b>	452,720	2,505,854	878	5,499	17,663	4,159	8,772	31,742
<b>1994</b>	465,499	2,650,248	390	6,270	18,687	2,350	10,116	32,698
<b>1993</b>	398,705	2,268,305	240	5,482	16,878	1,408	9,047	29,731
<b>1992</b>	339,268	1,794,588	194	3,812	12,443	1,096	6,660	22,348
<b>1991</b>	383,884	2,449,326	471	4,345	13,615	2,597	7,928	24,452
<b>1990</b>	417,048	2,447,259	276	4,696	15,326	2,762	8,623	27,614
	<b>7,935,455</b>	<b>44,668,203</b>	<b>16,098</b>	<b>91,420</b>	<b>268,187</b>	<b>81,027</b>	<b>141,487</b>	<b>505,027</b>

\* Prior to Pan American Silver acquisition.

## 9. Geology

### 9.1 Regional Geology

The regional geology is dominated by the Lower Cretaceous to Tertiary sedimentary sequence of the Zaña group, equivalent to the Goyllarisquizga Group in central Peru which contains the Chimu, Santa, Carrhuaz and Farrat Formations. At the transition of Lower to Upper Cretaceous time, the limestones of the Chulec, Pariatambo and Huaylas Formations were deposited. The continental and marine sedimentary sequence was later covered by the Calipuy Volcanics containing up to 2,000 m of flows and pyroclastic breccias, which range from rhyolitic to dacitic composition at the base and more andesitic composition at the top and are intercalated by lacustrine sediments. See Figure 9-1 for a map of regional geology.

The Calipuy Formation in northern Peru is of important economic significance hosting a large part of the gold mineralization.

The entire sedimentary sequence was later affected by a NE-SW oriented compressional event causing NW-SE striking folding and thrust faults.

The main intrusive rock formation in northern Peru is the Coastal Batholith of Cretaceous - Tertiary age, comprising of granodiorite with variations to diorite, granite and tonalites, forming a 20 to 50 km NW-SE striking band along the Peruvian coast. Other minor and more recent intrusives may be observed in the region; their composition varies from granodiorite to diorite.

Mineral deposition in the area has been generally categorized into the following five groups (outlined in Figure 9-2), all of which maintain a noticeable NW-SE strike, parallel to the Andean mountain range.

1. **Polymetallic Veins deposits (Ag-Cu-Pb-Zn):** including Quiruvilca, Salpo, Sayapuyo, Algamarca and Hualgayoc.
2. **Epithermal Gold deposits (Au-Ag):** high and low sulphidation; the following deposits have been identified from North to South: Tantauatay, La Zanja, Sipan, Yanacocha, El Toro, Minaspampa, La Arena, La Virgen, Los Angeles, Tres Cruces, Santa Rosa, Sol de Oro and extending South up to Pierina in Ancash.
3. **Porphyry Copper (Cu-Au) deposits:** including Michiquillay, Sorochuco, La Granja, Cañariaco, Minas Congas, El Galeno and Cerro Corona in Cajamarca, and the Río Blanco project in Piura, near the border with Ecuador.
4. **Eastern band of Au-Veins:** emplaced in the Pataz Batholith and the Marañon Complex, including the Poderosa, Horizonte, Retamas, Buldibuyo and Pagrasho deposits.
5. **Mississippi Valley Type deposits (Zn-Pb):** including Bongara in the north and San Vicente mine in central Peru.

## 9.2 Local Geology

The oldest rocks exposed in the Quiruvilca area are the Lower Cretaceous clastic sediments of the Chimu Formation outcropping in the NE of the deposit, which form the basement rocks for the later deposition of the volcanic sequence. The mineralization is hosted by the Calipuy Formation, an extensive oligocene to miocene intrusive-extrusive andesite sequence with an estimated thickness of up to 2,000 m. At Quiruvilca the Calipuy Formation consist of porphyritic andesite flows and flow breccias intercalated by thin basalt flows and tuffaceous lacustrine sediments. The geological environment of the district is interpreted as the central facies of an andesitic strato-volcano complex based on the presence of andesitic plugs, numerous dikes, stocks of andesitic to dacitic composition and on the radial orientation of flows, flow breccias and tuffs dipping away from the andesitic plugs (Bartos, 1987). A sectional representation of the local geology is shown in Figure 9-3.

A quartz monzonite porphyry stock is exposed 2.5 km to the north of the district but is cut by later Pb/Zn/Ag veins, hence of pre-mineralization age. The central zone of the deposits hosts several sericitized dacite stocks and dikes which are believed to be linked to the mineralization. Later on, the area was intruded by a series of unmineralized dacitic domes postdating the mineralization.

Veins are contained in two steeply dipping fracture sets, one trending N60°-70° E, the other N85° E. The N85° E fracture set is part of a set of regional strike-slip faults, centered at Quiruvilca, extending for over 16 km along strike. Figure 9-4 illustrates the orientation of the local structural deformation.

A stratigraphic section is provided in Figure 9-5.

## 10. Deposit Types

Quiruvilca is a large polymetallic vein deposit with over 130 different mineralized structures. The mineralization at Quiruvilca is contained in a series of narrow veins filling fractures and faults. Although narrow, the veins at Quiruvilca tend to have an extensive lateral and vertical continuity with abundant splits, cymoid loops, and pinch and swell structures. In some places, the veins show wider ore shoots connected to thinner sub-economic to non-economic zones. Mineralized structures vary in width from thin stringers up to 2 m wide veins.

Veins are typically coarse grained and massive, but in some cases, are vuggy. In many places, there is a well-developed banding in the vein caused by aggregates of sulphides and gangue. The main veins are mostly E-W striking, are more continuous, and have wider widths. Examples include Almiranta, Elisa and Luz Angelica veins, among others. There is a second system of smaller, NE-SW striking tensional veins such as Cieneguilla, Papelillo, Dina, Huasco, Zoila Gata, Compañías veins, among others. Secondary veins and branches also exist; however they, are of limited length, depth, and thicknesses.

Mineralized zones have been confirmed by diamond drilling up to 500 m deep, with further possibility of greater vertical extensions at depth, all within the Calipuy group. Large parts of the main structures have been exploited or have been in production for a long time; hence, more of the current and planned mining activities are focused on tensional and secondary veins.

## 11. Mineralization

Mineralization in Quiruvilca was emplaced in the previously existing faults and fractures cross-cutting the volcanic host rock., which were formed by several mineralization pulses or periods. Paragenesis for the entire district exhibits four sequential stages of deposition<sup>1</sup>:

**Pyrite Stage:** quartz, pyrite.

**Base Metal Stage:** arsenopyrite, galena, enargite, tetrahedrite-tennantite, sphalerite, pyrite, chalcopyrite, stannite, and chatkalite (Cu<sub>6</sub>FeSn<sub>2</sub>S<sub>8</sub>).

**Sulfosalt Stage:** alabandite, marcasite, pyrite, arsenopyrite, quartz, manganaxinite (Ca<sub>2</sub>Mn<sup>2+</sup>Al<sub>2</sub>[OH]BSi<sub>4</sub>O<sub>15</sub>), clinozoisite, stibnite, robinsonite, jamesonite, barite, orpiment, realgar, hutchinsonite, geocronite, native arsenic, seligmanite, Pb-As-S glass.

**Carbonate Stage:** manganoan calcite, rhodochrosite, dolomite, calcite, quartz.

Four mineralized zones can be distinctly recognized, spanning radial outwards in rough oval shaped rings. Ores in the central part of the district are mesothermal and dominated by enargite. The zones from the center outwards are the Enargite Zone, Transition Zone, Lead-Zinc Zone, and Stibnite Zone as shown in Figure 11-1 with respect to the town of Quiruvilca. Mineralization transitions to epithermal filling between the Transition Zone and Lead-Zinc Zone boundary. Most (~70%) of the mining in the past few years has been from veins in the Lead-Zinc Zone.

The paragenesis notably concurs with the fracturing process and thus, horizontal zoning is highly differentiated (see Figure 11-1 and Figure 11-2). Despite the segregated distribution of metallic content, there are consistent metallic constituents present throughout the deposit, indicative of their common source.

The hydrothermal process has affected the surrounding rock close to the veins with sericitization in various degrees. As distance from the vein increases, the predominate alteration of the rock mass become argilization and further away, becomes propylitization.

<sup>1</sup> Stages of deposition are cited from [http://findarticles.com/p/articles/mi\\_qa3672/is\\_/ai\\_n8763174/pg\\_7](http://findarticles.com/p/articles/mi_qa3672/is_/ai_n8763174/pg_7) Mineralogical Record.FindArticles.com. 26 Oct. 2007.  
[http://findarticles.com/p/articles/mi\\_qa3672/is\\_/ai\\_n8763174](http://findarticles.com/p/articles/mi_qa3672/is_/ai_n8763174)

### **11.1 Mineral Zoning**

Following are short descriptions of the mineralized zones at Quiruvilca:

#### **ENARGITE ZONE**

Surface Dimensions: Approx. 2,800 m E-W and 700m N-S

Mineralization Mechanism: Mesothermal

Ore Bearing Minerals: Enargite-pyrite and to a lesser extent chalcopyrite, tennantite, tetrahedrite, sphalerite, galena, hutchinsonite.

Gangue: Barite

#### **TRANSITION ZONE**

Surface Dimensions: Up to 1400 m wide around the peripheral of the Enargite Zone.

Mineralization Mechanism: Mesothermal to epithermal

Ore Bearing Minerals: Sphalerite, pyrite, tetrahedrite-tennantite and to a lesser extent galena, marcasite, arsenopyrite, covellite and wurtzite.

#### **LEAD-ZINC ZONE**

Surface Dimensions: From 1,000 to 3,000m in width from Transition Zone boundary.

Mineralization Mechanism: Epithermal

Ore Bearing Minerals: Sphalerite and galena and to a lesser extent pyrite, chalcopyrite, tetrahedritetennantite, marcasite, arsenopyrite, gratonite, and wurzite.

#### **STIBNITE ZONE**

Surface Dimensions: (larger than 1,000 m from Lead-Zinc zone boundary with irregular shape)

Mineralization Mechanism: Epithermal deposit

Ore Bearing Minerals: Stibnite and arsenopyrite and to a small extent pyrite, sphalerite and galena.

Gangue: Rhodochrosite and quartz.

## 11.2 Characterization Of Major Veins

Current mining at Quiruvilca is concentrated in two areas categorized as the North Zone and South Zone. Each zone is further categorized into mining areas based on mining access and infrastructure. The general mine scheme is shown in Figure 11-3. The mineralogy of the main veins in production are characterized as follows:

### Compania Centro

General Strike:	Varies
Average Dip:	Varies
Average Width:	Varies
Economic Minerals:	Sphalerite (40%), Tetrahedrite (20%), Galena (20%)
Ganague Minerals:	Pyrite (10%), Carbonates (10%)
Texture of Mineralization:	Massive and earthy with brittle subhedral phaneritic grains.
Lithological Matrix:	Varies
Comments:	Vein has been exposed to the 400 level with a noticeable increase in zinc grades.

### Luz Angelica

General Strike:	East to West
Average Dip:	75 °
Average Width:	0.61 m
Economic Minerals:	Sphalerite (25%), Tetrahedrite (10%), Galena (20%)
Ganague Minerals:	Pyrite (20%), Calcium and Magnesium Carbonates (10%), Quartz (15%)
Texture of Mineralization:	Massive, compact, and granular.
Lithological Matrix:	Tuff and pyroclastic breach of andesite composite.
Comments:	This has been one of the main production veins in recent years.

### Eva

General Strike:	Varies
Average Dip:	Varies
Average Width:	Varies
Economic Minerals:	Sphalerite (25%), Tetrahedrite (15%), Galena (20%)
Ganague Minerals:	Pyrite (30%), Carbonates & Quartz (10%)
Texture of Mineralization:	Massive and compact with subhedral grains of pyrite.
Lithological Matrix:	Varies
Comments:	Production is on 400 level and planned for 460 level.

### Betsy

General Strike:	Varies
Average Dip:	Varies
Average Width:	Varies
Economic Minerals:	Sphalerite (30%), Tetrahedrite (10%), Galena (10%), Enargite (10%)
Ganague Minerals:	Pyrite (15%), Quartz (15%), Carbonates (10%)
Texture of Mineralization:	Massive and compact sphalerite and tetrahedrite bands with enargite inbetween.
Lithological Matrix:	Varies
Comments:	The vein is being mined in the upper levels and although the vein has good grades the presence of enargite means that production needs to be controlled and blended.

### Dina



General Strike:	Varies
Average Dip:	Varies
Average Width:	Varies
Economic Minerals:	Sphalerite (30%), Tetrahedrite (10%), Galena (10%)
Ganague Minerals:	Pyrite (25%), Quartz (10%), Dolomite (10%), Rhonodite (10%)
Texture of Mineralization:	Varies
Lithological Matrix:	Varies
Comments:	Vein has good widths and silver grades. The mine plan for 2008 includes mining in-part (where grades are higher) below the 220 level.

**Elisa**

General Strike: Varies  
 Average Dip: Varies  
 Average Width: Varies  
 Economic Minerals: Tetrahedrite (15%), Calchopyrite (10%), Enargite (10%)  
 Ganague Minerals: Pyrite (50%), Quartz (15%)  
 Texture of Mineralization: Varies  
 Lithological Matrix: Varies  
 Comments: Vein has good widths and silver grades. The mine plan for 2008 includes mining in-part (where grades are higher) below the 220 level.

**Claudia**

General Strike: N 60 ° E  
 Average Dip: 65-70 °  
 Average Width: 0.70 m  
 Economic Minerals: Tetrahedrite (20%), Enargite (10%)  
 Ganague Minerals: Pyrite (65%), Quartz (5%)  
 Texture of Mineralization: Massive with crystallized bands of pyrite and tetrahedrite.  
 Lithological Matrix: Pyroclastic breach of andesite composite.  
 Comments: This is a high grade silver vein, but with presence of enargite.

**Zoila Gata**

General Strike: N 50 ° E  
 Average Dip: 65-70 °  
 Average Width: 0.79 m  
 Economic Minerals: Sphalerite (40%), Tetrahedrite (10%), Galena (10%)  
 Ganague Minerals: Pyrite (20%), Other (20%)  
 Texture of Mineralization: Massive and banded with well defined subhedral phaneritic pyrite and sphalerite strips.  
 Lithological Matrix: Tuff and pyroclastic breach of andesite composite.  
 Comments: Primarily valuable for its zinc content, this vein is often massive sulphide. The zinc grades are increasing with depth and the silver grades are decreasing.

## 12. Exploration

Historically, there has been over 172,000 m drilled on the Quiruvilca property, as summarized in Table 12-1, and there are over 134,400 channel samples stored in the database. Mineralized structures in the central area of the property are well-understood through past mapping, drilling and mining. Given the nature of the life of mine plan (4 years), the recent realization of higher metal prices is the driver of the mine. As such, the focus of recent exploration work has been limited to extending and delineating known veins. The concept is to extend the life of the mine while utilizing existing infrastructure to minimize development costs. There is a large potential for increasing mineral reserves and resources below the 400 level, as well as finding additional splits and sigmoidal loops branching off known veins.

This Technical Report, with the objective of updating the mineral resources and mineral reserves, does not pertain to any of the historical exploration surveying, mapping or sampling of the surface. The relevant exploration work done pertaining to the mineral resource and reserve estimates are interpreted from surface drilling of HQ and NQ cores, underground drilling of NQ and BQ cores, and underground channel samples.

**Table 12-1: Historical diamond drilling for exploration and delineation at Quiruvilca.**  
**QUIRUVILCA S HISTORICAL DRILLING**

<b>YEAR</b>	<b># Holes Drilled</b>	<b>Metres Drilled</b>
1926 - 1995	447	56,378.31
1995	13	1,788.08
1996	21	3,474.54
1997	44	8,900.51
1998	51	8,686.50
1999	72	9,872.05
2000	128	15,236.30
2001	108	15,188.80
2002	110	15,246.28
2003	33	4,639.78
2004	61	5,691.90
2005	89	10,652.92
2006	95	10,561.85
2007 (Sept)	55	6,127.75
<b>Total</b>	<b>1,327</b>	<b>172,445.57</b>

All recent diamond drilling since 2005 has been executed by MDH S.A.C, a Peruvian contractor, or by Quiruvilca's own exploration crew, under the directions and supervision of a PASQ geologist. During 2006, a total of 10,562 m of drilling was executed.

All channel sampling is done by PASQ employed samplers, who have successfully undergone PASQ sample training. Samplers are part of the on-site geology department and are directly supervised by a qualified geologist. During 2006, there was 3,774 m of drifting for mineral reserve delineation and access for mining.

The principal structures explored by PASQ in 2006 and 2007 on the Quiruvilca property are:: Zoila Gata, Compania Centro, Luz Angelica, Eva, Betsy, Dina, Elisa, and Claudia. These veins were described in section 11.2.

