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FORM 6-K

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For the month of, February **2014**
Commission File Number 000-13727

Pan American Silver Corp.
(Translation of registrant's name into English)

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(Address of principal executive offices)

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DOCUMENTS INCLUDED AS PART OF THIS REPORT

Document	
1	Pan American Silver Corp.,TECHNICAL REPORT, PRELIMINARY ECONOMIC ANALYSIS FOR THE EXPANSION OF THE LA COLORADA MINE, ZACATECAS, MÉXICO.

Document 1

TECHNICAL REPORT

PRELIMINARY ECONOMIC ANALYSIS FOR THE EXPANSION OF THE

LA COLORADA MINE

ZACATECAS, MÉXICO

Effective Date: December 31, 2013

PREPARED BY:

Michael Steinmann, P.Geo

Martin Wafforn, P.Eng

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1.0 SUMMARY

This Technical Report refers to a Preliminary Economic Assessment (PEA) of the expansion of the La Colorada silver mine in Zacatecas, Mexico owned by Pan American Silver Corp.

1.1. Expansion Project

La Colorada's expansion project is envisaged to be built progressively, ramping up from the mining and processing rates of 1,228 tonnes per day (tpd) in 2013 to 1,800 tpd by the end of 2017. Once the expansion is complete, the PEA estimates that La Colorada's annual production capacity will grow 64% to approximately 7.7 million ounces of silver in 2018.

The mine's expansion will require the construction of new mining infrastructure, the development of new mining zones to reach deeper mineralization and the expansion of the sulphide ore processing plant. A new 600-metre deep bore hole shaft is planned between the main Candelaria area that contains the NC2 and HW veins, and the Estrella area that contains the Amolillo vein. The new shaft, which over the long term would be required whether or not the expansion project proceeds, will increase hoisting capacity to 2,300 tpd, accommodating ore and waste extraction as well as serving as the main access to working areas for mine personnel and materials. Preliminary engineering work for the new shaft and hoist has already been conducted and detailed engineering is recommended to begin in early 2014. Construction of the new shaft would then start early in 2015, following completion of sufficient underground development around the shaft bottom, and commissioning would follow in the second half of 2016. The shaft and associated hoisting equipment will be designed such that it can be deepened in the future if justified by future exploration success.

Mining at both the Estrella and Candelaria areas will continue utilizing the cut-and-fill methods currently being successfully employed. The capacity of the ventilation and dewatering systems will be increased to handle the mine's hot and wet ground conditions as mining operations extend at depth. The expansion plan also includes the addition of 22 new pieces of mining equipment to the fleet and the hiring of over 100 additional mining personnel.

Total throughput at La Colorada's processing plants will progressively increase from today's 1,228 tpd to 1,800 tpd by the end of 2017. The mine currently produces doré bars from a conventional cyanide leach plant for the oxide ore, and silver-rich lead and zinc concentrates from a floatation plant that treats the sulphide ore. Both circuits currently share a single crushing plant. While the oxide plant will not be modified due to La Colorada's oxide production remaining at current levels for the rest of the mine's life, the sulphide plant will be expanded to treat the increased sulphide ore feed.

Expansion of the sulphide plant to 1,500 tpd will be implemented through the installation of a new crusher and grinding mill. The existing zinc flotation cells will be converted to lead floatation and a new zinc floatation circuit will be built. The plan also includes an upgrade and expansion of the plant's dewatering circuits and installation of a new 115 kV power line connection to the national grid replacing the existing 33 kV lines. Work on the plant's expansion will commence in early 2015 and is scheduled to be completed by mid-2016.

The total incremental expansion capital over the next 4 years has been estimated at $80 million, the majority of which is expected to be spent from 2014 to 2016. The sulphide plant expansion, additional mining equipment and accelerated development, plus several important infrastructure upgrades account for the largest portion of the incremental capital for the project. The economic analysis assumes that the expansion project can be completed without materially disrupting the current operation or ongoing exploration efforts.

Total capital that would be required to be invested at La Colorada over the next four years is estimated at $163.8 million (excluding exploration), for both ongoing operations and the expansion project, as shown in Table 1:

Table 1: Capital Investment

Area ($ Million)	2014	2015	2016	2017	2014-2017 LOM + Expansion Capital	2014-2017 Expansion Capital Only
Major Projects						
Shaft & Hoist Installation	$8.8	$23.0	$8.5	—	$ 40.3	—
Plant Expansion	$3.6	$33.6	$8.7	—	$ 46.0	$ 46.0
Infrastructure Upgrades	$6.5	$9.4	$0.1	—	$ 16.1	$ 11.9
Underground Development	$2.0	$2.6	$2.1	$1.7	$ 8.4	$ 4.8
Additional Mine Equipment	—	$4.1	—	$4.1	$ 8.3	$ 8.3
Initial Sulphide Tailings Expansion	$5.0	—	—	—	$ 5.0	—
Project Indirects	$2.3	$5.8	$4.9	—	$ 12.9	$ 5.2
Sub Total Projects	$28.2	$78.6	$24.4	$5.8	$ 137.0	$ 76.1
Other Capital						
Normal Mine and Plant Sustaining Capital	$5.8	$3.8	$5.2	$5.5	$ 20.3	$ (0.3)
Ongoing Tailings Dam Expansions	—	—	—	$6.6	$ 6.6	$ 4.2
Sub-total Other Capital	$5.8	$3.8	$5.2	$12.1	$ 26.9	$ 3.9
Total Capital	$34.0	$82.3	$29.6	$17.9	$ 163.8	$ 80.0

The economics analysis for the PEA of the La Colorada expansion demonstrates that the project has the potential to be robust at current prices. Assuming a long term silver price of $19 per ounce, and prices of $1,850 per tonne of zinc and $2,100 per tonne of lead, the expanded mine has the potential to generate estimated net revenues of $1.4 billion and after tax, undiscounted net cash flow of $372 million over the next 10-years 2014 through 2023, including the new Mexican mining taxes. The PEA estimates an after tax net present value (NPV) of $38.6 million at a 10% discount rate, an estimated internal rate of return (IRR) of 22% and an estimated payback period of 2.5 years. Using the long term silver price assumption of $22 per ounce that this Technical Report is based on, and prices of $1,850 per tonne of zinc and $1,950 of lead (base case), the expansion project's economic potential for the next 10 years becomes even more attractive with an estimated NPV of $54.1 million at a 10% discount rate, an estimated IRR of 27% and an

estimated payback period of 2.2 years as shown in Table 2.

Table 2: NPV and Payback

Metal Price Assumptions	**Base Case**		
Ag Price - $ Toz	$19.00	$22.00	$25.00
Zn Price - $ DMT	$1,850	$1,850	$1,850
Pb Price - $ DMT	$2,100	$1,950	$2,100
Au Price - $ Toz	$1,200	$1,300	$1,200
Ten-Year Comparison (2014 - 2023)			
Net Revenue (US$M)	$1,443	$1,624	$1,817
Undiscounted Net Cash Flow (US$M)	$372	$489	$614
Total Mine 10% NPV (US$M)	$196	$272	$354
Expansion 10% NPV (US$M)*	$38.6	$54.1	$71.7
IRR	23 %	27 %	32 %
Payback Period (years)	2.5	2.2	2.0
Life of Mine (2014 - 2027)			
Net Revenue (US$M)	$1,925	$2,167	$2,426
Undiscounted Net Cash Flow (US$M)	$510	$666	$834
Total Mine 10% NPV (US$M)	$243	$333	$429
Expansion 10% NPV (US$M)*	$25.8	$36.1	$47.6
IRR	22 %	27 %	32 %
Payback Period (years)	2.5	2.2	2.0

* Expansion 10% NPV is calculated based on the differential cash flow from expanding the mine versus status quo operation assuming the same tonnes and grade are mined

The PEA mine plan is based on La Colorado’s estimated mineral reserves and resources as of December 31, 2012 adjusted for production information available as of mid-2013. The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the results of the PEA, including the expanded mine plan, capital and operating cost estimates and economic evaluation, will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

The updated mineral reserves and mineral resources as of 31 December, 2013 are presented in this report.

The expansion plan contemplates production down to the 740 level in the East side of the Candelaria area, over 200 meters below the current deepest 528 mining level and down to the 610 level of the Amolillo vein, nearly 250 meters

below the current deepest 365 mining level. Currently the deepest positive drill hole in the Candelaria area intercepted ore-grade mineralization down to the 1,010 level, over 270 metres below the deepest level designed in the expanded mine plan and down to the 735 level of the Amolillo structure (125 metres below the deepest level designed in the expanded mine plan).

1.2. Property Description and Ownership

Information in this section was excerpted and updated from Sharp, et.al. 2007.

The La Colorada mine is located in Chalchihuites district, Zacatecas State, Mexico, approximately 99 km south of the city of Durango and 156 km northwest of the city of Zacatecas. Figure 1 shows the La Colorada location, general co-ordinates: longitude 23°22'N and latitude 103°45'W.The La Colorada mine-site is accessible by road approximately 2½ hours southeast of the city of Durango. The road consists of 120 km of a paved two-lane highway (Highway 45), and 23 km of public, all weather gravel road. The access from Zacatecas takes approximately the same time on similar types of roads. Durango and Zacatecas are serviced by daily flights from México City, other major centers in México and direct flights from some cities in the United States.

Figure 1: La Colorada Location (La Colorada Geology Department, 2012)

The La Colorada property was acquired by Pan American Silver Corp. ("PAS") in April 1998, through its wholly owned Mexican subsidiary Plata Pan Americana S.A. de C.V. ("Plata"), following the 1997-98 exploration program while the property was under option. The La Colorada property is comprised of 56 claims (7 awaiting title) totalling 8,395 ha. In addition, PAS also has control over approximately 571 ha of surface rights covering the main workings, namely the Candelaria, Campaña, Recompensa and Estrella mines.

1.3. Geology and Mineralization

Information in this section was excerpted and updated from Sharp, et.al. 2007.

The La Colorada property is located on the eastern flanks of the Sierra Madre Occidental at the contact between the Lower Volcanic Complex and the Upper Volcanic Complex Supergroups. The La Colorada property lies 16 km southeast of Chalchihuites and 30 km south-southwest of Sombrerete, two mining camps with significant silver and base metal production from veins and associated skarn deposits (San Martin and Sabinas mines).

The oldest rocks exposed in the mine area are Cretaceous carbonates and calcareous clastic rocks of the Cuesta del Cura and Indidura formations. Overlying the calcareous rocks is a conglomerate unit containing clasts derived mostly from the subadjacent sedimentary rocks. In the Chalchihuites district this unit is called the Ahuichila formation and is of early Tertiary age.