### 13. Drilling

Exploration at the Quiruvilca property is conducted using a combination of diamond drilling and underground drifting. Two to three diamond drills are in continuous operation at the property, drilling holes between 50 and 350 m length. Drill core recoveries are generally high and averaged 98% for the surface and 97% for the underground drilling. Positive exploration results are followed by underground drifting and cross-cutting at 70 metre spacing prior to the stope development.

In March 2006 an exploration program was initiated on the Elisa Vein, Jose Godoy, Chimborazo, Jose Godoy Split, and Recuperada veins as shown on Figure 13-1. The program consisted of diamond coring 32 surface holes and 39 underground holes spanning a topographic area of 48 ha. MDH S.A.C, a third party contractor, was retained to perform the drilling under the direction of the site geologist using two drill rigs: a CS-1000 for surface drilling and an Explorer Plus N° 20 for underground drilling.

The program completed 13 surface holes for a total of 2,295 m and an additional 15 underground holes for a total of 1,330 m. Surface drill holes varied from 184 to 305 m length at inclinations between 36° to 82°, while underground drill-holes were oriented 0° to -33° (referenced to the horizontal axis) of 45 to 154 m lengths. Specific details on the completed drill-holes are listed in Table 13-1, assays results are listed in Table 13-2 and 3, and drill-hole sections are shown in Figures 13-2A to 13-2G. Only about 50% of the original program was completed as the information was sufficient for a first pass mineral resource estimation. A detailed infill drill program will start at the beginning of 2008. The remaining 6,937 m of the 2006 drill program was executed in the main production area for infill drilling and lateral vein extension.

Surveys of the drill-hole collars are completed and verified by the engineering department using total station survey instruments. Inclination of the holes are determined by the geologist in the field using a compass to verify the working angle of the drill rods. Down-hole surveys are not used as the holes are generally short and considering the good rock mass quality (with RQD >70), it is assumed that potential deviations are very minor.

Drill hole orientations are planned in order to intersect the targeted vein at an angle as close to 90° as possible. The strike and dip angle of most target veins are known and the true width of a drill intersect can be easily calculated for day to day reporting purposes using trigometric functions. Hole collar information as well as hole lengths, rock types, sampling results and RQD information are loaded into the Datamine database and converted into true width by the software used for mineral resource estimation.

Drill cores are placed in corrugated polyethylene core boxes and transported to the core logging facility on site. The boxes are properly marked and numbered by the drill crews and tags are inserted to indicate the drill depths. After receiving the core, logging is initiated by the geology department. In the first step, the responsible geologist measures the core length between two tags and calculates the core recovery by comparing the core length to the tag depths. Afterwards fracture density is recorded in order to determine the rock quality ( RQD ). Lithology, structures and alterations are logged and the geologist indicates sampling intervals on the core.

Cores are split in half using a saw with a diamond blade. One half of the core is sent for analysis to the on site laboratory and the other half is stored in the same corrugated polyethylene core boxes in a safe, on-site location. Logging information is entered into the DHLogger software where it is automatically combined with the sampling results from the lab using the Fusion software. Log sheets are printed out for each hole and stored on-site. The electronic database with all the logging information is periodically backed up by the IT department.

Table 13-1: of drill-hole locations and survey from 2006 exploration program of Elisa vein.

Drill Hole ID	Drilling Unit	Level	Northing	Easting	Elevation	Azimuth	Dip	Depth	Start Date	End Date
SURFACE										
Qv- 0001-S-06	L-1000	Surface	9,115,815	795,969	3,963	183°	-36	277	6/10/2006	6/15/2006
Qv- 0002-S-06	L-1000	Surface	9,115,815	795,970	3,963	183°	-76	279	6/15/2006	6/21/2006
Qv- 0003-S-06	L-1000	Surface	9,115,833	795,867	3,953	183°	-36	290.2	6/22/2006	7/2/2006
Qv- 0004-S-06	L-1000	Surface	9,115,835	795,867	3,953	183°	-68	263.1	7/3/2006	7/9/2006
Qv- 0005-S-06	L-1000	Surface	9,115,702	795,763	3,959	183°	-36	294.95	7/10/2006	7/19/2006
Qv- 0006-S-06	L-1000	Surface	9,115,704	795,763	3,959	183°	-65	305.2	7/19/2006	7/26/2006
Qv- 0007-S-06	L-1000	Surface	9,115,779	795,668	3,942	181°	-35	301	7/28/2006	8/3/2006
Qv- 0008-S-06	L-1000	Surface	9,115,781	795,668	3,942	181°	-82	245.45	8/4/2006	8/7/2006
Qv- 0009-S-06	L-1000	Surface	9,115,852	796,071	3,962	180°	-46	184	8/8/2006	8/11/2006
Qv- 0010-S-06	L-1000	Surface	9,115,845	795,777	3,943	173°	-45	202.5	8/11/2006	8/14/2006
Qv- 0011-S-06	L-1000	Surface	9,115,846	795,777	3,943	173°	-74	230.3	8/15/2006	8/17/2006
Qv- 0012-S-06	L-1000	Surface	9,115,853	795,969	3,935	180°	-44	160.5	8/18/2006	8/19/2006
Qv- 0013-S-06	L-1000	Surface	9,115,853	795,969	3,962	175°	-67	239.15	8/20/2006	8/22/2006
UNDERGROUND										
Qv- 0060-U-06	Explorer Pluss # 20	100							7/24/2006	7/27/2006
			9,115,432	796,849	3,772	355°	Horiz	92.60		
Qv- 0062-U-06	Explorer Pluss # 20	100							7/28/2006	8/17/2006
			9,115,431	796,849	3,772	290°	Horiz	100.00		
Qv- 0063-U-06	Explorer Pluss # 20	100							7/8/2006	8/10/2006
			9,115,427	796,883	3,772	326°	Horiz	58.80		
Qv- 0068-U-06	Explorer Pluss # 20	100							8/18/2006	8/21/2006
			9,115,431	796,849	3,771	328°	-19	154.30		
Qv- 0070-U-06	Explorer Pluss # 20	100							8/22/2006	8/24/2006
			9,115,432	795,850	3,771	347°	-12	150.50		
Qv- 0072-U-06	Explorer Pluss # 20	50							8/26/2006	8/30/2006
			9,115,560	796,842	3,838	19°	-33	45.90		
Qv- 0078-U-06	Explorer Pluss # 20	50							8/30/2006	9/1/2006
			9,115,557	796,840	3,839	290°	-1	50.65		
Qv- 0079-U-06	Explorer Pluss # 20	160							8/31/2006	9/16/2006
			9,115,462	796,967	3,715	322°	Horiz	151.20		
Qv- 0080-U-06	Explorer Pluss # 20	50							9/1/2006	9/9/2006
			9,115,557	796,841	3,839	309°	-39	50.20		
Qv- 0081-U-06	Explorer Pluss # 20	50							9/10/2006	9/14/2006
			9,115,558	796,841	3,941	309°	52	55.00		
Qv- 0082-U-06	Explorer Pluss # 20	50							9/14/2006	9/16/2006
			9,115,558	796,841	3,941	9°	52	65.05		
Qv- 0083-U-06	Explorer Pluss # 20	160							9/19/2006	9/22/2006
			9,115,461	796,967	3,715	292°	1	152.00		
Qv- 0084-U-06	Explorer Pluss # 20	50							9/18/2006	9/23/2006
			9,115,555	796,844	3,840	120°	2	90.00		
Qv- 0086-U-06	Explorer Pluss # 20	160							9/23/2006	9/25/2006
			9,115,465	796,968	3,715	341°	Horiz	150.30		
Qv- 0087-U-06		50	9,115,554	796,843	3,840	170°	Horiz	70.35	9/24/2006	9/26/2006

Qv- 0060-U-06	Explorer									
	Pluss # 20									
	Explorer	100							7/24/2006	7/27/2006
	Pluss # 20		9,115,432	796,849	3,772	355°	Horiz	92.60		



**Table 13-2: Summary of Elisa Vein drill results from surface drill hole of 2006 exploration.**  
**SUMMARY OF RESULTS FROM SURFACE EXPLORATION PROGRAM 2006**

Drill-Hole Number	Structure	Elevation of		Measured		True		Au	Ag	% Cu % Pb % Zn		
		Intersection	From	To	Width	Width	g/TM	g/t				
Qv-0001-SJ06	Jose Godoy Split	3902	107.4	108.65	1.25	1.08	1.175	143	0.06	4.15	6.7	
	Jose Godoy	3860	174.72	178.85	4.13	2.47	1.42	76	0.16	0.4	2.61	
	Elisa	3810	26.03	263.99	0.96	0.85	5.466	62	0.33	0.33	0.2	
Qv-0002-SJ06	Jose Godoy Split	3816	154.00	158.88	4.88	2.89	1.458	49	0.07	2.66	3.53	
	Jose Godoy	3755	215.48	216.07	0.59	0.55	2.494	67	0.22	2.39	3.25	
Qv-0003-SJ06	Olivia Split	3919	57.36	58.74	1.38	0.69	0.366	59	0.03	1.22	2.81	
QV-0004-SJ06	Zona Olivia Split	3851	109.15	116	6.85	5.98	1.296	88	0.51	0.47	0.91	
	Zona Jose Godoy Split	3786	178.8	193	14.2	14.17	0.276	12	0.01	0.54	0.56	
	Zona Jose Godoy	3722	248.75	251	2.25	2.22	0.386	22	0.03	1.05	2.3	
QV-0005-SJ06	Zona Jose Godoy Split	3910	92	98.46	6.46	6.36	1.347	45	0.14	0.35	1.64	
	Zona jose Godoy	3878	149.85	152.55	2.7	2.22	1.524	315	1.08	0.32	2.5	
	Zona Chimborazo	3849	203.4	206.37	2.97	2.87	6.08	35	0.1	0.67	1.98	
Qv-0006-SJ06	Zona Jose Godoy Split	3875	91.6	96.75	5.15	4.85	1.173	29	0.04	0.97	5.04	
	Zona jose Godoy	3834	138.52	141	2.48	2.43	0.521	51	0.2	0.69	3.32	
	Zona Chimborazo	3730	253.2	255.2	2	2	0.054	286	2.49	1.15	4.95	
	Zona Chimborazo	3726	259.20	263	3.8	3.46	0.771	57	0.24	0.07	0.84	
	Zona Chimborazo	3718	267.95	274.2	6.25	6.2	0.491	13	0.03	0.34	1.07	
QV-0007-SJ06	Chimborazo	3796	254.52	255.13	0.61	0.53	3.098	51	0.08	0.13	1.24	
QV-0008-SJ06	Zona Jose Godoy	3715	227.66	230.16	2.5	0.86	2.5	104	0.45	1.23	1.94	
QV-0009-SJ06	Olivia Split	3868	134.78	135.2	0.42	0.32	0.163	18	0.02	0.99	1.82	
	Veta Jose Godoy Split	3848	159.74	160.28	0.54	0.41	0.558	133	0.07	6.93	7.46	
	Veta Jose Godoy Split	3844	165.06	165.45	0.39	0.39	9.823	318	0.81	5.49	9.54	
QV-0010-SJ06	Zona Jose Godoy Split	3837	152.3	153.86	1.56	1.49	3.824	92	0.18	0.6	7.1	
	Veta Jose Godoy	3812	185	186.26	1.26	1.2	6.672	77	0.06	3.06	3.7	
QV-0011-SJ06	Zona Jose Godoy Split	3771	180.15	180.88	0.73	0.25	7.447	11	0.02	0.31	0.91	
QV-0012-SJ06	Zona Olivia Split	3923	19.35	19.5	0.15	0.13	1.563	86	0.03	2.92	7.5	
QV-0013-SJ06	Zona Jose Godoy Split	3789	187.84	188.35	0.51	0.5	2.636	44	0.18	0.22	0.92	

**Table 13-3: Summary of drill results from underground drill holes of 2006 exploration of Elisa vein**  
**SUMMARY OF RESULTS FROM UNDERGROUND EXPLORATION PROGRAM 2006**

Drill-Hole Number	Structure	Elevation of		Measured True		Au g/TM	Ag g/t	% Cu	% Pb	% Zn	
		Intersection	From	To	Width						Width
Qv-0060-U-06	Nv100Veta Esperanza Sur	3,772	71.5	72	0.5	0.48	1.478	255	1.23	6.97	11.81
Qv-0062-U-06	Nv100Zona Zinc	3,772	77.1	88.1	11	10.34	0.297	3	0.04	0.09	1.49
	Zona Zinc	3,772	91.10	96.1	5	4.53	0.134	0	0.03	0.03	1.9
	Zona Veta Esperanza Sur	3,772	99.1	100	0.9	0.89	0.568	123	1.36	0.09	1.47
Qv-0063-U-06	Nv100Veta Esperanza Sur	3,772	5.85	6.06	0.21	0.17	0.509	41	0.94	0.02	0.25
Qv-0068-U-06	Nv100Veta Esperanza Sur	3,764	75.94	76.38	0.44	0.39	1.653	198	4.9	2.57	2.2
	Veta Esperanza Split	3,736	136.71	136.82	0.11	0.11	3.071	723	17.92	6.46	1.43
Qv-0070-U-06	Nv100Veta Esperanza	3,757	109.44	110.26	0.82	0.77	1.865	61	1.47	0.04	0.13
	Zona Veta Esperanza Split	3,754	122	123.14	1.14	1.11	0.419	5	1.77	0.02	0.08
Qv-0072-U-06	Nv 50 Veta Elisa Tensional 2	3,820	37.51	37.7	0.19	0.17	214	56	0.15	0.07	0.04
Qv-0079-U-06	Nv160Veta Esperanza Sur	3,719	113.46	113.6	0.14	0.11	1.985	191	1.99	0.5	0.9
Qv-0080-U-06	Nv 50 Veta Elisa Tensional 2	3,808	49.62	49.83	0.21	0.11	1.54	857	1.91	0.94	4.99
Qv-0081-U-06	Nv 50 Zona Veta Elisa Tensional 2	3,862	25.7	27.95	2.25	2.06	0.531	172	1.2	0.27	0.36
Qv-0082-U-06	Nv 50 Veta Elisa Tensional 2	3,870	35.85	36.4	0.55	0.55	1.61	2,418	4.96	0.18	4.08
Qv-0083-U-06	Nv160Veta Esperanza Sur	3,719	129.18	130.18	1	1	1.77	117	1.56	0.03	0.23
Qv-0084-U-06	Nv 50 Veta Esperanza Sur	3,843	76.36	76.71	0.35	0.33	1.075	47	0.14	0.24	0.84
	Veta Esperanza	3,843	80.02	80.23	0.21	0.18	0.543	82	0.1	0.25	1.31
Qv-0086-U-06	Nv160Veta Esperanza Sur	3,719	125.53	126.15	0.62	0.56		15	1.48	0.02	0.1

## **14. Sampling Method and Approach**

### **14.1 Introduction**

There are no core or sample recovery problems which could have materially impacted the accuracy and reliability of the results. During 2006, recovery of drill core samples averaged 98% from surface and 97% from underground. There are no core or sample recovery problems which could have materially impacted the accuracy and reliability of the results.

PAS has standardized sampling procedures throughout its operations and ensures through its QPs that its practices meet or exceed industry standards. All sampling is done by PASQ personnel under the direct supervision of the site geology department. Procedures and results were reviewed and approved by the authors of this Technical Report.

Drill-holes are sampled after the core has been logged. A geologist visually determines the vein cuts and marks the sample lengths; lengths vary between 0.10 and 1.5 m. The visual definition of the vein is very simple as they mostly contain massive sulphides with a clear and sharp contact to the unmineralized, volcanic wall rock. Veins at Quiruvilca Mine are typically narrow (< 1.5m) hence vein intersects are sampled across the entire width taking one sample. The samples are then split using a circular saw equipped with a diamond blade. Half of the sample is taken by the geologist to the lab and the other half is stored in the core box. In general, the drill cores are in good condition as the rock mass is typically of good quality (greater than 70 RQD). As such, there are no issues regarding contamination during sample splitting.

Channel sampling is major part of mine development and ore control. Underground sampling is carried out by a trained sample collector and one assistant using a hammer and chisel. For stope sampling, a sample is collected every 3 m across the vein using the chute or access as reference for description of sample location. For sublevels and exploration drifts, samples are collected every 2 m across the vein. In vertical developments, samples are collected every metre. These samples are collected regardless of rock type, mineralized zone width or geological controls and the average grade of the sample is determined. The average sample sent to the laboratory weighs 1 to 1.5 kg.

All samples are sent to the Shorey Lab in Quiruvilca. Within 24hrs of receiving a sample, the lab delivers assay results referenced by number, type, location, and metallic values. Sample numbers are bar coded in the lab and assay results are automatically captured by the LIMS system that has been installed, sent to the geology department and stored in the database.

As of July 31, 2007 there were 134,487 channel and diamond drill core samples in the database; therefore, it is not practical to provide a complete list of individual samples or sample composites with values and estimated true widths. In the opinion of the authors of this Technical Report., the samples are of an acceptable quality for resource and reserve estimation. To the best of the authors' knowledge, there are no factors that may have resulted in a sample bias and the samples are representative.

## **14.2 Sampling Procedures**

Each sample is registered on a sampling card containing the following information: sample number, name of sampler, date, place of sampling, sample type and x, y, and z coordinates.

### ***14.2.1 Drill Core Samples***

As soon as a new drill hole has been started, it is numbered following the system explained below. Drill cores must be cleaned of mud and grease by the drill contractor and placed in provided core boxes of adequate size. The cores are transported to the surface logging shack and logged by an experienced geologist.

As soon as possible, the underground survey team conducts a survey of the hole collar to define the x, y and z coordinates as well as dip and azimuth of the drill hole.

Sample intervals are determined by the geologist after the core has been logged.

The hanging-wall and foot-wall are sampled for at least 3 m outside visible mineralization. Barren parts in between mineralized intersections are sampled over their entire length if they are smaller than 6 m.

If the intersects are clearly defined mineralized zones which can be mined separately, the sample length depends on the geology to get independent results for ore and wall rock without compositing.

The responsible geologist indicates with paint on the core boxes where the sampling has to take place and notes the exact distances on the log sheets.

The core is sawn longitudinally in two equal half parts without biasing mineralization.

Core boxes are numbered consecutively and labelled with the correct drill-hole ID and the associated sample ID.

Core boxes are stored on metal or wooden racks for easy handling.

Samples are put into new, clean and transparent plastic bags with two number tags inside and one number and barcode tag outside and closed with a metal strip.

DHLogger software is used for logging and data is exported daily to the central database.

Assay results from exploration and delineation drill holes are emailed to the chief geologist on-site as well as certain staff members in head office for review. Results are entered into the Century LIMS database by the lab and a hard copy is filed by the geology department.

### ***14.2.2 Channel Samples***

Channel samples are taken to sample vein structures or other relatively evenly distributed mineralization. They are always taken perpendicular to structures to avoid introducing bias. If there are cross cutting vein systems, they have to be taken very carefully to avoid sampling along a possibly mineralized structure. Each sample location contains three samples taken from the vein, hanging wall and foot wall crossing the entire development width. As of July 31, 2007, the database contained 134,487 records of channel samples all cutting mineralized veins which are or have been in production. Due to the large amount of samples it is not practical to show the entire database as a table. Channel samples are the base of the resource calculation and are all of similar importance.

The sampling surface is cleaned of dust, mud or any other contaminating agent by washing the rock-face with a water hose and scrubbing with a brush. Protruding points and ridges are removed before taking the sample so that the sample surface is flat.

The exact location of the channel is marked by drawing two parallel lines separated by 20 cm using chalk or paint. The sample location is determined by a measure from the nearest survey station or plug.

The channel is carved manually with a chisel and hammer or with a diamond-disk saw.

The sample is collected from the total material taken from the channel.

If the structure has different types of mineralization, separate samples are taken for each type.

The distance between channels is 3 m in stopes, 2 m in horizontal exploration development and 1 metre in vertical development.

All samples collected are filled in bags that are perfectly clean and in good condition.

After taking the sample vein thickness and the widths of the drifts are measured and filled into the sample card together with the location information.

Assay results from channel samples are emailed to the geology department and mine engineering department for verification and planning. Results are entered into the Century LIMS database by the lab and a hard copy is filed by the geology department.

#### ***14.2.3 Numbering System***

##### **Drill-Hole ID**

Drill-hole IDs are formatted as follows:

##### **Sample Numbers**

All channel samples, standard samples, and blanks are labelled with a sequential 5-digit number.

**15. Sample Preparation, Analyses and Security**

All sample preparation and analysis is executed by PASQ employees. Underground channel samples are transferred from the plastic bags into a metal tray and dried in an oven for 1.5 hours. After crushing, the samples are split to a size of 200-250 grams. Samples are pulverized using a concentric-ring mill for approximately 1 minute 15 seconds and then homogenized. The pulp is transferred into a bar-coded envelope for subsequent analysis.

The Quiruvilca laboratory uses Acid Digestion and atomic absorption spectroscopy. The prepared samples are analysed for Ag, Zn, Pb, Cu, Sb, Fe and As. During the entire procedure from sampling to analysis, sample security is controlled by PASQ employees or by a certified third party laboratory.

It is PAS standard practice to have a primary lab on-site that performs all sample analysis and also a third party secondary lab to re-iterate analysis on at least 2% of the samples for quality assurance and quality control (QA/QC, check samples).

The primary laboratory is the Shorey Laboratory in Quiruvilca, which is PASQ owned and operated. The laboratory conducts a routine internal QA/QC program, supervised by the geology department, that includes external check samples and the routine submission of standards. For each batch of twenty, at least one internal duplicate and one internal standard is added by the laboratory. The responsible geologist will add one certified standard and one blank each day. Duplicate samples of diamond core samples come from the remaining half core split to a quarter core. For channel samples, a duplicate is obtained by collecting a sample of equal weight from the same sampling location.

The Quiruvilca Mine currently has a contract with ALS Chemex, in Lima, to act as their external secondary lab to analyze the check samples by Atomic Absorption for Ag, Zn, Pb and Cu. ALS Chemex Lima fulfills the requirement of ISO 9001:2000 and reports assay results by e-mail and by certified paper copy to PASQ.

Assay results of inserted blank and standard samples, for 2006 and 2007 (to Oct. 31<sup>st</sup>) are provided in Graphs 15-1 and Graphs 15-2. Each graph is plotted with a warning and action line, to identify outliers. These indicators are equal to  $\pm 2$  and  $\pm 3$  (plus or minus 2 standard deviations and plus or minus 3 standard deviations) respectively. The certified values determined for the standard sample are as follows:

**Table 15-1: Values of the Certified Standard**

<b>ELEMENT</b>	<b>Ag ppm</b>	<b>Cu %</b>	<b>Pb %</b>	<b>Zn %</b>
<b>Average</b>	<b>293.00</b>	<b>0.58</b>	<b>1.08</b>	<b>3.65</b>
<b>Mean</b>	<b>294.00</b>	<b>0.59</b>	<b>1.08</b>	<b>3.65</b>
<b>St. Dev.</b>	<b>7.042</b>	<b>0.026</b>	<b>0.019</b>	<b>0.051</b>
<b>% RSD</b>	<b>2.40</b>	<b>4.54</b>	<b>1.77</b>	<b>1.39</b>
<b>Conf. Int.</b>	<b>2.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.01</b>

Standard results between the warning and action lines are acceptable, but further attention is given to quality control. Standard results outside the action line trigger further investigations and re-analysis may be requested. However, if channel samples are from stopes with small tonnages and immediate production, re-assaying the lot is not practical, but instead, the deviations are used to improve procedures.

Observations from Graphs 15-1 and 15-2 identified that there was a significant amount of outliers beyond the action line in the zinc assays for both inserted blanks and standards for the first 8 months of 2006. The monthly averages on standards samples are given in Table 15-2. This table indicates that zinc assays were problematic when the procedure was first implemented, and that corrective action was taken with notable improvements from September 2006 onwards. The acceptable long term accuracy of both the primary and secondary labs should be within  $\pm 5\%$  of the probable true value of the inserted standards, compiling results from 2006 to present indicate that the labs are within those limits. The authors recognize that the mineral resources and reserves are affected by the reliability of the assays, based on the long production history and the small difference between the theoretical and analyzed standard grades, it is the authors' opinion that the effect on the overall mineral reserves and resources do not impact the assessment of economic viability of the proven and probable mineral reserves.



**Table 15-2: Monthly Average of Assay Results on Standard Samples**

Feb 11	Mar 10	Apr 7	May 11	Jun 12	Jul 16	Aug 22	Sep 21	Oct 24	Nov 20	Dec 22	Annual 186	Jan 19
294.53	290.51	282.90	287.40	287.15	289.31	296.83	284.86	291.77	286.68	292.27	290.26	293.40
0.53 0.18%	-3.50 -1.19%	-11.10 -3.78%	-6.60 -2.24%	-6.85 -2.33%	-4.69 -1.59%	2.83 0.96%	-9.14 -3.11%	-2.23 -0.76%	-7.32 -2.49%	-1.73 -0.59%	-3.74 -1.27%	-0.60 -0.20%
0.58	0.58	0.57	0.56	0.58	0.58	0.57	0.56	0.58	0.56	0.56	0.57	0.56
-0.006 -1.09%	-0.011 -1.88%	-0.020 -3.44%	-0.030 -5.02%	-0.012 -1.96%	-0.012 -2.01%	-0.020 -3.36%	-0.029 -4.93%	-0.007 -1.16%	-0.026 -4.42%	-0.033 -5.56%	-0.019 -3.26%	-0.03 -4.29%
1.07	1.07	1.07	1.02	1.03	1.04	1.06	1.07	1.07	1.05	1.06	1.06	1.05
-0.015 -1.35%	-0.012 -1.11%	-0.010 -0.93%	-0.056 -5.22%	-0.046 -4.24%	-0.037 -3.40%	-0.019 -1.73%	-0.012 -1.13%	-0.007 -0.68%	-0.025 -2.36%	-0.019 -1.77%	-0.021 -1.97%	-0.03 -4.29%
3.40	3.52	3.52	3.21	3.39	3.15	3.35	3.47	3.51	3.81	3.58	3.45	3.45
-0.254 -6.95%	-0.135 -3.70%	-0.135 -3.70%	-0.437 -11.98%	-0.265 -7.26%	-0.497 -13.62%	-0.296 -8.10%	-0.177 -4.84%	-0.139 -3.79%	0.162 4.43%	-0.067 -1.83%	-0.204 -5.59%	-0.204 -5.59%
Feb 19	Mar 17	Apr 19	May 22	Jun 23	Jul 23	Aug 20	Sep 23	Oct 24	Nov	Dec	Annual 211	20 19
296.04	290.58	298.67	288.20	298.27	291.35	288.00	295.37	295.51			293.40	293.40
2.04 0.69%	-3.42 -1.16%	4.67 1.59%	-5.80 -1.97%	4.27 1.45%	-2.65 -0.90%	-6.00 -2.04%	1.37 0.47%	1.51 0.51%			-0.60 -0.20%	-0.60 -0.20%
0.56	0.56	0.58	0.57	0.56	0.57	0.56	0.57	0.57			0.56	0.56
-0.03 -4.82%	-0.03 -5.83%	-0.01 -2.13%	-0.02 -3.10%	-0.03 -4.67%	-0.02 -4.11%	-0.03 -5.07%	-0.02 -3.43%	-0.02 -3.77%			-0.03 -4.29%	-0.03 -4.29%
1.05	1.04	1.06	1.05	1.07	1.03	1.05	1.06	1.06			1.05	1.05
-0.03	-0.04	-0.02	-0.03	-0.01	-0.05	-0.03	-0.02	-0.02			-0.03	-0.03

-2.72%	-3.60%	-1.78%	-3.00%	-0.83%	-4.30%	-2.99%	-1.78%	-1.86%	-2.56%
3.68	3.74	3.76	3.71	3.70	3.65	3.65	3.69	3.67	3.70
0.03	0.09	0.11	0.06	0.05	0.00	0.00	0.04	0.02	0.05
0.84%	2.48%	2.88%	1.54%	1.25%	-0.02%	0.07%	1.22%	0.45%	1.27%

Check sample assays performed in the month of July 2007 are included, comparing the Shorey Laboratory results to ALS Chemex's results. The comparisons are plotted for easier interpretation on scatter plots in Graphs 15-3 and on Thompson-Howard plots in Graphs 15-4. Both graphs show 20% warning lines.

In the authors' opinion, the sample preparation, security and analytical procedures are of adequate quality for resource and reserve estimation.

## 16. Data Verification

PASQ performs routine assay data verification by primary and secondary laboratory check sample analyses. In addition, the on-site Shorey Laboratory and ALS Chemex, Lima perform numerous internal standard determinations and checks. Michael Steinmann, P.Geo., reviews the results and performance of the labs on a monthly basis. ALS Chemex reports the check sample results by e-mail and by certified hard copy. Results of these two reports are compared on a monthly basis by the Quiruvilca geology department.

Channel samples, generally 2 to 3 per sample location (see section 14.3.1), enter the database with assigned X, Y, Z coordinates and a vein code. Hence, they can easily be plotted on each vein long section. 3D sample location for the drill holes are plotted in Datamine software using the collar information, dip and plunge angles and drill hole depth information. All samples are automatically compared in the database during the data verification stage. Visibly wrong locations, due to erroneous data entry are corrected. Duplication of grades or sample locations (closer than 1 metre) are highlighted for easy revision. The responsible geologist compares the duplicated grades to the original data entry and omits one sample in cases of an entry error. If two samples have really been taken in a spacing of less than 1 metre, a weighted average of the grades is used in the database.

Data analysis and verification evaluations have been performed for Quiruvilca by Mr. Elmer Ildefonso, Geostatistical consultant to PASQ. Mr Ildefonso is an accomplished expert in mineral resource and reserves model development; however, he is not a Qualified Person. As such, PAS Dr. Michael Steinmann has reviewed and verified the work of Mr. Ildefonso.

Mr. Ildefonso performed mathematical and statistical validation of the exploration database. The procedures included:

- Verification for duplicate collars of drill holes

- Verification for twin holes

- Verification for overlapping assays

- Verification for zero length assays

- Verification of surface collared holes against the surface topography

It is the authors opinion that the quality of the data given in this Technical Report follows industry standards and that numbers and types of anomalies are within industry norms for databases of this size and age, and that these anomalies have no material effect on the overall mineral resource estimate.

On the base of the statistical checks, the authors believe that the exploration database has been prepared according to industry norms and is suitable for the development of geological and grade models.

**17. Adjacent Properties**

There is no information on adjacent properties in the Technical Report.

**18. Mineral Processing and Metallurgical Testing**

Forecasts for metal recovery are based on historical performance of plant operations. Because Quiruvilca is an operating mine with an operating mineral processing plant, metallurgical testing is conducted every day in the plant. Therefore, the forecasts of recoveries in this Technical Report are based on actual performances of the processing plant. A description of the existing mill and discussion of the historical actual recovery and metallurgical balances are presented in section 25.

The project metallurgy used for the life of mine plan is based on a head grade that is calculated from the mine plan based on the grades defined from the mineral reserves and mineral resources of veins to be mined. When a new vein is intersected, samples are tested at the on-site laboratory.

The metallurgical assumptions used in the life of mine plan are as follows:

**Table 18-1: Life of Mine Head Grade Projections.**

Head Grade	2008	2009	2010	2011
Tonnes Milled	376,052	364,186	379,600	360,597
Silver (g/t)	159.88	155.49	157.63	158.48
Copper	0.91	0.72	0.65	0.40
Lead	1.04	1.10	1.10	1.27
Zinc	3.35	3.67	3.61	3.44
Gold	0.51	0.5	0.5	0.37

**Table 18-2: Life of Mine Recovery Projections**

% Recovery	2008	2009	2010	2011
Silver	82.2	82.0	82.3	82.2
Copper	75.5	72.4	70.2	70.1
Lead	81.0	81.0	81.0	81.2
Zinc	84.0	85.2	85.2	85.5
Gold	10.3	17.4	16.7	13.5

**Table 18-3: Life of Mine Concentrate Projections**

	2008	2009	2010	2011
Concentrates				
Copper				
Tonnes (DMT)	9,573	8,383	8,269	5,610
Ag (g/DMT)	3,650.0	3,750.0	4,000.0	4,620.0
Cu (%)	22.8	27.0	22.8	21.0
Zn (%)	9.0	9.0	9.0	9.0
Lead				
Tonnes (DMT)	5,741	5,884	6,125	6,737
Ag (g/DMT)	2,000.0	2,000.0	2,100.0	2,680.0
Pb (%)	55.0	55.0	55.0	55.0
Zinc				
Tonnes (DMT)	18,742	20,177	20,662	18,777
Ag (g/DMT)	160.0	160.0	160.0	160.0
Zn (%)	56.5	56.5	56.5	56.5

Currently, mining is being deepened to level 400 (and later to level 460) and it is expected that lead, copper, and zinc grades will increase with depth, but not silver grades.

As there is distinct zonation of the mineralogy at the Quiruvilca Mine, the mineralogy of the principal veins on the production plan has been taken into account in order to arrive at the metallurgical assumptions shown above in Table 18-1, Table 18-2, and Table 18-3. The principal veins considered are Zoila Gata, Compania Centro, Luz Angelica, Eva, Betsy, Dina, Elisa, and Claudia. The mineralogy of these veins were described in section 11.2.

### **18.1 Plant Improvement Projects**

A value chain (see Figure 18-1), has been prepared for the plant aiming at identifying processing strengths and weaknesses and finding opportunities for improvement. With this basis, research work and reconfiguration of the entire milling process has been prioritized with the goal of creating economic and environmental value.