Most of the outcrop in the mine area is represented by altered dacite, an intermediate to felsic volcanic rock type of the regional Lower Volcanic Complex. There are several subgroups within this unit, including plagioclase porphyry, crystal to crystal-lapilli tuffs, and volcanic breccias. Generally these sub-units are too small to map.

East to northeast striking faults form the dominant structures in the project area and control mineralization. Most of these faults dip from moderately to steeply to the south and juxtapose younger hangingwall strata against older footwall rocks. Evidence suggests down-dip motion on these faults; however, most of the faults were reactivated at some point so the movement direction during the initial formation is uncertain. Stratigraphic contacts are displaced from ten to over a hundred metres lower on down-dropped blocks.

The mineralized veins at La Colorada contain both oxide and sulphide material. The depth below surface and the permeability of the mineralized zone controls the level of oxidation in the veins. The most common sulphide minerals are galena, sphalerite, tetrahedrite, argentite, and pyrite.

1.4. Status of Exploration

The initial exploration program of PAS was completed between September 1997 and March 1998 to evaluate potential while the property was under an option agreement. With the encouraging results of that program, the decision was made to acquire the mine, which was completed in 1998.

A total of 230,218 m of exploration drilling (1,209 drill holes) has been completed by PAS between 1997 and 2013. For 2014 the exploration program is budgeted for 36,300 m of combined surface and underground diamond drilling. This program's objectives are to increase the confidence of the geological and grade continuity by infill drilling on known structures in order to upgrade inferred mineral resources to indicated mineral resources or measured mineral resources, outlining of new inferred mineral resources, and testing the main structures at depth.

1.5. Development and Operations

During 2013, the mine produced an average 418 tonnes per day (tpd) of oxide ore and 810 tpd of sulphide ore. Each type of ore is processed through separate circuits which share a single crushing plant. The mining method used is overhand cut and fill. Stoping is undertaken with hand held drills using horizontal drilling for safety reasons in oxides and vertical drilling in the more competent sulphide ore. Back fill comprises either broken waste rock or hydraulic tailings.

Development mining is either by hand held drill or electric hydraulic jumbo drill depending on the size of the excavation required. The mine currently has approximately two years of ore development ahead of stoping. This provides flexibility for planning, and scheduling.

Mine production has increased steadily as a result of increased sulphide ore production. Over the course of the last 5 years the overall production rate has increased from 890 tpd to 1,228 tpd as a result of sulphide ore production being doubled while the oxide ore production has declined slightly (475 tpd to 418 tpd). During this period of mine production growth, the mineral resources and mineral reserves have grown rapidly.

The maximum capacity of the mine in its existing configuration has now been reached and further increases to the mine production rate will require significant upgrades to the mine plant and infrastructure. The La Colorada expansion project plans to increase the overall production rate of the mine to 1,500 tpd starting in 2016 and to 1,800 tpd by the end of 2017.

The current El Aguila shaft hoists ore from both the Candelaria and Estrella mines from the 438 level to surface. This is an old shaft that has been deepened a number of times and was initially developed near surface on vein. Near surface historic (pre PAS ownership) stoping operations mined up to the shaft and although it is maintained on a regular basis, PAS took the decision to prohibit personnel transport in the shaft a number of years ago. The El Aguila shaft is currently operating at very close to its maximum capacity and has no capacity for hoisting waste (all development waste is currently used for backfill), or materials.

The existing sulphide and oxide plants share a crushing plant which is currently operating at close to its maximum capacity. The sulphide plant has a conventional flotation flowsheet comprised of crushing, grinding and selective lead and zinc froth flotation circuits to recover precious and base metals into separate lead and zinc concentrates. When PAS acquired the La Colorada property in 1998 the sulphide plant was rated at 120 tpd and produced a lead concentrate only. Since then the flowsheet has been modified to include the production of a zinc concentrate and the

capacity expanded to the current 810 tpd.

1.6. Mineral Resources

Mineral resources at the La Colorada mine at December 31st, 2013 were estimated to be as shown in Table 3. This mineral resource estimate was prepared using metal prices of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc, and $1,950 per tonne of lead and was prepared under the supervision of and reviewed by Michael Steinmann, P.Geo., EVP Corporate Development & Geology for PAS, who is a Qualified Person ("QP") as that term is defined in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101").

Table 3: La Colorada Mineral Resources as of December 31, 2013

Measured and Indicated Resources

Category	Tonnes (Mt)	Ag (ppm)	Ag Cont. (Moz)	Au (ppm)	Pb %	Zn %
Oxide Measured	0.2	168	0.8	0.17	N/A	N/A
Sulphide Measured	0.3	161	1.3	0.14	0.64	1.05
Measured Resources	0.4	164	2.2	0.15	0.40	0.65
Oxide Indicated	0.8	232	6.2	0.19	N/A	N/A
Sulphide Indicated	0.8	278	7.6	0.39	1.02	1.64
Indicated Resource	1.7	255	13.8	0.29	0.51	0.83
M&I Oxide	1.0	222	7.0	0.19	N/A	N/A
M&I Sulphide	1.1	251	8.9	0.33	0.93	1.50
Total M&I Resources	2.1	237	16.0	0.26	0.49	0.80