#### **18.1.1 Grinding Circuit**

As a result of the metallurgical tests performed during the first quarter of 2007, circuit using the Marcy 6 Øx42 as the secondary ball mill was replaced by a Marcy 7 Øx7 ball mill. This change improved the minus 200 mesh particle size passing to flotation from 54% to 62%. This is expected to improve the recoveries of base metals (copper, lead, zinc).

#### **18.1.2 Bulk Flotation Circuit**

The copper concentrate contributes the highest revenue to Quiruvilca, but is also subject to high smelter penalty charges, notably for arsenic (6% average in the LOM plan) and antimony (7% average). Strong focus is placed on improving the quality and recovery ratio of copper concentrate.

Initially, the bulk flotation circuit consisted of three rougher cells that sent concentrates to a cleaning circuit. Sampling showed that concentrates from the third rougher only had 1% copper and 27% iron. Thus, the bulk flotation circuit was re-organized to convert the third rougher into a scavenger.

#### **18.1.3 Zinc Flotation Circuit**

Re-commissioning of an additional WENCO 66 cell is in progress with the intent of reducing zinc content lost in the final tailings. An automatic pulp level monitoring system will also be installed to improve the operating efficiency and the zinc concentrate quality.

#### **18.1.4 Authors Comments**

Many years of production history, including actual results from processing in the mill at Shorey, mean that the metallurgy to be expected from the deposit is very well-know and established.

In the authors opinion, there is no need for further testing other than that which is part of normal daily operating routine.

Metallurgical testing may be undertaken to review the metallurgy of any new veins if they are discovered. Other metallurgical testing may be undertaken from time to time to explore ideas for improvement or the application of new technology as it becomes available. This type of testing would only lead to improvements over the life of mine economic case as it is presented in this Technical Report.

As discussed in section 18.1.2, the copper concentrate contains a high penalty element content and is treated more as a specialty product by the smelters and concentrate traders. To date, PASQ has been able to sell all of the copper concentrate that it has produced, and for the purposes of the LOM economic analysis, it has been assumed that PASQ will continue to be able to sell this concentrate by paying the high penalty charges that are typical for this type of concentrate in the current market.

Martin Wafforn, P.Eng, has reviewed the metallurgical assumptions used in the economic analysis and compared them to the historic performance of the Shorey mill. In addition, the metallurgical assumptions in the plan have been reviewed by the Pan American Silver Peru S.A.C., a subsidiary of PAS, corporate metallurgist, Edgar Canta, who is not a Qualified Person but is considered to be an expert on flotation metallurgy. Mr. Canta has presented papers on flotation metallurgy internationally and has written a detailed report on the Quiruvilca plant entitled *Memoria Descriptiva Planta Concentradora Shorey* dated 06/11/07 that contains the basis for the processing and metallurgical information presented in this section 18 and section 25. In the opinion of the authors this is further confirmation that the metallurgical assumptions used are reasonable.

### **19. Mineral Resource and Mineral Reserve Estimates**

For each modeled vein, there is a long section oriented along strike of the vein, perpendicular to the X-Y plane. The geology and mine engineering department examines the section and lays out a geo-block system based on mining levels, stope layout and mined out areas. The geo-block system is a configuration of geometric blocks created to best fit an area of mineralization into a physically mineable block if deemed economical. Block sizes vary but are in general 50x20 metres (strike x dip). These blocks are updated on a regular basis as ore extraction advances.

Over each long section and its geo-block system, a resource block model is constructed using a block size of 5x5x10 metres (strike x dip x vein width). The block size in the block model was established based on:

Variography on 14 main structures

Geo-block model size of 50 x 20 metres

Spacing of channel samples of about 3 x 2.5 metres (strike x dip)

These blocks are used for resource estimation. As mentioned above, the vein long sections are constructed on a plane parallel to the strike and dip of each structure. This results in a pseudo 3D block model as it does not include the vein sinuosity along either strike or dip. Mineral resource estimates done with a pseudo 3D model have been reviewed by PAS QP's and it is believed that the marginal difference that would be obtained from creating a full 3D block model would not significantly impact mineral resource estimates. Nonetheless, PAS is aiming to generate full 3D block models for each vein, as it is very useful for mine planning.

The block model construction as well as the mineral resource and reserve estimation are done at the site by two PAS personnel:

**Modeling Geologist:** This geologist updates in coordination with the mine geologists the longitudinal sections, creates or edits the geo-blocks and defines block model limits based on geological observations and makes a visual data verification.

The statistical data validation, data verification, definition of estimation parameters and determination of the estimation methodology is done by E. Ildefonso, Geostatistical consultant to PASQ. Mr Ildefonso is an accomplished expert in mineral resource and reserves model development; however, he is not a Qualified Person.

As such, PAS Dr. Michael Steinmann has reviewed and verified the work of Mr. Ildefonso.

PAS implemented a new procedure for mineral resource and mineral reserve estimates in the second quarter of 2007, making a change from MineSight software to the Datamine software package. Together with the software change, the estimation method was changed from inverse distance to the third power to OK based on established variography. Forty-one important veins in production have been modelled in Datamine software, however resource and reserves estimates of less significant veins are still interpreted by MineSight or Geolink software as they have not changed since the previous estimates. Currently, 99% of the total mineral reserves are estimated using Datamine software. The objective is to assess all the veins with the Datamine system; a task that will be implemented gradually.



The use of the three software packages in the mineral resource estimate is briefly described below:

Datamine Model:

Datamine software is the estimation tool used since the second quarter of 2007. Forty-one important veins in production have been modeled and estimated with this software. The applied block model is 5x5x10m (Strike x Dip x Cross-strike). 99% of the mineral reserves are estimated using the Datamine Model.

MineSight Model

This software has been used since January 2002. The block model that was being used had 3x3x10m (strike x dip x cross-strike). The interpolation method used was inverse distance to the third power, constrained to a search ellipse of 50x100x10m (strike, dip, and cross-strike respectively). The estimation did not perform a variographic analysis to justify the parameters used. Only a very small amounts of blocks estimated through the MineSight model remain in this model.

Geolink Mapping

There is a group of inactive veins and their resources have been previously estimated with the Geolink system. This small software package allows for selecting data, assigning mineral reserve block codes and determining a weighted average. The weighting factor is the longitude and spacing between channels. This method does not use block modeling.

**19.1 Compositing**

The reserves estimation data is collected from two sources: channel samples and diamond core samples. In both cases, sampled sections have been composited to the total vein width. In the case of channel samples, the composite is equivalent to the channel as the samples are taken perpendicular to the vein and have been sampled from the hanging wall to the foot wall. In the case of diamond core, composite can be defined once the geologist has identified the position of the footwall, vein, and hanging wall during core logging. The core sample is geometrically corrected based on the vein dip and the drill hole angles before compositing.

Channel sample and diamond core data is managed with Microsoft Access and DHLogger. The latter is a key tool linked to Fusion, a program that allows posting chemical lab grades directly into the database, thus avoiding unnecessary data manipulation and eliminating possible input errors.

**19.2 Defining Lithology and Specific Gravity**

Incorporation of lithology into the block model is kept simple by defining the block as either mineral or waste. The contacts between wall rock and veins are clearly defined. All mineralization in the veins is deemed to be ore and a specific gravity ( SG ) of 3.6 is assigned. A SG of 2.6 is assigned to the wall rock samples.

Ore density tests were performed on-site following the standard method of water volume displaced by sample weight.

There are efforts to carry out a density measurement campaign to establish a mathematical function for density calculations based on the Zn, Pb, Cu, Fe, Ag and Au grades.

### 19.3 Dilution

The diluted width is calculated independently for each channel. Due to the long production history of Quiruvilca, the well-known mining method and rock mass quality, dilution factors can be estimated using real production data. Over-break is not constant for all structures, but on average, a 0.40m dilution for all structures (0.20 m of wall rock on either side of the vein) has been applied at zero grade.

Each block in the block model contains the vein width based on sampling and drill results. Dilution is calculated for each block using the following parameters:

If the width of the vein is  $< 0.4$  m, it is diluted to the minimum mining width of 0.80m.

If the width of the vein is  $\geq 0.4$ m, 0.40 metres are added; 0.20 m per wall.

### 19.4 Grade Model

A variographic analysis was performed on fourteen representative veins, the variogram parameter have been standardized to a sill of 1 and some of the variables have up to 4 imbricated structures. The principal axis of anisotropy are along strike and dip of the veins. Based on geological similarities and/or close special location an additional 27 veins have been associated to one of the fourteen established variograms. Where these variograms were applicable, silver, copper, lead, and zinc grades are interpolated using the OK method in Datamine. The veins without variography were evaluated using the inverse distance to the square (ID) method. The geology department is currently working on a separate variographic analysis for each vein of the deposit.

The dimensions for the search ellipsoid which determines the amount of samples used for the grade interpolation in the block model are based on the silver and zinc variograms. The orientation of the ellipse long axis is parallel to the vein strike. As for the variograms, there are search ellipses for 14 main structures and 27 similar structures have been associated to one of the 14 veins.

Before kriging, all blocks of the block model were assigned a geo-block number. Mined-out areas have been omitted in order to evaluate only remaining resources. Interpolation of the block model was done in two stages:

In the first stage, the block model was interpolated using channel sample data. This phase involves areas in production as well as areas in further distances. Each grade interpolation is constrained to a minimum of three, and a maximum of ten, composites.

In a second interpolation stage, remnant blocks from the first stage were estimated using drill holes and channel samples located in larger distances. This phase involves only blocks from the peripheral area of the veins. Grade interpolation of each block is constrained to a minimum of one, and a maximum of ten, composites.

Once the block model has been interpolated and validated, the resources of the block model are diluted as indicated in section 19.3 and the specific gravity factor is applied (see section 19.2). Finally each resource geo-block (50 x 20 m) is estimated based on the 5 x 5 m block model. The resource of an entire vein is the sum of all geo-blocks.

**19.4.1 Assigning Values to a Geo-Block**

Once the block model has been interpolated and validated, the geo-block system incorporates the block model to determine a Value Per Tonne ( VPT ) for each geo-block based on the following data:

**Average Vein Width of the Geo-Block** refers to the arithmetic average of the vein widths of all the blocks located within the geo-block.

**Diluted Width of the Geo-Block** refers to the arithmetic average of the diluted widths of all the blocks that are located within the geo-block.

**Calculation of Specific Gravity** - The specific gravity of a block is the weighted average of the gravities of the vein and of the dilution, and is calculated using the following formula:

$$SG = (\text{vein width} * 3.6 + \text{dilution width} * 2.6) / (3.6 + 2.6)$$

Where:

3.6 is the specific gravity of the vein and,

2.6 is the specific gravity of the dilution.

**Calculation of Volume** refers to the sum of the volumes of all the blocks located within the geo-block. The volume of a block is obtained by multiplying the area of the block by the diluted width.

Volume of a Block =  $5\text{m} * 5\text{m} * \text{diluted width (m)}$ .

**Calculation of Total Tonnage** refers to the sum of the tonnages of all the blocks located within the geo-block. The tonnage of a block is obtained by multiplying the volume of the said block by the specific gravity of the block.

Tonnage of one block =  $\text{Volume of block (m}^3\text{)} * \text{SG block (t/m}^3\text{)}$

**Average Sampling Grade (Vein) of the Geo-Block** - refers to the heavy average/mean of the grades without dilutions with the vein width of each block and it considers all the blocks located within the geo-block.

**Average Diluted Grade of the Geo-Block** refers to the heavy average/mean of the diluted grades with the tonnage of each block and it considers all the blocks located within the geo-block.

**19.4.2 Determination of the VPT of a Geo-Block**

Quiruvilca is a polymetallic deposit with production of 4 different metals, hence no simple cut off grade can be used to determine the economic viability of a block. Instead, net smelter return ( NSR ) calculations are used to assign a VPT for each block. The NSR factor for each % of contained Cu, Pb, Zn or each g/t contained Ag is based on actual plant recoveries and on the current concentrate sales terms. In order to assign a VPT to a sample or resource block, the grades can simply be multiplied by the respective NSR factors. Table 19-1 is an example of how the VPT for a block is calculated.

**Table 19-1: Example Calculation of VPT for a Block**

Element	NSR Factor	Grade	VPT (\$/t)
Au	1.0383	0.20	0.2077
Ag	0.1521	200.00	30.42
Cu	0.7779	0.30	0.2333
Pb	2.3463	1.22	2.8625
Zn	5.4058	4.50	24.33
VPT of Block			58.05

In order to determine if a geo-block can be deemed economic, the VPT can simply be compared to the mining cost of the respective mine area.

**19.5 Model Validation**

Validation of the block model is done by visually comparing interpolated grades with its neighbouring blocks results. No other interpolation method has been applied for comparison purposes. The mine has been in production for decades and there are monthly reconciliations between the reserves and plant data.

PASQ constantly compares the mineral reserve and resource estimates to actual production from the mill. Formal reconciliations are conducted that compare the model projections to the actual results on an annual basis, or if it becomes apparent that the results vary from the detailed mine plan that forms the operating budget for the mine, is prepared annually. If these reconciliations show that the model is starting to drift away from the actual results, then the model parameters are typically modified in order to tune the model. Examples of changes made to the model as a result of the reconciliations include increasing the mine dilution parameters to their current levels, and increasing the anticipated mining losses.

**19.6 Mineral Resource and Reserve Statement**

The mineral resources at the Quiruvilca Mine were estimated by a consultant to PAS, Elmer Ildefonso and the on-site geology department under the supervision of Dr. Michael Steinmann, P. Geo., Senior Vice-President of Exploration and Geology for PAS. Following the application of mining parameters, preparation of a mine plan, and an economic analysis, the measured and indicated portions of the mineral resources were converted to proven and probable mineral reserves under the supervision of Mr. Martin Wafforn, P. Eng., PAS Vice-President of Mine Engineering. All mineral resources and reserves quoted are estimated in accordance with accepted industry practices, are in accordance with the CIM Definitions Standards and are in compliance with NI 43-101.

MINERAL RESERVES

Proven and probable mineral reserve estimates for the Quiruvilca Mine as at July 31, 2007 are as follows:

**Table 19-2: Quiruvilca Mineral Reserves**

Reserve	Silver	Ag Content	Gold				
Category	Tonnes	(g/t)	(ounces)	(g/t)	% Copper	% Lead	% Zinc
Proven	988,075	168	5,350,351	0.58	0.64	1.12	3.41
Probable	492,093	152	2,402,414	0.47	0.76	1.21	4.05
Total	1,480,168	163	7,752,766	0.55	0.68	1.15	3.62

## Notes:

PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.

PAS's share is 100% of the total mineral resources.

The geological model employed for Quiruvilca involves geological interpretations on sections and plans derived from core drill-hole information and channel sampling.

The mining and processing rate is currently 1,150 tonnes per day.

Mineral resources for the principal structures are estimated with a 3 dimensional block model using Datamine software. Mineral resources for minor structures are estimated using polygonal methods on longitudinal sections.

Environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues are not expected to materially affect the above estimate of mineral resources.

Mineral resources that are not mineral reserves do not have demonstrated economic viability.

Calculated using a price of \$9.00 per ounce of silver, \$2,100 per tonne of zinc, \$1,000 per tonne of lead and \$5,000 per tonne of copper

Estimates of mineral reserves are calculated on the basis of blocks exposed by underground workings on one or more sides and having an in-place diluted value equal to or above the cutoff grade (\$27/tonne). Proven and probable mineral reserves are extrapolated between 15 and 30 metres down dip depending on vein continuity.

Mineral reserve estimates for Quiruvilca were prepared under the supervision of, or were reviewed by, Michael Steinmann, P.Geo., Senior Vice President Geology & Exploration of PAS, and Martin G. Wafforn, P.Eng., Vice-President of Mine Engineering of PAS, as Qualified Persons as that term is defined NI 43-101.

The Quiruvilca Mine has proven and probable mineral reserves which indicate a projected mine life of four years at current production rates. In addition, the mine holds a substantial amount of measured and indicated resources, which management of PAS believes could be, depending on metal prices and capital requirements, converted into proven and probable mineral reserves, extending the mine life of the mine.

MINERAL RESOURCES

Mineral resource estimates for the Quiruvilca Mine as at July 31, 2007 are as follows:

**Table 19-3: Quiruvilca Mineral Resources**

Resource		Silver	Ag Content	Gold			
Category	Tonnes	(g/t)	(ounces)	(g/t)	%	%	%
					Copper	Lead	Zinc
Measured	4,239,427	134	18,271,750	0.59	1.15	0.85	2.28
Indicated	1,018,488	175	5,739,868	0.48	0.73	1.29	3.72
Total M&I	5,257,915	142	24,011,618	0.57	1.07	0.93	2.56
Inferred	2,588,320	145	12,079,263	0.97	0.46	1.25	3.63

## Notes:

PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.

PAS's share is 100% of the total mineral resources.

The geological model employed for Quiruvilca involves geological interpretations on sections and plans derived from core drill-hole information and channel sampling.