Inferred Resources

Category	Tonnes (Mt)	Ag (ppm)	Ag Cont. (Moz)	Au (ppm)	Pb %	Zn %
Oxide Inferred	0.7	153	3.2	0.17	N/A	N/A
Sulphide Inferred	2.2	298	21.3	0.49	1.74	2.81
Total Inferred Resources	2.9	265	24.5	0.42	1.34	2.17

Notes:

1. CIM definitions were followed for mineral resources
2. Grades are shown as contained metal before mill recoveries are applied.
3. PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.
4. Mineral resources were diluted including minimum vein width of 2.18 m, planned mining dilution, and floor dilution for stope ore.
5. Mineral resources have been estimated using a mining recovery of 85 to 95% (pillars are left in some thicker zones leading to lower mining recovery). Mineral resources were estimated based on the use of cut and fill mining methods.
6. Mineral resources were estimated using the polygonal method on longitudinal sections.
7. Mineral resources were estimated using a price of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc and $1,950 per tonne of lead.
8. There are no known metallurgical, environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues expected to materially affect the estimate of mineral resources.
9. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

1.7. Mineral Reserves

Mineral reserves at the La Colorada mine at December 31st, 2013 were estimated to be as shown in Table 4.

This mineral reserve estimate was prepared using a price of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc, and $1,950 per tonne of lead and was prepared under the supervision of and reviewed by Martin Wafforn, P.Eng., Vice President of Technical Services for PAS who is a QP as that term is defined in NI 43-101.

Table 4: La Colorada Mineral Reserves as of December 31, 2013

Proven and Probable Reserves

Category	Tonnes (Mt)	Ag (ppm)	Ag Cont. (Moz)	Au (ppm)	Pb %	Zn %
Oxide Proven	0.7	350	7.8	0.32	N/A	N/A
Sulphide Proven	1.7	429	23.5	0.30	1.90	3.48
Proven Reserves	2.4	406	31.2	0.31	1.35	2.47
Sulphide Probable	1.3	378	16.2	0.29	N/A	N/A
Oxide Probable	2.8	377	34.0	0.44	1.92	3.47
Probable Reserves	4.1	378	50.2	0.39	1.30	2.35
Oxide Reserves	2.0	369	23.9	0.30	N/A	N/A
Sulphide Reserves	4.5	397	57.5	0.38	1.91	3.47
Total Reserves	6.5	388	81.4	0.36	1.32	2.40

Notes:

1. CIM definitions were followed for mineral reserves.
2. Grades are shown as contained metal before mill recoveries are applied.
3. PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.
4. La Colorada mineral reserves have been estimated at a cut off value per tonne of $116.10 and $126.10 below 600 level for Candelaria oxides, $101.17 and $111.17 below 600 level for Candelaria sulphides, $100.79 for Estrella oxides, $85.82 for Estrella sulphides and $73.84 per tonne in the Recompensa mine (sulphide ore).
5. Mineral resources were diluted including minimum vein width of 2.18 m, planned mining dilution, and floor dilution for stope ore.
6. Mineral reserves were estimated using a mining recovery of 85 to 95% (pillars are left in some thicker zones leading to lower mining recovery). Mineral reserves were estimated based on the use of cut and fill mining methods.
7. Mineral reserves were estimated using the polygonal method on longitudinal sections.
8. Mineral reserves were estimated using a price of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc and $1,950 per tonne of lead.
9. There are no known metallurgical, environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues expected to materially affect the estimate of mineral reserves.

1.8. Qualified Person’s Conclusions and Recommendations

Based on the site visits and reviews the qualified persons draw the following conclusions:

Sampling methods and protocols are consistent with industry standards.

The assaying is done using industry standard methods for the ore types and grades of the deposit.

The geology department has a QA/QC program for assay results, independent from the laboratory.

The geology database is in industry standard software using secure protocols.

There is good understanding of the geology, mineralogy and the deposit model.

Mineral resources are estimated utilizing an acceptable estimation methodology.

The parameters for the conversion of mineral resources to mineral reserves is based on observations at the operating mine and adjusted periodically based on reconciliation results.

Recoveries and cost estimates are based on actual operating data.

The exploration program has been highly successful increasing the estimated mineral reserves from 19.8 million silver ounces as of December 31st, 2005 to 81.4 million as of December 31st, 2013, net of production.

The cost estimates, projections of future production and economic analysis for the Preliminary Economic Analysis (PEA) to expand the La Colorada Mine have been conducted appropriately for this level of study.

The conceptual design, construction schedule and cost estimate for the new shaft and borehole hoisting system was conducted by Cementation Canada Inc. (Cementation), a company based in Ontario with expertise in shaft engineering and construction. The design allows for future deepening if economically justifiable.

The conceptual designs, construction schedules and cost estimates for the sulphide plant expansion, surface infrastructure and tailings dams were conducted by Procesos Mineros Metalurgicos S.A. de C.V. (PROMIMET), a company based in Guanajuato, Mexico with expertise in those areas and with a history of working at the La Colorada mine site.

The conceptual designs, construction schedules and cost estimates for the mine dewatering, mine ventilation, mine development and mining equipment required to develop the resources to depth and expand the mine production rate were conducted by the engineering staff at the La Colorada mine with assistance from PAS corporate technical staff.

As part of the overall expansion project PAS technical staff has subsequently increased the capital cost estimates to include owner’s costs, project indirects and contingencies based on experience constructing other projects in Mexico and other countries.

There are no material issues with the local community or government.

La Colorada mine is certified clean industry by PROFEPA (Mexican federal environmental protection department).

All permits are current.

Recommendations:

Based on the results of the economic analysis presented in this Technical Report, the authors recommend that PAS proceed with the La Colorada Mine expansion project in the following general manner:

Establish an owner’s project team to manage consultants and contractors

Continue to develop the access to the bottom of the planned new shaft location.

Proceed with detailed engineering of the shaft and thereafter the construction. The authors note that the upper part of the existing shaft was developed on vein and that stoping operations were conducted to the shaft. This precludes personnel transport in the existing shaft, precludes further deepening or capacity expansion and increases the risk of extended downtime to the operation. For these reasons the authors recommend that a new shaft be developed regardless of mine expansion.

Proceed with engineering of the sulphide plant and surface infrastructure expansion, finalize the flow sheet and then proceed with basic and detailed engineering, with construction to start in 2015.

Proceed with additional engineering to further define the optimal tailings storage locations and construction designs from an environmental and cost of storage perspective. It is further recommended that an expansion to the sulphide tailings storage facility in 2014 proceed as planned.

That planned expansions to the ventilation circuits are completed in 2014 and that ventilation recommendations are closely followed. It is recommended that further engineering and definition of the dewatering, ventilation, development, and mine equipment requirements are also conducted during 2014. The capital cost of the expansion project over the period 2014 – 2017 is shown in Table 1 and has been estimated to total $137.0 million.

As the engineering progresses, update the capital cost estimates and check the economic viability prior to the start of the plant and infrastructure expansion in 2015.

The mine should consider the benefit to mine planning and mine geology efficiency of changing the resource estimation methodology to three dimensional modelling utilizing commercially available mining/geology software.

Continue with annual near mine exploration program.

1.9. Cautionary Note Regarding Forward-looking Information and Statements

Certain of the statements and information in this Technical Report constitute “forward-looking statements” within the meaning of the United States Private Securities Litigation Reform Act of 1995 and “forward-looking information” within the meaning of applicable Canadian securities laws. All statements, other than statements of historical fact, are forward-looking statements. When used in this Technical Report, the words “estimates”, “expects”, “projects”, “plans”, “contemplates”, “calculates”, “objective”, “potential”, and other similar words and expressions, identify forward-looking statements or information. These forward-looking statements or information relate to, among other things: the future successful development of the La Colorada Mine; the estimates of expected or anticipated economic returns; future production of minerals and mine-life of the La Colorada Mine; future cash costs per ounce of silver; the price of silver and gold; the sufficiency of PAS’ current working capital, anticipated operating cash flow or its ability to raise necessary funds; the accuracy of mineral resource and mineral reserve estimates; estimated production rates for silver

and other payable metals produced at the La Colorada Mine; the cash and total costs of production; the estimate of metallurgical recoveries for silver and gold; the estimate for mining dilution; the estimated cost of and availability of funding necessary for sustaining capital and closure plans; and ongoing or future development plans and capital replacement, improvement or remediation programmes.

These statements reflect current views with respect to future events and are necessarily based upon a number of assumptions and estimates that, while considered reasonable, are inherently subject to significant business, economic, competitive, political and social uncertainties and contingencies. Many factors, both known and unknown, could cause actual results, performance or achievements to be materially different from the results, performance or achievements that are or may be expressed or implied by such forward-looking statements and information contained in this Technical Report and assumptions and estimates have been made based on or related to many of these factors. Such factors include, without limitation: fluctuations in spot and forward markets for silver, gold, base metals and certain other commodities (such as natural gas, fuel oil and electricity); fluctuations in currency markets (such as the Mexican Peso versus the United States Dollar); changes in national and local government, legislation, taxation, controls or regulations and political or economic developments, particularly in Mexico and in Canada; crime risks and hazards associated with the business of mineral exploration, development and mining (including environmental hazards, industrial accidents, unusual or unexpected geological or structural formations, pressures, cave-ins and flooding); development, mining or production plans are delayed or do not succeed for any reason; employee relations; relationships with and claims by local communities and indigenous populations; availability and increasing costs associated with mining inputs and labour; the speculative nature of mineral exploration and development, including the risks of obtaining necessary licenses and permits and the presence of laws and regulations that may impose restrictions on mining; diminishing quantities of grades of mineral reserves as properties are mined; global financial conditions; challenges to, or difficulty in maintaining, title to properties and continued ownership thereof; the actual results of current exploration activities, conclusions of economic evaluations, and changes in the parameters of the La Colorada Mine to deal with unanticipated economic or other factors; escalation of capital and operating costs; increased competition in the mining industry for properties, equipment, qualified personnel, and their costs; and, with respect to PAS, those factors identified under the caption “Risks related to Pan American’s business” in PAS’ most recent Form 40F and annual information form filed with the United States Securities and Exchange Commission and Canadian provincial securities regulatory authorities. Investors are cautioned against attributing undue certainty or reliance on forward-looking statements and information. Although PAS has attempted to identify important factors that could cause actual results to differ materially, there may be other factors that cause results not to be as anticipated, estimated, described, or intended. The companies do not intend, and do not assume any obligation, to update these forward-looking statements or information to reflect changes in assumptions or changes in circumstances or any other events affecting such statements or information, other than as required by applicable law.