The mining and processing rate is currently 1,150 tonnes per day.

Mineral resources for the principal structures are estimated with a 3 dimensional block model using Datamine software. Mineral resources for minor structures are estimated using polygonal methods on longitudinal sections.

Environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues are not expected to materially affect the above estimate of mineral resources.

Mineral resources that are not mineral reserves do not have demonstrated economic viability.

These mineral resources are in addition to mineral reserves. Calculated using a price of \$9.00 per ounce of silver, \$2,100 per tonne of zinc, \$1,000 per tonne of lead and \$5,000 per tonne of copper.

Mineral resource estimates for Quiruvilca were prepared under the supervision of, or were reviewed by, Michael Steinmann, P.Ge., Senior Vice President Geology & Exploration of PAS, and Martin G. Wafforn, P.Eng., Vice-President of Mine Engineering of PAS, as Qualified Persons as that term is defined in NI 43-101.

Mineral reserves and resources have been calculated as at July 31, 2007 in accordance with the CIM Definition Standards.

Although PAS believes that the mineral reserve and resource estimates for Quiruvilca will not be materially impacted by external factors such as metallurgical, safety and environmental, permitting, legal, taxation and other factors there can be no assurance that they will not be impacted. There are numerous uncertainties inherent in estimating mineral reserves and resources. The accuracy of any reserve and resource estimation is the function of the quality of available data and of engineering and geological interpretation and judgment. Results from drillings, testing and production, as well as a material change in metals prices or a change in the planned mining method, subsequent to the date of the estimate, may justify revision of such estimates.



**20. Other Relevant Data and Information**

No other data is relevant for the review of the Quiruvilca Mine operations.



## 21. Interpretation and Conclusions

Mr. Martin Wafforn, P. Eng., Vice President of Mine Engineering of PAS, and Dr. Michael Steinmann, P. Geo., Senior Vice President of Exploration and Geology of PAS, both Qualified Persons, reviewed pertinent data from the Quiruvilca Mine regarding exploration data and methods, mineral resource and reserve estimates, metallurgy, and process performance. They determined that the estimates of mineral resources and mineral reserves as of July 31, 2007 for the Quiruvilca Mine are in accordance with the CIM Definition Standards. The authors further generally conclude the following:

- (1) The geology and mineralization of a large polymetallic system with over 130 different veins on the mine property is well understood. Geological models appropriate to guide mineral resource estimates have been developed in a professional manner.
- (2) Exploration drilling, sampling, sample preparation, assaying, density measurements and drill-hole surveys have generally been carried out in accordance with industry standard practices and are suitable to support mineral resource estimates.
- (3) Exploration and drilling programs are well-planned and executed and supply sufficient information for mineral resource estimates and mineral resource classification.
- (4) Sampling and assaying includes a QA/QC program, supervised by the geology department that includes external check samples and the routine submission of standards and blanks.
- (5) The Quiruvilca deposit resource model was developed using industry accepted methods. The QPs validated the resource estimate and found it to be acceptable in both tonnage and grade.
- (6) Mine designs have been developed using industry standard practices and appropriate design criteria. Proven and probable mineral reserves were developed from measured and indicated resources with appropriate application of cost and design criteria.
- (7) Mineral resources are classified as measured, indicated and inferred mineral resources. Resource classification criteria are appropriate in terms of the confidence in grade estimates and geological continuity and meet the requirements of NI 43-101 and the CIM Definition Standards.
- (8) The economic analysis calculates that the Net Present Value is \$-5.08 million at a 10% discount rate and \$-3.16 million at a 15% discount rate. The undiscounted after tax cash flow is \$-11.97 million. The NPV calculation included the closure costs of the Quiruvilca Mine, which will be incurred regardless of continued operations. Without the closure cost included, the undiscounted NPV is calculated to be \$7.08 million. The average Quiruvilca Mine unit total operating cost is projected to be \$63.48 during 2008 to 2011.
- (9) The life of mine plan presented in this Technical Report is based solely on proven and probable mineral reserves. The life of mine plan extends until 2011.

**22. Recommendations**

The authors recommend execution of the Life-of-Mine Plan and Schedule at the Quiruvilca Mine operation.

**23. References**

Report entitled Memoria Descriptiva Planta Concentradora Shorey dated November 6, 2007 by Edgar Canta PAS Peru corporate metallurgist

Report entitled Plan de Cierre de la Unidad Minera Quiruvilca, Informe Final Proyecto No. 1-A-068-009 dated August 2006 by SVS Ingenieros S.A.

Opinion on the Quiruvilca Mining Properties , dated November 14, 2007 by Rodrigo, Elias & Medrano Abogados (legal entity).

Report entitled Quiruvilca, Peru: Mineral Zoning and Timing of Wall-Rock Alteration Relative to Cu-Pb-Zn-Ag Vein-Fill Deposition , Economic Geology Vol. 82 pp 1431-1452, dated 1987 by Paul J. Bartos.

## **24. Additional Requirements for Technical Reports on Development Properties and Production Properties**

### **24.1 Mining**

#### **24.1.1 Mine Layout**

The Quiruvilca Mine extends over an area that is 4 km east/west by 3 km north/south and from an elevation of 4,050 metres at the top of the mountain down to the 400 level (elevation 3,468 metres). Access to the mine is from four adits driven into the side of the mountain at elevations ranging from 3,648 m to 3,870 m. The mine is sub-divided into two areas: the North Zone and the South Zone, as outlined in Figure 25-1. Each zone is further distinguished by areas, which can be grouped by common means of accessibility or infrastructure. A general schematic of these zones is shown on Figure 11-3.

#### **NORTH ZONE**

The North Zone includes the Central area, Satellite area and the Codiciada area. This area of the mine was previously closed down in 2003 as part of a strategic restructuring of the operation. The area below the 220 level was allowed to flood and the proven and probable mineral reserves in the area were downgraded to measured and indicated mineral resources. With the advent of higher metal prices, production in the North Zone has now resumed, albeit at a smaller scale than before. Some of the measured and indicated mineral resources are being converted once again to proven and probable mineral reserves as they once again become part of the mine plan.

Production is focussed in the higher grade areas and those areas where ore is readily accessible. A rehabilitation program is underway to provide access to explore for extensions of known veins. The mine plan for 2008 and 2009 includes mining high silver grade ore in the Dina and Elisa veins by developing small ramps below the 220 level. Current production from the North Zone is around 6,000 tonnes per month with average grades of 250 grams Ag and 2% Zn per tonne. The mine plan is developed to manage or blend production from the areas of the North Zone that have elevated arsenic and antimony grades in order to maintain concentrate grades that are marketable.

The North Zone is comprised of the levels Morococha, 50, 100, 160 and 220. The main access is gained through the Central-Elvira shaft, which transports personnel and material from surface to the 220 level. The Satellite shaft extends from the 220 level to below the 340 level and would normally service the 280 and 340 levels; however, it is not operational at present because it is flooded up to the 220 level. Although the hoist is being maintained and would otherwise be operational, the life of mine plan presented in this Technical Report does not contemplate dewatering the North block below the 220 level and converting the current mineral resources there into mineral reserves. This remains an option but is currently considered to require higher metal prices than those assumed in the preparation of this Technical Report.

The ore from all levels is fed by gravity via ore passes from the Morococha level down to the 220 level, Almirvilca Tunnel, which is the main extraction level. The layout of the 220 level, including its general mine development plan for 2007-2008, is illustrated on Figure 25-2.

## **SOUTH ZONE**

The South Block contains the Luz Angélica vein systems both above and below the main portal on the 220 level. The South s area currently produces in the order of 24,000 t/month with average grades of 120 grams Ag and 3.5% Zn per tonne.

### **LUZ ANGELICA AREA**

The Luz Angélica Alta area is defined by the levels 3926, 3879, 3800, 3720 and 220. Access to this area is through the existing mine entrances already developed on each of the levels, as shown in Figures 6-4A to 6-4G.

The ore is collected through the 415 ore pass, which goes from the 3926 level down to the principal level of extraction on level 220.

### **MINE DEEPENING AREA**

Principal access and transport is through the main ramp. In each level of this area there are independent ore and waste bins that feed on to the conveyor belt that is used for ore and waste extraction from level 340 up to level 220. The conveyor discharges ore or waste into bins from where it is either fed in to the crusher in the case of ore, or trammed to the waste dump.

The conveyor stops below the 340 level., Ore from the 400 level, and from any subsequently deeper levels, will be hauled up to the 340 level and fed onto the conveyor belt for transport to surface. There are two haulage systems for the 400 level: the first consists of a 4 m by 4 m haulage ramp to access the Luz Angelica vein and the vein splits near to the Luz Angelica vein. This ramp has now been developed and ore is hauled up in a 15 ton (13.6 tonnes) capacity mine truck and dumped into a pass that feeds onto the conveyor.

The second haulage system accesses the Zoila Gata vein system it comprises of a small 3 m by 3 m access ramp and an inclined shaft between the 340 and 400 levels that is currently in construction and is expected to be completed by the end of 2007. After being hoisted up the inclined shaft, ore and waste will be hauled using the existing 340 level rail haulage system to the conveyor-way for conveying to surface. While awaiting the completion of this inclined shaft, the Zoila Gata vein system is being developed using the access ramp and a scooptram to haul away ore and waste.

Plan drawings of the 340 and 400 level are shown in Figure 25-3 and Figure 25-4.

PASQ plans to continue to develop the Luz Angelica ramp system down to the 460 level and start mining. Although it is thought to be likely that the vein systems continue on to the 460 level, and the mine has operated for many years with a small proven and probable mineral reserve base, there is not sufficient diamond drill information to record a large proven and probable mineral reserve on that level. Consequently, the life of mine plan presented in this Technical Report only considers mining ore on the 460 level that is in the proven and probable mineral reserve category.

### **24.1.2 Mining Method**

There are, on average, 60 active stopes at any given time, almost all using the overhand cut and fill mining method, and in the rare case, shrinkage stoping. Overhand cut and fill is done by one of two methods depending on local conditions.

1) **Upper Stoping** Illustrated in Figure 25-5.

Mined in 17.5 m long by 2.1 m high cuts; width varies with vein.

Working level is accessed by a timbered man-way also serving as a ventilation raise and an ore-pass.

Miners drill above themselves at a 50 degree angle using a stoper drill and 8 ft (2.44 m) drill steel. Drilling is done on top of a previously backfilled stope.

Once blasted, the ore is mucked down the ore pass with a slusher.

Backfill barricade is positioned and hydraulic fill is pumped via the man-way.

2) **Breasting** Illustrated in Figure 25-6.

Similar to upper stoping, except ore is drilled horizontally while the driller is standing on top of previously blasted ore. Thus, extraction of ore is left until the entire span of the stope has been blasted.

This method is less productive than upper stoping and is typically only used in areas with difficult ground conditions where more control is required.

Approximately one-third of the stopes are typically in the drilling and blasting phase, one-third in the mucking phase and one-third in the filling phase at any given time. In stopes where hydraulic backfill is not available, or in places where the vein is very narrow and would not otherwise be economic, resueing is employed with the waste rock remaining in the stope as backfill. In all other stopes, tailings are poured into the stope hydraulically to serve as backfill.

#### **DRILLING AND BLASTING**

The drilling operation is performed with pneumatic Jackleg drills, using 2, 4, 6 and 8 ft (0.61 m to 2.44 m) drill steel with 36 and 38 mm diameter bits. The blasts are done with emulsion and gel dynamite explosives. The mine currently has 83 jacklegs either in operation or being rebuilt.

#### **MUCKING**

Mucking the broken ore in the cut and fill stopes is done utilizing 15 hp, 20 hp, 25 hp and 35 hp slushers (the mine has 76 of these slusher winches) that have 25 to 36 inch buckets.

Mucking of development heading is done with either 1.5 yd<sup>3</sup> (1.15 m<sup>3</sup>) capacity scooptrams (of which the mine has 2) or more commonly, using compressed air overshot shovels (of which the mine has 23). The compressed air shovels are a mix of Atlas Copco LM56 and Eimco 12B machines.

### SUPPORT

Wooden boards and posts are used in the stope cuts to support the backs and to support the walls as required. Based on the results of geotechnical assessments that are routinely carried out, bolts (Split Set, Mechanical) are used in the development heading where their use is deemed necessary. Shotcrete and welded mesh screen are used to a lesser degree but are available for application in longer term infrastructure such as the hoist-room for the new inclined shaft that has been developed to the Zoila Gata vein between the 340 and 400 levels.

### TRANSPORT

Small 4 or 4.5 ton (3.63 or 4.08 tonnes) battery locomotives are used to haul ore and waste in mine cars on the levels from the stopes and development headings to ore and waste passes. The mine has 20 of these battery locomotives and they typically haul using trains of varying numbers of mine cars. In the upper levels of the mine (above 220 level) headings are smaller and mine cars of 40 ft<sup>3</sup> (30.58 m<sup>3</sup>) capacity are used. The mine has a fleet of 111 of these mine cars that are in a constant cycle of operation, rebuilding and replacing. The mine also has a fleet of 54 mine cars of 84 ft<sup>3</sup> (64.22 m<sup>3</sup>) capacity that are used on surface, 220, 280 and 340 levels.

Ore from the upper levels of the mine is delivered to ore passes, which transfer it to the 220 main haulage level. A 12 ton (10.89 tonnes) capacity and a new 8 ton capacity trolley locomotive are used with a fleet of 22 larger mine cars (2 of 100 ft<sup>3</sup> (76.46 m<sup>3</sup>) capacity and 20 of 120 ft<sup>3</sup> (91.75 m<sup>3</sup>) capacity) to transport ore from the ore and waste passes on the 220 level to the coarse ore bins at the crushing plant and to the waste dump.

### TRANSPORT: MINE DEEPENING

A 590 m long, 76 cm wide, conveyor is used to transport ore and waste from below the 220 level to a surface bin at the 220 level. The conveyor belt has a capacity of 150 t/hr. The mine completed the extension of this conveyor belt down to the 340 level in August of 2005. Ore from the 400 level will be transported up to the 340 level in order to utilize the conveyor belt for haulage to surface. Ore from the 400 level Luz Angelica vein system will be trucked up a ramp using 2 to 15 ton (1.81 to 13.61 tonnes) capacity 4 wheel drive mine haulage trucks. Ore from the Zoila Gata vein system will be hoisted via an inclined shaft using a 50 hp Ingersoll Rand winch that has been installed on the 340 level. The haulage and access systems for the 400 level were started in 2006. The ramp system for the Luz Angelica vein is now completed and is in use. The ramp to the Zoila Gata vein is completed and is in use for the vein development on 400 level. The excavation works for the inclined shaft and associated infrastructure are almost complete and the mine is currently working on the civil, mechanical and electrical systems required for completion. The inclined shaft is projected to be completed by the end of 2007.

### VENTILATION

The main mine ventilation system is separated into two main circuits. For the North Zone and the Mine Deepening Area, fresh air is taken in through a main fan located in the Luz Angélica area in the Almirvilca Tunnel and the access ramp. Primary ventilation fans are 150 hp, 100 hp and 60 hp capacity and provide sufficient ventilations to effectively clear blasting fumes and the exhaust fumes of the few pieces of diesel equipment that are in operation at the mine.

For the Luz Angélica levels (220, 3720, 3800, 3870 and 3926) fresh air is taken in through each of the level's mine entrances, primarily by the natural air flow caused by the pressure differential. These levels have auxiliary (booster) fans in the mine's interior.

Auxiliary ventilation fans sizes are typically between 5 hp to 20 hp and direct the air from the primary circuits into the stopes and the development headings. Larger auxiliary fans of 50 hp and 60 hp capacity are being used to provide ventilation for the current deepening projects to the 400 level and the 460 level.

#### BACKFILL

Tailings from the mill are directed to the hydraulic fill plant located near the Santa Catalina Tailings Impoundment. The fine fraction is removed with cyclones, and the coarse fraction is directed to the storage tanks in the hydraulic fill plant. The sand-fill is pumped 2,700 m to the Luz Angelica distribution plant, or a further 1,600 m to the Central distribution plant through a 76 mm HDPE line. These distribution plants are equipped with 170 m<sup>3</sup> storage tanks. When backfill is required underground, the fill is re-slurried and pumped underground. The monthly hydraulic backfill volume averages 5,200 m<sup>3</sup>.

#### PUMPING

Water inflows to the mine vary with the season and the amount of rainfall on surface. Water is pumped to surface using primarily 50 hp 3 x 4 pumps and 150 hp 3 stage centrifugal pumps. Mining is not below the water table and the amount of water inflow is not expected to increase significantly over current annual average levels throughout the life of mine plan.

#### COMPRESSED AIR

The mine has a nominal 9,600 CFM (7,340 m<sup>3</sup>/min) at 125 psi (861 kPa) of compressor capacity installed on surface, including two new 1,500 CFM (1,447 m<sup>3</sup>/min) compressors installed in 2007. Calculation of actual compressor capacity should include adjustments (derating) for altitude; however this is sufficient capacity to continue to operate the mine at its existing output as planned in the life of mine plan presented in this Technical Report.

#### ***24.1.3 External Dumps***

In the past the principal waste rock dump was the La Codiciada waste rock dump located across the Shorey River near the Almirvilca Tunnel outlet. Natural flows from the Shorey River are diverted into small tunnels located at the right abutment of the storage impoundment and discharged downstream of the impoundment toe. This dump is now closed and being rehabilitated. Currently all waste rock generated from the mine is stored within the limits of the Santa Catalina tailings storage impoundment which is described in section 24.4.

In 2007 the waste rock area was reconfigured in conformance with the designs for the final closure of this impoundment. The natural drainage path of the Shorey River was re-established with the excavation of a large spillway at the right abutment of the impoundment. The spillway has been designed by external consultants to handle the estimated probable maximum flow. A river training dike was constructed at the upstream intake of the spillway to direct river flows towards the spillway. The erosion protection works along the spillway remain to be completed. Once completed, the tunnels will be decommissioned and all flows directed through the spillway. The downstream slopes of the waste rock dump were reconfigured with benches and uniform slopes to minimize erosion.



## **24.2 Milling**

In 2006, the concentrator plant processed 370,115 tonnes of ore. Processing is expected to be in this range throughout the life of mine plan. The actual capacity of the mill is much higher than this, in the order of 700,000 tonnes per annum as evidenced by historic production levels before PAS initiated a strategic restructuring and reduced the output from the North Zone in 2003. In the opinion of Martin Wafforn, P.Eng., the mill is easily capable of processing the production forecast in the life of mine plan.

Quiruvilca operates a mill using froth induced flotation technology to produce silver in copper, lead, and zinc concentrates. The mill flowsheet consists of three-stage-crushing, ball mill grinding and selective flotation of the ore to concentrates, followed by thickening and filtering of the concentrates.

The Quiruvilca deposit is polymetallic comprising the following main minerals:

Copper minerals: Tetrahedrite and Chalcopyrite

Silver minerals: Argentiferous tetrahedrite, freibergite

Lead mineral: Galena

Zinc minerals: Sphalerite, Marmatite

Gangue minerals: Pyrite, Rhodocrosite, Quartz

The mill is old; however it was well-built by ASARCO, who was a previous owner of the mine. As most of the equipment is old, it is easier to quote equipment sizes in imperial units.

The mill flow sheet is provided in Figure 25-7.

### **24.2.1 Crushing**

The crushing plant has 2 coarse ore bins of 1,000 tons capacity each. Ore is fed via feeders from each storage bin (one feeder is 48 inches by 28 ft and the other is 36 inches by 17 ft 6 inches) onto a reversible 30 inch wide by 187 ft long conveyor belt. From there the ore travels over a sequence of conveyor belts and through a 5 ft by 7.5 ft vibrating grizzly. The oversize is then crushed in a 24 inch by 36 inch jaw crusher. The ore then travels to a double deck screen with the top screen at 2 inches with the reject from this screen going to a 4 1/4 ft Symons cone crusher. The bottom screen is 3/4 inch with the reject going to a 3 ft Symons short head cone crusher. The final crushing product is conveyed up the hill to the process plant via conveyor belts of 24 inches by 990 ft feeding another belt of 24 inches by 456 ft.

### **24.2.2 Grinding and Classification**

The crushed ore is stored in fine ore bins of 1,000 tons and 400 tons capacity. There are 2 grinding circuits available. As a result of metallurgical testing, emphasis is given to operating the circuit with a 9.5 ft diameter by 12 ft long primary ball mill and a 7 ft diameter by 7 ft long secondary mill. Final product from this circuit is 60% to 62% minus 200 mesh. The other grinding circuit available is a 9.5 ft diameter primary mill operating in closed circuit with a 6 ft diameter by 4.5 ft long ball mill using a D-20 hydrocyclone.

### **24.2.3 Flotation**

The pulp from the grinding circuit is fed to the flotation cells at a density of 1,310 to 1,340 grams per litre. Bulk flotation to produce a copper / lead concentrate is followed by copper and then zinc.

Bulk flotation occurs in 3 stages: primary rougher is in an OK16 cell, followed by secondary rougher comprising 3 DR300 cells and the third rougher is 2 DR300 cells. The froth from the roughers is sent to cleaning in 10 DR21 cells and is the bulk concentrate for lead / copper separation. The tailings from the DR21 cells go to a scavenger cleaner and the froth is returned to the first cleaner the tails are returned to the first rougher cell.

Copper / lead separation is done in 2 DR21 cells where the copper is depressed with MIXC at a pH of 12. The lead that is floated goes to a primary and secondary cleaning. The lead concentrate obtained typically grades 55% to 58% lead (55% used in the economic analysis for this Technical Report). The tailings from this stage are the copper pre-concentrates and go to a thickener.

The copper pre-concentrates are re-ground in a Hardinge mill operating in a closed circuit with a D-6 hydrocyclone. The cyclone overflow is sent to bulk flotation in 4 Wemco cells and the froth going to the first cleaning stage and the tailings returning to the head (lead / copper rougher). Cleaning consists of 4 Wemco 43 x 46 using a MIX reagent. The froth is added to the lead concentrate and the tailings from this step become the copper concentrate.

The tailings from the bulk concentrate become the feed for the zinc flotation circuit. First the pulp goes to 2 10 ft diameter by 10 ft conditioning cells after conditioning to 2 rougher stages and the froth is sent to 3 cleaners in a conventional circuit where the zinc concentrate is produced. The tailings from the 3 rougher cells are the final tailings.

### **24.2.4 Thickening and Filtering**

The lead concentrate is thickened in a Denver 16 ft diameter by 8 ft high thickener. The concentrate is fed at a density of 2,000 grams per litre to a Peterson 8 ft diameter by 12 ft drum filter. The final concentrate has a moisture content of approximately 9%.

In the same way, the copper concentrate is thickened in a Denver 16 foot diameter by 8 ft thickener and fed with a pulp density of 2,200 grams per litre to a Peterson 6 ft diameter by 8 ft drum filter. The final concentrate has a moisture content of approximately 11%.

The zinc concentrate goes to a 36 ft diameter by 10 ft Dorrco thickener and is later fed to a Dorr Oliver 11 ft diameter by 12 ft drum filter at a density of 1,900 grams per litre. The final concentrate has a moisture content of approximately 8%.

**24.2.5 Reagents Used in the Plant**

Table 24-1 provides a summary of typical reagent consumption rates.

**Table 24-1: Typical reagent consumption rates**

Reagents	cc/min	g/tonne
ZnSO <sub>4</sub> /CNNa	1,080	130
CuSO <sub>4</sub>	1,030	205
Xanthate Z-11	900	86
MIBC	40	34
ZnO/CNNa	1,700	69
Xanthate Z-6	25	1.0
HNaSO <sub>3</sub>	130	82

**24.3 Metal Recovery**

The projected recoveries used in the economic analysis are shown in section 18.

Projected metallurgy in the LOM plan has been summarized as follows:

Copper concentrates contain 18% to 27% copper depending on the head grades. Copper recoveries vary from 70% to 75%. The silver grade in the copper concentrate is projected to vary from 3,600 g/t to 4,600 g/t.

Lead concentrates contain 55% lead and recover 80% of the lead contained in the feed. Silver grades in the lead concentrate are projected to be between 2,000 g/t and 2680 g/t depending on the head grade. Overall silver recovery to the copper and lead concentrates averages 82%.

Zinc concentrates contain 55% to 56.5% zinc at a recovery of 82.5% to 85.5%.

Table 24-2 sets out the metallurgical balance for 2007 to the end of August and is included to demonstrate the performance capability of the mill.

Table 24-3 has been included to show the general trend of historical recoveries of metals at the Quiruvilca Mine.

Table 24-2: Metallurgical balance for 2007 to the end of August

**METALLURGICAL BALANCE 2007 (August)****PRODUCT COMPOSITION**

<b>PRODUCT</b>	<b>Tonnes Produced</b>	<b>Au (g/t)</b>	<b>Ag (g/t)</b>	<b>Cu (%)</b>	<b>Pb (%)</b>	<b>Zn (%)</b>
Copper Concentrate	4,829.065	3.94	4,964.73	22.82	3.10	8.64
Lead Concentrate	3,131.289	4.39	2,734.53	4.96	53.89	4.40
Zinc Concentrate	8,769.952	1.10	175.33	0.64	0.48	54.55
Tailings	222,131.694	0.92	30.85	0.08	0.09	0.23
<b>TOTAL</b>	<b>238,862.000</b>	<b>1.03</b>	<b>171.35</b>	<b>0.62</b>	<b>0.87</b>	<b>2.45</b>

**PRODUCT  
CONTENTS**

<b>PRODUCT</b>	<b>Au (g)</b>	<b>Ag (g)</b>	<b>Cu (tonnes)</b>	<b>Pb (tonnes)</b>	<b>Zn (tonnes)</b>
Copper Concentrate	19,018.2	23,975,016.4	1,101.8	149.8	417.4
Lead Concentrate	13,738.0	8,562,599.0	155.3	1,687.5	137.9
Zinc Concentrate	9,612.9	1,537,619.5	56.1	41.9	4,784.2
Tailings	204,051.3	6,853,419.6	178.0	197.3	511.1
Total Metal Content	246,420.3	40,928,654.5	1,491.1	2,076.6	5,850.7
<b>Actual Metal Recovered</b>	<b>42,369.0</b>	<b>34,075,234.9</b>	<b>1,101.8</b>	<b>1,687.5</b>	<b>4,784.2</b>

**% RECOVERY**

<b>PRODUCT</b>	<b>Au</b>	<b>Ag</b>	<b>Cu</b>	<b>Pb</b>	<b>Zn</b>
Copper Concentrate	7.72%	58.58%	73.89%	7.22%	7.13%
Lead Concentrate	5.58%	20.92%	10.41%	81.26%	2.36%
Zinc Concentrate	3.90%	3.76%	3.76%	2.02%	81.77%
Tailings	82.80%	16.74%	11.94%	9.50%	8.74%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Actual Recovery</b>	<b>17.20%</b>	<b>83.26%</b>	<b>73.89%</b>	<b>81.26%</b>	<b>81.77%</b>

Table 24-3: Historical metal recovery of milling facilities.

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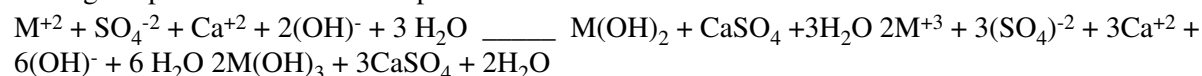
#### 24.4 Mine Water Management

The main source of acid mine drainage ( AMD ) are the extensive underground mine workings. Flows from surface tailings and waste rock storage areas also contribute to AMD. These flows are collected and directed to the water treatment plant constructed near the outlet of the Almirvilca Tunnel. The water treatment plant was constructed in 1997. Annual water volume treated has been between 2 million to 2.5 million cubic metres over the last 5 years.

The capacity of the water treatment plant is 300 m<sup>3</sup>/hr. The plant does have the capacity to treat a maximum of 400 m<sup>3</sup>/hr during the rainy season when additional amounts of runoff water have been treated. The additional water treated normally starts at a better quality than the mine water. The water coming from the mine workings usually has a pH of approximately 1.60.

The effluent treatment plant is a high density sludge mechanical treatment plant designed to treat the low pH, high metal loading flows emanating from the mine and other sources. The treatment plant produces a sludge which is sent to the San Felipe storage impoundment for permanent disposal.

Drainage is collected in a flash- mix tank. Lime and re-circulated mud will be mixed in a mud-lime tank prior to starting the process. This mix will pass to a flash-mix tank where two reactions will occur:



The product of these reactions is collected in a reactor vessel where air is added in order to provide the required oxygen for completing oxidation of the Fe<sup>+2</sup>. The reactor tank discharge passes to the clarifier where separation occurs. The underflow is mud with approximately 30% solids and the overflow is the final treated effluent that is discharged into the river free of contaminants with a pH between 7 and 8. Part of this mud (75%) is re-circulated once more so as to start the process in the mud-lime tank and the excess will be passed out to the former San Felipe tailings impoundment.

The mine is operating in compliance with its environmental permits.

#### 24.5 Tailings Management

##### SANTA CATALINA IMPOUNDMENT

The final tailings from the plant is pumped to the Santa Catalina tailings impoundment by four 6 x 6 Ash pumps. The tailings feed an 8 x 6 Denver pump which pumps to a cyclone nest to classify the tailings into coarse and fine sediments. The coarse sediments are used for hydraulic backfill and for dam building.

The tailings impoundment is formed with the construction of two dams termed the Main Dam and the Intermediate Dike.

The Main Dam is constructed from cycloned tailings sand. The coarse fraction of the tailings is separated from the fined portion and discharged at the crest and downstream slope of the Main Dam. Continuous, or periodic, cycloning of the tailings sand allows for the raising of the dam crest. The finer portion of the tailings from the cycloning process is discharged into the tailings impoundment.

The stability of the Main Dam was assessed by external consultants in 1996 in order to estimate the seismic and static stability of the dam embankment. The stability assessment included electric piezocone testing of the tailings in the dam. The testing was used to estimate the in-situ properties of the tailings material composing the body of the dam embankment. The results of the stability assessment indicated that the high seismicity of the area resulted in the likelihood of sufficient ground accelerations to induce liquefaction of the tailings dam with the risk of failure of the dam. The stability assessment identified the need to build a toe buttress at the Main Dam in order to increase the factors of safety against failure to acceptable levels. The lower portion of the toe buttress was constructed of rockfill in 1997. The toe buttress has subsequently been raised, as per design recommendations, using cycloned tailings placed with a dozer. The target static and seismic factors of safety have been achieved with the construction of the toe berm. As the dam is raised the factors of safety are maintained by increasing the height of the berm crest.

The Intermediate Dike is a zoned earthfill dam constructed with a low permeability clay core, a sand filter, gravel filter and downstream rockfill zone. It is the smaller of the two dams. The Intermediate Dike is designed as a water retaining structure as the fine tailings and slurry water are impounded against its upstream slope. As additional storage is required in the impoundment the dike is raised using the downstream method of dam raising. The intermediate dike crest elevation is being raised in 2007 to provide an additional three years of tailings storage capacity.

Surface water inflow into the Santa Catalina tailings impoundment is minimized with the construction of a diversion canal. The canal is located along the perimeter of the impoundment in the area where there is a large catchment region uphill of the tailings impoundment. The slurry water and direct precipitation entering into the impoundment is collected in a sloping decant intake located near the abutment of the Intermediate Dike. The decant line is located below the tailings impoundment and discharges at the toe of the Main Dam from where it is re-circulated to the processing plant. An emergency spillway is located at the abutment of the Intermediate Dike to provide safety against overtopping of the dams in the case of extreme precipitation.

#### **SAN FELIPE IMPOUNDMENT**

The San Felipe tailings impoundment was used to store tailings from the Quiruvilca Mine in the past. The impoundment is formed by a dam constructed of mine tailings located at the downstream limit of a side drainage to the Shorey River downstream of the processing plant.

The stability of the tailings dam was assessed in 1997 by external consultants. The assessment included the use of electric piezocone testing to characterize the tailings composing the dam embankment. The assessment indicated that high site seismicity could lead to the liquefaction of tailings within the dam embankment. The construction of a stabilizing berm was recommended in order to improve the stability of dam to acceptable levels. The stabilizing berm was constructed and a series of pneumatic and vibrating wire piezometers have been installed to monitor the dam pore water pressures. The stabilization measures included the provision for constructing a containment dike at the crest of the impoundment to provide storage for the sludge from the water treatment plant. The containment dike will be raised in 2008 in order to provide additional storage capacity. The storage of sludge at the San Felipe storage impoundment has been identified in the PAMA as part of the closure of this impoundment. The sludge will provide an effective low permeability cover to minimize infiltration of precipitation into the underlying tailings.

## 24.6 Marketing

The principal products from the Quiruvilca Mine are zinc, and silver-rich lead and copper concentrates. All of these concentrates are sold under arm's length contracts to metals trading companies or integrated mining and smelting companies. Under the terms of all of its sales contracts, PASQ receives payment for an agreed percentage of the silver, lead, zinc, or copper contained in the concentrate, after deductions for smelting and refining costs.

In 2006, zinc concentrate was sold to Glencore International AG ( Glencore ) under a contract which runs until 2009. Currently, the Quiruvilca Mine sells its lead concentrate to Glencore pursuant to a contract with fixed terms through to the end of 2007.

A contract for the sale of copper concentrate was renewed with Doe Run Peru for 2007 and 2008. Spot sales were made to Xstrata Copper Canada ( Xstrata ), BHL Peru S.A.C. ( BHL ), and Traxys Belgium S.A. / N.V. ( Traxys ) during 2006.