1.10. Cautionary Note Regarding Decision to Proceed with Expansion

PAS’s decision to proceed with expansion of the La Colorado mine as described herein is not based on a feasibility study of mineral reserves demonstrating economic and technical viability and as such may be subject to increased uncertainty and risks. The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the results of the PEA, including the expanded mine plan, capital and operating cost estimates and economic evaluation, will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

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2.0 INTRODUCTION

2.1. Purpose and Background

PAS prepared this technical report in accordance with the disclosure requirements of NI 43-101 to support disclosure of the PEA results which evaluated the potential viability of expanding production at the La Colorada Mine. This disclosure includes information of the mine expansion PEA study including mine plan, required upgrades to the infrastructure, updated mineral reserve and resource estimation and reports prepared by external consultants. The increased reserves due to aggressive drilling programs over the last several years have provided an opportunity to increase production which has been justified by the PEA.

The effective date of this Technical Report is 31 December, 2013. The drilling cut-off date for mineral resource estimation was 31 December, 2013. The geological, mining, and economic analyses to prepare the mineral resources and mineral reserve estimates was completed as of 31 December 2013. No new material information has become available between these dates and the signature date given on the certificate of the qualified persons. PAS is a silver mining and exploration company listed on the Toronto Stock Exchange (TSX:PAA) and the NASDAQ exchange (NASDAQ:PAAS).

The PEA mine plan is based on La Colorado's estimated mineral reserves and resources as of December 31, 2012 adjusted for production information available as of mid-2013. The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the results of the PEA, including the expanded mine plan, capital and operating cost estimates and economic evaluation, will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

Unless otherwise stated, all units are metric and currencies are expressed in US dollars ($). All tonnages stated in this Technical Report are dry metric tonnes ("dmt") unless otherwise specified.

2.2. Sources of Information

Data, reports, tables, figures and other information used for the compilation of this Technical Report were obtained from personnel in the PAS offices in Vancouver, British Columbia, the Plata office in Durango, México and from the La Colorada Mine offices in Zacatecas, México unless stated otherwise. This Technical Report is based on work conducted by PAS geologists, engineers and metallurgists, as well as third party consultants retained by PAS.

Specifically, information and data for the mineral resource and mineral reserve estimates were obtained from La Colorada geology department personnel in México and information and data for matters pertaining to metallurgy and processing, cost estimates, environmental and geotechnical investigations, and economic analyses were provided by PAS.

The authors have used the reports and documents listed in section 27 of this Technical Report in the preparation of this Technical Report:

2.3. List of Qualified Persons

Table 5 lists the qualified persons and the sections they are responsible for.

Table 5: List of Qualified Persons

Qualified Person	Section Responsibility
Michael Steinmann	1-12, 14, 20, 23-28
Martin Wafforn	1-5, 13, 15-22, 25-28

2.4. Personal Inspections

Both qualified persons for the preparation of this Technical Report conduct regular site visits to PAS mining operations. Details of the most recent personal inspections are given:

Michael Steinmann last visited the La Colorada mine September 17th to 19th, 2013 to review and support the mine expansion and PEA work being done. His previous visits were January 22nd to the 23rd, 2013 to review the 2012 end of year resource estimate and April 28th to the 29th 2012 to collect information from planning, geology, safety, and plant personnel and to review the exploration programs for 2012.

Martin Wafforn last visited the La Colorada mine on October 25th, 2013 to discuss tailings dam and sulphide plant expansion options. This meeting was followed with meetings in Durango the following day to discuss the mine's operating budget for 2014. Prior visits to the mine in 2013 included from January 22nd to the 23rd to review the 2012 end of year reserve estimate; April 9th to 11th and from September 17th to 19th to work with the mine technical staff on developing plans to expand the mine to efficiently extract the new mineral resources being discovered in the Estrella and Candelaria mines. This work focused on expansions to the mine production areas, hoisting capacity via new shaft development, ventilation capacity and circuit expansion to depth, mine dewatering, sulphide plant expansion, tailings capacity and surface infrastructure requirements. In most cases this meant ensuring that mine staff directed engineering consultants to complete the necessary studies as detailed in this Technical Report.

3.0 RELIANCE ON OTHER EXPERTS

The authors of this Technical Report have not relied upon other experts.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1. Property Location

The La Colorada property holdings in the Chalchihuites mining district are located in Zacatecas State, México, approximately 99 km south of the city of Durango and 156 km north-west of the city of Zacatecas. The La Colorada Mine property general coordinates are longitude 23°22'N and latitude 103°45'W. The La Colorada Mine consists of various mine workings, namely the Candelaria, Campaña, Recompensa and Estrella working areas.

4.2. Mineral Tenure

The La Colorada claim holdings in the Chalchihuites mining district are comprised of 56 mining claims (7 awaiting title) totalling 8,395 ha. The extent of the mineral tenure where the mineral reserves and mineral resources are located and where mining takes place is shown in Figure 2. The claims have been surveyed by a licensed surveyor and filed with Direccion General de Minas government department.

Figure 2: La Colorada Mine Concessions (PAS, 2013)

Table 6 gives details of each claim, including the title number, total hectares, the annual maintenance cost, and the expiration date of each claim.