During 2006 and 2005, the revenue per type of concentrate produced at the Quiruvilca Mine was as follows:

**Table 24-4: Concentrate Revenues 2006.**

	Revenue	Tonnes	Average Sales Price
	(\$ Million)	Sold	(\$/Tonne)
2006			
Copper Concentrate	23.2	6,705	3,460
Lead Concentrate	8.2	6,372	1,287
Zinc Concentrate	18.8	15,949	1,179

**Table 24-5: Concentrate Revenues 2005.**

	Revenue	Tonnes	Average Sales Price
	(\$ Million)	Sold	(\$/ Tonne)
2005			
Copper Concentrate	12.3	6,681	1,838
Lead Concentrate	3.0	3,237	919
Zinc Concentrate	6.9	18,011	381

The zinc concentrates produced by the Quiruvilca Mine are highly marketable as they contain high zinc grade, low levels of impurities and low silver content. The lead concentrates have arsenic and antimony as impurities but are attractive to lead smelters due to their high lead, silver and gold content. Although the silver-rich copper concentrate produced by the Quiruvilca Mine contains arsenic and antimony impurities, it has maintained marketability due to the high amount of silver contained in the concentrate. To date, PAS has been able to secure contracts for the sale of the Quiruvilca concentrates.

## 24.7 Contracts

### 24.7.1 Sales Contracts

Below is a list of contracts held by PASQ for future production. The terms of smelting contracts are confidential as specified within each contract. However, Martin Wafforn, P.Eng., has reviewed these terms and compared them with similar contracts outside of PAS and considers these contracts to be within industry norms. There are no hedging or forward sales contracts.



**Table 24-6: Summary of Concentrate Sales Contracts.**

Contract Sales for Quiruvilca 2008-09

	Client	Sales (Tonnes Per Year)	Contract Duration (Year)
Copper Concentrate	Doe Run Peru S.A.C	5,000 to 7,000	2008
	Xstrata Copper Canada	2,400	2008 - 2009
Lead Concentrate	Glencore International AG	4,500	2008 - 2009
Zinc Concentrate	Glencore International AG	Total Production	2008 - 2009

**24.7.2 Other Contracts**

PASQ holds a contract with JR Contratistas, a mining contractor, to the end of 2007. Also, PASQ has a contract with Compania DID S.A.,C., a transport service for the delivery of concentrates, until July 2008. Martin Wafforn, P.Eng., does not foresee any problems with renewing contracts if services are further required.

Current electricity rates are 5 cents per kilowatt hour. There is a risk that PASQ might not be able to secure a new long term electricity contract and the cost of electricity might increase to 8 cents per kilowatt hour. Current life of mine scheduling is based on 104 kilowatt hours per tonne of ore mined and if the cost is increased by 3 cents per kilowatt hour, the new schedule would be increased by approximately 3 kilowatt hours per tonne to a total of 107 kilowatt hours per tonne.

**24.8 Taxes**

The following is a summary of current Peruvian fiscal rates and legislation.

**24.8.1 Fiscal Depreciation Rates**

The following is a summary of the annual depreciation rates for various types of assets:

Exploration, mine development, mine rehabilitation: 100%

Mine equipment: 20%

Vehicles: 20%

Computers: 25%

Buildings and other infrastructure: 3%

Other: 10%

**24.8.2 Income Tax and Workers Participation**

The corporate tax rate on taxable income in Peru is 30%. The workers participation rate is 8%. Workers participation is deductible from taxable income. Therefore, the effective income tax / worker s participation rate is 35.6%

**24.8.3 Value Added Taxes**

The value added tax ( VAT ) rate in Peru is 19%. VAT is paid on all goods and services except for direct labour costs. Indirect labour costs (i.e. contractors and sub-contractors) are subject to VAT.

VAT is recovered through domestic sales. A 19% VAT rate is applied to all domestic sales and is applied against the VAT receivable. Companies cannot recover more VAT in any period than the amount accounted for as being receivable.

**24.8.4 Government Mining Royalties**

Mining royalties are charged on revenues net of refining, smelting, transportation, and general selling charges. Mining royalties are escalated in the following manner:

1% on the first \$60 million of net revenues

2% on net revenues from \$60 million to \$120 million

3% on net revenues above \$120 million

Government mining royalties are income tax deductible. There are no private royalties payable.

**24.8.5 Voluntary Contributions**

Voluntary contributions are paid into two separate mine funds: local and regional funds. The contributions calculations are based on after tax net income. The following are the rates on the two funds:

Local mining fund: 2% of after tax net income minus mining royalties.

Regional mining fund: 1% of after tax net income.

## 24.9 Capital and Operating Costs

### 24.9.1 Capital Expenditures

During 2006, capital expenditures were approximately \$1.9 million and consisted of:

1. equipment replacement and improvements totalling \$0.5 million;
2. mine development and deepening to the 400 level totalling \$0.5 million; and
3. definition drilling in the north zone of the mine totalling \$0.9 million.

Table 24-7 is a summary of the capital expenditures forecasted in the life of mine plan. Highlights of the 2007 capital budget consist of:

1. \$1.7 million for mine development and equipment;
2. \$0.9 million for mine equipment; and
3. \$1.0 million for expansion of the Santa Catalina tailings dam.

#### **Table 24-7: Life of Mine projected capital expenditures.**

LOM SUMMARY OF CAPITAL EXPENDITURES (in \$ 000s)

Area	2007	2008	2009	2010	2011
Geology	\$ 25	\$ 691	\$ 300	\$ 100	\$ 0
Mine	\$ 1,656	\$ 2,423	\$ 500	\$ 250	\$ 50
Plant	\$ 187	\$ 113	\$ 24	\$ 15	\$ 0
Maintenance	\$ 889	\$ 1,156	\$ 500	\$ 250	\$ 0
Safety & Environment	\$ 100	\$ 541	\$ 564	\$ 1,184	\$ 50
Other	\$ 1,601	\$ 352	\$ 190	\$ 50	\$ 0
Total	\$ 4,458	\$ 5,274	\$ 2,078	\$ 1,849	\$ 100

**24.9.2 Operating Costs**

Operating costs as accounted by the mine's certified accountant for the year-to-date as of the end of August 2007 is shown in the table below.

**Table 24-8: Accounting summary of 2007 operating cost to the end of August.**

	<b>BUDGET</b>	<b>ACTUAL</b>	<b>DIFF</b>	<b>VAR</b>
Tonnes Milled	250,688	238,862	(11,826)	-4.7%
<b>Net Smelter Return</b>				
Zinc Concentrate	\$ 10,493,288	\$ 9,242,357	\$ (1,250,931)	-11.9%
Lead Concentrate	\$ 3,868,481	\$ 5,738,816	\$ 1,870,335	48.3%
Copper Concentrate	\$ 9,703,583	\$ 13,051,165	\$ 3,347,583	34.5%
Unbudgeted Tenders	\$ 0	\$ 0	\$ 0	0.0%
Mining Royalties	\$ (240,654)	\$ (300,412)	\$ (59,759)	24.8%
<b>Total NSR</b>	<b>\$ 23,824,698</b>	<b>\$ 27,731,926</b>	<b>\$ 3,907,228</b>	<b>16.4%</b>
<b>Costs</b>				
Mine	\$ 5,548,402	\$ 6,408,728	\$ (860,326)	-15.5%
Processing	\$ 804,053	\$ 889,664	\$ (85,611)	-10.6%
Water Treatment Plant	\$ 709,837	\$ 774,851	\$ (65,015)	-9.2%
Planning & Engineering	\$ 155,276	\$ 169,667	\$ (14,391)	-9.3%
Geology	\$ 287,084	\$ 364,744	\$ (77,660)	-27.1%
Safety & Environment	\$ 395,150	\$ 405,921	\$ (10,771)	-2.7%
Maintenance	\$ 1,360,617	\$ 1,393,388	\$ (32,771)	-2.4%
Electric System	\$ 1,329,510	\$ 1,335,586	\$ (6,076)	-0.5%
Camp Administration	\$ 2,057,477	\$ 2,229,860	\$ (172,384)	-8.4%
<b>Production Costs</b>	<b>\$ 12,647,405</b>	<b>\$ 13,972,409</b>	<b>\$ (1,325,005)</b>	<b>-10.5%</b>
Transaction Costs	\$ 117,191	\$ 120,521	\$ (3,330)	-2.8%
Mining Concessions	\$ 12,800	\$ 4,207	\$ 8,593	67.1%
Admin, insurance & Legal Costs	\$ 490,555	\$ 407,810	\$ 82,745	16.9%
Shipping & Selling	\$ 434,760	\$ 656,562	\$ (221,802)	-51.0%
Ocean Freight	\$ 96,000	\$ 55,670	\$ 40,330	42.0%
Management Fee Peru	\$ 683,948	\$ 670,451	\$ 13,497	2.0%
Management Fee Canada	\$ 0	\$ 95,571	\$ (95,571)	0.0%
<b>Operations Costs</b>	<b>\$ 14,482,659</b>	<b>\$ 15,983,202</b>	<b>\$ (1,500,543)</b>	<b>-10.4%</b>
<b>Production Basis Margin</b>	<b>\$ 9,342,039</b>	<b>\$ 11,748,724</b>	<b>\$ 2,406,685</b>	<b>25.8%</b>
Miscellaneous Costs	\$ 160,000	\$ 348,869	\$ (188,869)	-118.0%
Capital Spending	\$ 2,972,150	\$ 1,652,620	\$ 1,319,530	44.4%
Reclamation Expenditures	\$ 209,703	\$ 297,240	\$ (87,537)	-41.7%
<b>Margin</b>	<b>\$ 6,000,186</b>	<b>\$ 9,449,995</b>	<b>\$ 3,449,809</b>	<b>57.5%</b>

**Unit Metrics**

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NSR per tonne	\$ 95.04	\$ 116.10	\$ 21.06	22.2%
Total cost per tonne	\$ 57.77	\$ 66.91	\$ (9.14)	-15.8%

**Margin per tonne** \$ 37.27 \$ 49.19 \$ 11.92 32.0%

The current life of mine plan extends to 2011 and is based on the costs listed in Table 24-4. These estimated costs are projected from historical costs and are subject to change.

In 2007, the Sol has strengthened against the United States Dollar ( USD ). A portion of the operating expenditures such as mine site labour are in Soles. This has caused the operating costs which are reported in USD to increase. These operating costs might continue to increase if the Sol continues to strengthen. PAS has assumed that the Sol will remain near its current levels of 3 Soles per USD throughout the LOM plan.

PAS has assumed that there will be a 5% increase in labour, contractor and material costs in 2008 and that there will be no cost increases thereafter. This is normal practice for evaluating projects where the metal prices are assumed to be flat throughout the LOM plan, and where capital investments made in the mine will provide productivity increases that are not otherwise accounted for.

**Table 24-9: Operating cost estimates for Life of Mine Plan.**

**FORECASTED OPERATING COSTS**

<b>Unit Costs per tonne</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Mine	\$ 22.70	\$ 23.95	\$ 24.30	\$ 24.27	\$ 24.30
Processing	\$ 3.30	\$ 3.69	\$ 3.72	\$ 3.70	\$ 3.73
Water Treatment Plant	\$ 2.64	\$ 3.35	\$ 3.46	\$ 3.43	\$ 3.46
Planning & Engineering	\$ 0.64	\$ 0.67	\$ 0.70	\$ 0.67	\$ 0.70
Geology	\$ 1.18	\$ 1.46	\$ 1.51	\$ 1.48	\$ 1.51
Safety & Environment	\$ 1.62	\$ 1.61	\$ 1.66	\$ 1.64	\$ 1.67
Maintenance	\$ 5.58	\$ 5.90	\$ 5.96	\$ 5.93	\$ 5.96
Electric System	\$ 5.48	\$ 5.32	\$ 5.49	\$ 5.46	\$ 5.50
Camp Administration	\$ 8.38	\$ 8.85	\$ 9.13	\$ 9.11	\$ 9.14
Inventory Variations	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
<b>Production Costs</b>	\$ 51.51	\$ 54.79	\$ 55.93	\$ 55.69	\$ 55.98
Transaction Costs	\$ 0.48	\$ 0.49	\$ 0.51	\$ 0.51	\$ 0.51
Mining Concessions	\$ 0.05	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Administrative Insurance+Legal	\$ 2.01	\$ 1.64	\$ 1.69	\$ 1.69	\$ 1.69
Management Fee Peru	\$ 1.78	\$ 2.90	\$ 3.00	\$ 3.00	\$ 3.00
Management Fee Canada	\$ 0.39	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Shipping & Selling	\$ 2.82	\$ 2.70	\$ 2.73	\$ 2.73	\$ 2.73
Ocean Freight	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
<b>Total Costs</b>	\$ <b>59.05</b>	\$ <b>62.54</b>	\$ <b>63.87</b>	\$ <b>63.63</b>	\$ <b>63.92</b>

#### **24.10 Environmental Considerations Monitoring Program and Inspections**

An environmental monitoring program at the Quiruvilca Mine has been approved by the MEM. The program involves the monthly monitoring of air and water quality at various locations in the vicinity of the mine. The monitoring program includes:

Eight surface water monitoring locations, including;

4 monitoring locations of effluents;

2 monitoring locations within receiving waters; and

2 monitoring locations of water sources; and

Five air quality monitoring locations located within the vicinity of the mine operations.

The results of the monitoring program are reported regularly to MEM. The MEM also carries out inspections of the Quiruvilca Mine, in accordance with their practice at all mining operations in the country, two times per year.

Quiruvilca is in compliance with its environmental permits and there are no outstanding orders.

##### **24.10.1 Closure**

In October 2003, the Peruvian government passed legislation requiring active mining operations to file closure plans within twelve months of the date of passage of the legislation. Administrative rules associated with this legislation which laid out detailed closure requirements, including bonding and tax deductibility of reclamation and rehabilitation expenses, were promulgated in October 2005. These rules required that detailed closure plans and cost estimates be compiled by a certified third party consultant by October 2006.

In September of 2006 PAS submitted a comprehensive closure plan for the Quiruvilca Mine to the MEM in accordance with the ministry's regulations. The closure plan was prepared by third party consultants registered with the Peruvian authorities as qualified to present closure plans to the MEM. The closure plan includes a summary of the proposed closure scheme for each of the major areas of impact such as mine water, tailings areas, waste rock dumps, plant site infrastructure, and underground mines. A detailed cost estimate was prepared based on PAS' and the consultant's shared experience with closure works over the past 12 years at Quiruvilca and experience with other projects in Peru. As required by the ministry the costs were summarized in three phases; concurrent closure, final closure and post closure.

The closure plan has been submitted to MEM and is pending their review. Once reviewed and approved, a financial guarantee will be payable for the final years of operation of the mine. The amount of the guarantee is adjustable based on changes to the mine plan or changes in closure cost estimates. The total estimated cost for the closure plan was \$14.3 million.

This cost estimate serves as the basis for the calculation of the financial guarantee required by the MEM closure plan regulations. In the case where the final closure solution for a specific facility or area of the mining operation was not precisely definable, due to questions of the technical feasibility of different alternatives or the potential for yet evaluated alternatives, a base case cost was estimated for the closure item. This cost estimate was used to avoid any potential over-commitment for the payment of the financial guarantee. For the purpose of the corporate estimate of closure and reclamation costs, the uncertainty of the closure solution was managed with the application of probabilities to potential closure scenarios. The current present value of the closure expenditures included the provision for potentially higher costs for construction of a soil cover over the operating tailings facility and alternative potential solutions for closing the underground mine and post closure mine water treatment. This upside estimate carries a value of \$15.6 million.

For the purpose of financial reporting, PAS has also estimated an Asset Retirement Obligation ( ARO ) of \$20.0 million. The undiscounted, risk free ARO estimate is summarized in the table below.

**Table 24-10: Summary of ARO costs for mine closure plan**

#	Area	Estimated Cost (USD)
1	Closure Plan Design/Permitting	934,243
2	Underground/Open Pit Mine Closure	3,985,619
3	Process Facility Demolition	1,061,975
4	Other On-site Demolition	1,393,376
5	Off-site Infrastructure Demolition/Rehabilitation	0
6	Waste rock Dump Closure/Reclamation	786,797
7	Tailings Impoundment Closure/Reclamation	9,249,641
8	Heap Leach Facility Closure/Reclamation	0
9	Other Surface Contouring/Reclamation	1,024,419
10	Water Treatment System Construction	0
11	Post Closure Water Treatment	1,183,042
12	Post Closure Monitoring	382,700
	<b>Total</b>	<b>20,001,813</b>

The principal areas of uncertainty relating to the final closure of the Quiruvilca Mine are the closure of the underground mine, post closure water treatment requirements and the closure cover for the Santa Catalina tailings impoundment.

Key accomplishments during 2006 related to the environmental management of the mine and development projects include:

- preparation and submittal of closure plans for the Quiruvilca Mine in accordance with the requirement of the MEM s guidelines;

- initiation of the final reclamation of the La Codiciada waste rock pile at the Quiruvilca Mine;

- ongoing treatment of acid mine water effluent at the Quiruvilca Mine; and

- reclamation of small waste rock and tailings areas at the Quiruvilca Mine.



#### **24.11 Economic Analysis**

PAS, like many other precious metals producers, uses methods established by The Gold Institute (Production Cost Standards, Nov. 1999) to calculate costs per ounce of silver produced at mine operations. For each mine, PAS totals all direct mining costs, adds smelting and shipping costs, plus royalties, production-related taxes, interest on loans and mine management / administration costs. From this total operating cost, PAS subtracts the amount received from selling the mine's by-products (zinc, lead, copper, and gold) and divides by the number of payable ounces produced to get the total cash cost per ounce of silver produced. This calculation allows comparison of operational efficiency at a mine relative to its performance in previous years and also allows comparison with peer companies' operations. As well, this cost reflects by-product metal prices. For instance, when zinc prices are low, PAS receives lower by-product revenues from zinc. Subtracting this smaller by-product revenue from total costs yields a higher total cash cost per ounce of silver produced. The total production cost per ounce of silver differs from the total cash cost per ounce of silver in that it includes provisions for depreciation, depletion and amortization ( DD&A ) and reclamation, which are non-cash items on the financial statement and the effect of all other taxes.

The DD&A number is an accounting allowance for the cost to acquire, develop, construct and sustain a mining operation. The reclamation component is an accounting allowance of the estimated cost to reclaim the mine at the end of its life. The bulk of these expenditures occur at the beginning or end of a mine's life but reflect the true total mine cost.

The Net Present Value is \$(5.08) million at a 10% discount rate and is \$(3.16) million at a 15% discount rate. The undiscounted after tax cash flow is \$(11.97) million. The Economic model is presented in Table 24-11.

The reclamation costs that will be incurred between 2012 and 2014 have been included in the sensitivity analysis. Whether the Quiruvilca Mine shuts down its operations earlier or later, these sunk costs would present negative cash flow of \$19.5 million over three consecutive years.

Sensitivity analysis were conducted for variants in metal prices, grade, capital and operating costs.

**Table 24-11: Economic Model**

<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>Metal Price Assumptions</b>							
Silver Price (\$/ounce)	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00
Copper Price (\$/tonne)	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
Lead Price (\$/tonne)	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
Zinc Price (\$/tonne)	\$ 2,100.00	\$ 2,100.00	\$ 2,100.00	\$ 2,100.00	\$ 2,100.00	\$ 2,100.00	\$ 2,100.00
Au Price (\$/ounce)	\$ 525.00	\$ 525.00	\$ 525.00	\$ 525.00	\$ 525.00	\$ 525.00	\$ 525.00
<b>Production</b>							
Tonnes Mined	376,052	364,186	379,600	360,597			
Silver Head Grade (g/t)	159.88	155.49	157.63	158.48			
Copper Head Grade (%)	0.91	0.72	0.65	0.40			
Lead Head Grade (%)	1.04	1.10	1.10	1.27			
Zinc Head Grade (%)	3.35	3.67	3.61	3.44			
Gold Head Grade (g/t)							
Silver Ounces Produced	1,588,966	1,492,940	1,583,241	1,510,286			
Copper Tonnes Produced	2,585	1,911	1,736	1,010			
Lead Tonnes Produced	3,158	3,236	3,369	3,705			
Zinc Tonnes Produced	10,589	11,400	11,674	10,609			
Gold Ounce Produced	1,102	1,014	1,019	577			
<b>Cash Flow Summary</b>							
Total NSR	\$ 33,151	\$ 31,170	\$ 31,304	\$ 27,468			
Total Operating Costs	\$ (23,519)	\$ (23,259)	\$ (24,153)	\$ (23,051)			
Other Costs	\$ (1,066)	\$ (474)	\$ (495)	\$ (102)			
Royalty	\$ (442)	\$ (323)	\$ (326)	\$ (275)			
Reclamation	\$ (1,157)	\$ (1,040)	\$ (783)	\$ (393)	\$ (393)	\$ (393)	
Total Depreciation	\$ (1,730)	\$ (1,675)	\$ (1,746)	\$ (1,659)			
<b>Quiruvilca Pre-Tax</b>							
<b>Income</b>	<b>\$ 5,239</b>	<b>\$ 4,398</b>	<b>\$ 3,801</b>	<b>\$ 1,988</b>	<b>\$ (393)</b>	<b>\$ (393)</b>	
Taxes	\$ (1,629)	\$ (1,511)	\$ (1,613)	\$ (278)			
<b>Net Income (Loss) After</b>							
<b>Taxes</b>	<b>\$ 3,610</b>	<b>\$ 2,887</b>	<b>\$ 2,187</b>	<b>\$ 1,710</b>	<b>\$ (393)</b>	<b>\$ (393)</b>	
Add Back Depreciation	\$ 1,730	\$ 1,675	\$ 1,746	\$ 1,659			
Total Changes Working							
Capital	\$ 0	\$ 0	\$ 0	\$ 0	\$ (811)	\$ (950)	\$ (1,301)
Reclamation							
Provision-Expenditures	\$ 407	\$ 221	\$ 783	\$ (2,107)	\$ (3,877)	\$ (4,607)	\$ (6,845)
Capital Costs	\$ (5,274)	\$ (2,078)	\$ (1,849)	\$ (100)			

<b>Projected Cash Flows</b>	\$	<b>472</b>	\$	<b>2,706</b>	\$	<b>2,868</b>	\$	<b>1,162</b>	\$	<b>(5,081)</b>	\$	<b>(5,950)</b>	\$	<b>(8,146)</b>
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**Financial Metrics**

Payable Silver Ounces	1,449,189	1,351,361	1,435,820	1,371,410
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Cash Cost per Payable

Ounce	\$	2.65	\$	3.39	\$	4.25	\$	5.98
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Non-Cash Cost per

Payable Ounce	\$	1.99	\$	2.01	\$	1.76	\$	1.50
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**Total cost per Payable**

Ounce	\$	<b>4.65</b>	\$	<b>5.39</b>	\$	<b>6.01</b>	\$	<b>7.48</b>
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NSR per Tonne	\$	86.98	\$	84.70	\$	81.61	\$	75.41
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Cost per Tonne	\$	62.54	\$	63.87	\$	63.63	\$	63.92
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<b>Margin</b>	\$	<b>24.44</b>	\$	<b>20.84</b>	\$	<b>17.98</b>	\$	<b>11.49</b>
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**24.11.1 Metal Price Sensitivity**

A table showing the economics of the project over a wide range of metal prices is shown in Table 24-12. Note that the higher metal prices are used for Case 2 and the lower metal prices are used for Case 3. As the date of this report is effective July 31, 2007, the analysis is developed for the period from 2008 to the end of life of mine (2011). Metal price is assumed to be the same for the duration of mine life for each case. The prices have been considerably higher than those used in Case 1; therefore, Martin Wafforn, P.Eng. considers this to be a reasonable assumption.

**Table 24-12: Metal Price Sensitivity**

Metal Prices	Case #1	Case #2	Case #3
Silver \$/Ounce	\$ 9.00	\$ 11.00	\$ 6.50
Lead \$/Tonne	\$ 1,000.00	\$ 1,700.00	\$ 600.00
Copper \$/Tonne	\$ 5,000.00	\$ 6,000.00	\$ 3,500.00
Zinc \$/Tonne	\$ 2,100.00	\$ 2,100.00	\$ 1,500.00
Gold \$/Ounce	\$ 525.00	\$ 600.00	\$ 450.00
NPV (Discount Rate) (x \$1000)	Case #1	Case #2	Case #3
NPV 0%	\$ (11,970)	\$ 2,401	\$ (44,813)
NPV 10%	\$ (5,080)	\$ 6,399	\$ (31,126)
NPV 15%	\$ (3,155)	\$ 7,223	\$ (26,624)

**24.11.2 Grade Sensitivity**

In order to test the sensitivity of the project to the grade of the mineral reserves, the estimated head grade for each metal and for each year of operation was multiplied by factors of 100% (the base case presented in Table 24-13), 75%, 90%, 110%, and 125%. The cash flow and financial metrics for each case were then recalculated and are shown in Table 24-8. Martin Wafforn, P.Eng. concludes that the economics of the project are very sensitive where after a 9% reduction in the estimated head grades the NPV is equal to \$0.00.

**Table 24-13: Metal Grade Sensitivity**

Metal Grade (x \$1000)	100% (Base Case)	75%	90%	110%	125%
NPV 0%	\$ (11,970)	\$ (35,574)	\$ (20,299)	\$ (4,287)	\$ 7,239
NPV 10%	\$ (5,080)	\$ (23,751)	\$ (11,654)	\$ 1,045	\$ 10,240
NPV 15%	\$ (3,155)	\$ (19,958)	\$ (9,065)	\$ 2,377	\$ 10,684

**24.11.3 Capital Cost Sensitivity**

The economics of the Quiruvilca Mine are not sensitive to changes in capital cost up to the limits of the engineering estimate that is plus or minus 25%.

**Table 24-14: Capital Cost Sensitivity**

Capital Cost (x \$1000)	100% (Base Case)	75%	90%	110%	125%
NPV 0%	\$ (11,970)	\$ (9,644)	\$ (11,040)	\$ (12,900)	\$ (14,295)
NPV 10%	\$ (5,080)	\$ (3,088)	\$ (4,283)	\$ (5,877)	\$ (7,073)
NPV 15%	\$ (3,155)	\$ (1,297)	\$ (2,412)	\$ (3,898)	\$ (5,012)

The Quiruvilca Mine is currently operating at its full production rate and requires capital investments to sustain its operations. The capital costs are accounted for within the LOM plan and are shown in Table 24-7. As these capital costs are scheduled amounts, the pay back period for these costs are irrelevant, as the annual cash flows are positive and are capable of paying for the incurred capital expenditures.

**24.11.4 Operating Cost Sensitivity**

The economics of the project to variances in operating costs were calculated in a similar manner. This calculation further demonstrates that the economics of the project are highly sensitive to variance in operating costs. If operating costs increase by 12% the NPV would be equal to \$0.00.

**Table 24-15: Operating Cost Sensitivity**

Operating Cost (x \$1000)	100% (Base Case)	75%	90%	110%	125%
NPV 0%	\$ (11,970)	\$ 2,972	\$ (5,993)	\$ (18,403)	\$ (28,794)
NPV 10%	\$ (5,080)	\$ 6,763	\$ (343)	\$ (10,130)	\$ (18,237)
NPV 15%	\$ (3,155)	\$ 7,513	\$ 1,112	\$ (7,683)	\$ (14,933)

**24.12 Mine Life**

PAS completed the Quiruvilca life of mine plan. Martin Wafforn, P.Eng., who is an author of this Technical Report has reviewed and determined in his professional judgment that the mine plan discussed in this Section 25 is sound and recommends that this mine plan should be adopted. The plan is based on providing 1,050 TPD of ore to the mill by mid 2008 and ramp down to 775 TPD by 2011. This life of mine plan does not include any inferred mineral resources. All of the proven and probable mineral reserves totalling 1.48 million tonnes grading 163 g/t silver, 0.68 % copper, 1.15 % lead, 3.62 % zinc, and 0.36 % gold are planned to be mined over a mine life that extends to 2011. The mine plan does not include any measure or indicated mineral resources estimated at 5.26 million tonnes. The mine plan also does not include any of the inferred resources or possible mineral reserve additions that may occur in the future through exploration.

**25. Date and Signature Page**

The information in this report is current as of July 31, 2007. Operation data such as costs and recovery are more current, as it was made available during the time frame between the mineral resource and reserve estimate and the period taken to prepare this Technical Report.

This report has been prepared by Martin G. Wafforn, P. Eng. and Dr. Michael Steinmann, P. Geo. each of whom are Qualified Persons.

Respectfully submitted this 29th day of January 2008.

Martin Wafforn

Signature and seal of Qualified Person

Martin Wafforn, P.Eng.

Print Name of Qualified Person

Michael Steinmann

Signature and seal of Qualified Person

Michael Steinmann, P.Geo., Ph.D.

Print Name of Qualified Person

**26. Illustrations**

























































































































**CERTIFICATE OF QUALIFIED PERSON**

I, Martin Wafforn, P.Eng, of Pan American Silver Corp., 1500-625 Howe St., Vancouver, British Columbia, Canada V6C 2T6, do hereby certify that:

1. I graduated with a degree in Bachelor s of Science in Mining from Camborne School of Mines in Cornwall, England in 1980.
2. I am a Professional Engineer in good standing in the Province of British Columbia in the areas of Mining engineering. I am a Chartered Engineer in good standing in the United Kingdom.
3. I am currently employed as Vice President of Mine Engineering for Pan American Silver Corp. and by reason of my employment, am not independent of Pan American Silver Corp. as described in section 1.4 of National Instrument 43-101 ( NI 43-101 ).
4. I have worked as an engineer in the mining industry for a total of twenty six years since my graduation from Camborne School of Mines.
5. I have read the definition of qualified person set out in 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. Pan American Silver Corp. is a producing issuer as defined in NI 43-101.
7. I visited the Quiruvilca mine site from September 15 to September 16, 2007. I am responsible for sections 1, 2, 3, 4, 5, 6, 7, 8, 17, 18, 20, 21, 22, 23, 24 and 25 of the report entitled Technical Report for the Quiruvilca Property, La Libertad, Peru dated effective July 31, 2007 (the Technical Report ) and for all figures, tables, and graphs within those sections of the Technical Report.
8. I am co-author of the Technical Report dated effective July 31, 2007.
9. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101.
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 be disclosed to make the Technical Report not misleading.

Dated the 28th day of January, 2008.

Martin G. Wafforn

Signature and Seal of Qualified Person

Martin G. Wafforn, P.Eng.

**CONSENT OF QUALIFIED PERSON**

TO: British Columbia Securities Commission

Alberta Securities Commission

Saskatchewan Financial Services Commission

The Manitoba Securities Commission

Ontario Securities Commission

Autorité des marchés financiers

New Brunswick Securities Commission

Securities Commission of Newfoundland & Labrador

Nova Scotia Securities Commission

Registrar of Securities, Prince Edward Island

Government of the Northwest Territories, Department of Justice, Securities Registry

Nunavut Legal Registries

Registrar of Securities, Government of the Yukon Territories

I, Martin Wafforn, P.Eng. do hereby consent to the filing with the regulatory authorities referred to above of the technical report titled Technical Report for the Quiruvilca Property, La Libertad, Peru dated effective July 31, 2007 (the Technical Report ).

No additional written disclosure will be filed with the Technical Report.

Dated the 28th day of January, 2008.

Martin Wafforn

Signature and Seal of Qualified Person

Martin Wafforn, P. Eng.

**CERTIFICATE OF QUALIFIED PERSON**

I, Dr. Michael Steinmann, P.Geo., Ph.D., of Pan American Silver Corp., 1500-625 Howe St., Vancouver, B.C., Canada V6C 2T6, do hereby certify that:

1. I graduated with a degree in Master of Science in Geology from the University of Zurich in 1993. In addition, I earned a Doctor of Natural Science in Geology from the Swiss Federal Institute of Technology, Zurich, Switzerland.
2. I am a Professional Geoscientist in good standing in the Province of British Columbia in the areas of mining geology and exploration.
3. I have worked as a geologist for a total of fourteen years since my graduation from the University of Zurich.
4. 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 and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of the NI 43-101.
5. I am currently employed as Senior Vice President of Exploration and Geology for Pan American Silver Corp. and by reason of my employment, am not independent of Pan American Silver Corp. as described in section 1.4 of NI 43-101.
6. Pan American Silver Corp. is a "producing issuer" as defined in NI 43-101.
7. I visited the Quiruvilca Mine site from September 15, 2007 to September 16, 2007. I am responsible for sections 1,2,3,4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 19, 21, 22, 23 and 24 of the report entitled "Technical Report for the Quiruvilca Property, La Libertad, Peru" dated effective July 31, 2007 (the "Technical Report" ) and for figures, tables, and graphs contained in sections 9, 10, 11, 12, 13, 14, 15, and 19 of the Technical Report.
8. I am co-author of the Technical Report dated effective July 31, 2007.
9. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101.
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 be disclosed to make the Technical Report not misleading.

Dated the 28th day of January, 2008.

Michael Steinmann

Signature and Seal of Qualified Person

Michael Steinmann, P.Geo., Ph.D.

**CONSENT OF QUALIFIED PERSON**

TO: British Columbia Securities Commission

Alberta Securities Commission

Saskatchewan Financial Services Commission

The Manitoba Securities Commission

Ontario Securities Commission

Autorité des marchés financiers

New Brunswick Securities Commission

Securities Commission of Newfoundland & Labrador

Nova Scotia Securities Commission

Registrar of Securities, Prince Edward Island

Government of Northwest Territories, Department of Justice, Securities Registry

Nunavut Legal Registries

Registrar of Securities, Government of the Yukon Territory

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No additional written disclosure will be filed with the Technical Report.

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Michael Steinmann

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Michael Steinmann, P.Geo., Ph.D.