Table 6: Mining Claims

Claim Name	Title	Hectares	Pesos per Hectare	Total Pesos	Expiration date
Unif Victoria Eugenia	188078	286	125	35,629	21/11/2040
Victoria Eugenia I	204862	23	125	2,909	12/05/2047
Victoria Eugenia II	211166	49	125	6,112	10/04/2050
Victoria Eugenia III	204756	1	125	140	24/04/2047
Victoria Eugenia IV	217627	37	125	4,607	05/08/2052
Marieta	171833	9	125	1,123	14/06/2033
Cruz del Sur	170155	11	125	1,384	16/03/2032
Unificacion Canoas	211969	19	125	2,308	15/03/2023
San Cristobal	170095	10	125	1,247	15/03/2023
Ampl de San Cristobal	170097	29	125	3,633	15/03/2023
Unif el Conjuro	170592	45	125	5,598	01/06/2023
Tepozan Segundo	163260	14	125	1,689	03/09/2028
Ampl Al tepozan	182730	11	125	1,345	15/08/2038
Victoria 2	217628	17	125	2,087	05/08/2052
Victoria 3 Fracc A	217629	459	125	57,296	05/08/2052
Victoria 3 Fracc B	217630	14	125	1,767	05/08/2052
El Real	214498	20	125	2,495	01/10/2051
Nueva Era	214659	30	125	3,707	25/10/2051
La Reforma	218667	136	125	16,912	02/12/2052
Platosa	216290	41	125	5,119	29/04/2052
San Francisco	221728	8	125	967	29/01/2048
Victoria 5	226310	693	71	49,151	05/12/2055
Victoria Eugenia	211587	36	125	4,501	15/06/2050
San Francisco Fracc 1	223953	166	125	20,650	14/03/2055
San Francisco Fracc 2	223952	3	125	416	14/03/2055
La Cruz	211085	9	125	1,062	30/03/2050
Creston	213594	9	125	1,123	17/05/2051
Escalera Fracc 1	N/T	2	0	0	
Escalera Fracc 2	N/T	3	0	0	
Escalera Fracc 3	N/T	2	0	0	
Escalera Fracc 4	N/T	1	0	0	
Escalera Fracc 5	N/T	7	0	0	
Escalera Fracc 6	N/T	6	0	0	
Escalera Fracc 7	N/T	6	0	0	
El Real 2	228945	561	35	19,897	20/02/2057
Melisa	217670	70	125	8,678	05/08/2052
Lizette	221172	23	125	2,917	02/12/2053

Tres Flores	229893	14	35	484	25/06/2057
Fatima 1	233147	241	35	8,551	11/12/2058
Fatima	233977	288	18	5,082	12/05/2059
Fatima Fraccion	234041	0	18	2	21/05/2059
Fatima Fraccion 1	234042	3	18	61	21/05/2059
Fatima Fraccion 2	234043	1	18	14	21/05/2059
Fatima Fraccion 4	234044	1	18	16	21/05/2059
Fatima Fraccion 5	234045	7	18	125	21/05/2059
Fatima Fraccion 6	234046	3	18	49	21/05/2059
Fatima Fraccion 7	234047	0	18	5	21/05/2059
Fatima Fraccion 8	234048	4	18	70	21/05/2059
Jul	232538	25	35	876	25/08/2058
Manto 1	238175	19	9	166	08/08/2061
Manto 2	238757	1	9	7	24/10/2061
Pan Am	233733	4333	18	76,340	24/10/2061
El Cristo	228944	120	35	4,242	20/02/2057
Mississippi	195070	432	125	53,904	24/08/2042
Feryter	192967	38	125	4,780	18/12/2041
Eureka	N/T	1	0	0	
TOTAL		**8,395**		**421,241**	

Note:

[1] The Escalera Fracc 1, Escalera Fracc 2, Escalera Fracc 3, Escalera Fracc 4, Escalera Fracc 5, Escalera Fracc 6 and Escalera Fracc 7 claims are awaiting grant of legal title.

4.3. Nature and Extent of Title

The above listed claims, with the exceptions of the Escalera Fracc group of claims, are wholly owned by PAS through its wholly owned Mexican subsidiary, Plata. Concessions Escalera Fracc 1, 2, 3, 4, 5, 6 and 7 were staked, however, the Direccion General de Minas (DGM), the department of the Mexican Government which issues concessions, has registered these claims under two different names, as listed above and also as Laurita. The DGM will need to decide which of the two valid claims to cancel. These claims are not material to the La Colorada mineral reserves and mineral resources estimate or the mine operation and the decision either way does not affect the mine operation or the current economics of the mine in any way. Eureka is a small claim recently acquired and title number has not yet been assigned.

In addition, Plata also has control over approximately 751 ha of surface rights covering the mine workings, namely the Candelaria, Campaña, Recompensa and Estrella Mines, all of which form part of the La Colorada Mine. The concession Unificada Victoria Eugenia contains all of the mineral resources and mineral reserves, most of the mine workings, part of the mine plant, buildings and offices, the San Fermin Mine portal, the Candelaria Mine portal, the Recompensa Mine portal, the Estrella Mine workings, and the El Aguila shaft.

The Veta Dos portal, and some of the mine workings are located on Victoria 2. Victoria 3 Fraccion B also contains some mine workings. The tailings dam and storage area are located on Victoria 5 and Victoria 3 Fraccion A. The remainder of the mine plant, buildings and offices are located on Victoria 3 Fraccion A.

4.4. Royalties

The Mexican Federal Government has implemented a precious metal royalty beginning in January 2014. The rate is 0.5% on gold and silver revenues. The La Colorada mine is not subject to any other royalties, back-in rights, payments or other agreements and encumbrances known to PAS.

4.5. Environmental Liabilities

An Environmental Impact Statement and risk assessment was authorized by the Mexican federal environmental authority in November of 1999. On November 8, 2010 the authorization was renewed for an additional 5 years effective October 22, 2010. To the best of the authors' knowledge, Plata is currently in compliance with all applicable environmental laws. Known environmental liabilities are associated with mining disturbances. The cost of closure of

the La Colorada Mine is discussed in section 20.4.

4.6. Permits and Agreements

Foreign Trade Services Department

On September 19, 2005, Plata was designated by the Mexican Ministry of Economy as an “ALTEX”, or high level exporting company, and was registered as such with the Mexican Ministry of Economy under Certificate No. 2005/5838. That certificate was last reissued on May 25th, 2012. As an ALTEX, Plata is entitled to carry out importing and exporting activities in relation to its operations and to obtain fiscal benefits and refunds related to such activities.

National Registry of Foreign Investment

To the best of the authors' knowledge, Plata is in compliance with the quarterly and annual filing requirements of this registry.

Federal Labour Delegation

To the best of the authors' knowledge, Plata is in compliance with the requirements of the applicable labour laws of Mexico, and all registrations, as required, for the Federal Labour Delegation, in the State of Zacatecas, have been filed.

Federal Board of Conciliation and Labour Arbitration

To the best of the authors' knowledge, there are no labour lawsuits against Plata.

Real Estate

To the best of the authors' knowledge, title to the concessions held by Plata associated with La Colorada have been registered in the Public Registry of Property of Sombrerete, Zacatecas and are free of any liens or encumbrances.

Ministry of Finance

To the best of the authors' knowledge, all filings with the Mexican Ministry of Finance in respect of income and sales taxes have been made on time and as prescribed.

Mexican Social Security Institute ("IMSS")

To the best of the authors' knowledge, Plata is in compliance with the payment of dues to IMSS in respect of both employer and employee withholdings.

General Management of the Federal Registry of Firearms and Explosives (Secretaria de la Defensa Nacional ("SEDENA")

Plata was granted General Permit (2917-Zacatecas) in 2000 authorizing the purchase, storage and use of explosives subject to Plata continuing to meet permit requirements. This is revalidated on an annual basis; the last permit is effective as of January 1st, 2014. To the best of the authors' knowledge, Plata is in compliance with the monthly reporting requirements of this permit.

Federal Bureau of Environmental Protection (Secretaria de Medio Ambiente y Recursos Naturales: SEMARNAT) and National Ecology Institute (Institutio Nacional de Ecología: Direccion General de Ordenamiento Ecologico e Impacto Ambiental)

Following submission of an environmental impact statement, named the Manifestación de Impacto Ambiental-Modalidad General ("EIS") and environmental risk assessment study, named the Estudio de Riesgo Ambiental Modalidad Análisis de Riesgo, the federal environmental authority granted approval ("the Dictamen") for new project construction under D.O.O.DGOEIA.- 007244 on November 11, 1999. Plata received a second continuation of this permit for a period of 5 year, effective from October 22, 2010.

National Water Commission (Comisión Nacional del Agua: Conagua)

Mining generates tailings, which are materials considered to be potentially hazardous wastes. Plata filed an application to become a hazardous waste generator in January 1999 and the required permit was received March 26, 2001. This permit does not have an expiry but requires regular reporting which is in good standing.

Plata holds a permit (Concesión 03ZAC103761/11EQGE02) dated September 19, 2002, which permits the discharge of waters into the subsurface of the La Colorada property. Pursuant to a new National Waters Law (Ley de Aguas Nacionales), Plata is permitted to make use of waters obtained from the exploitation of a mine without having to apply to the National Water Commission for a permit or authorization.

4.7. Significant Factors or Risks

No significant factors or risks which could affect access, title, or the right or ability to perform work on the property are known to PAS.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

Information in this section was excerpted and updated from Sharp, et.al. 2007.

5.1. Physiography

The physiography of the region is characterized by wide flat valleys and narrow, relatively low mountains ranges and hills. Elevations near the Candelaria, Recompensa and Campaña Mine sites are between 2,100 m and 2,550 m above sea level.

5.2. Access

The La Colorada mine is accessed primarily from Durango by a continuously maintained 120 kilometre all-weather, paved, two lane highway (Highway 45) and a 23 kilometre public, all-weather, gravel road. The mine is also accessible from the city of Zacatecas by similar types of roads.

5.3. Location and Transport

La Colorada is located in a major silver mining region of Mexico. The cities of Durango and Zacatecas are the major industrial and supply centers for the region. Flights to both cities are scheduled daily from México City and other major commercial and industrial centers in México.

The closest municipality to the La Colorada property is the city of Chalchihuites, which is 16 km northwest of La Colorada Mine, with a population of approximately 1,000.

5.4. Climate

The climate is arid to semi-arid and vegetation typically includes mesquite and cactus. The rainy season is from July to September.

Table 7 gives the precipitation statistics measured at the local government weather station. Winter temperatures are around freezing at night. The mine operates throughout the entire year.

Table 7: Chalchihuites Rain and Evaporation (La Colorada Environmental Dept. 2013)

Averages from 1966 to 2011 in millimetres

Month	Max rain in 24 hours	Max rain per month	Evaporation
January	14	34	135
February	8	33	144
March	3	44	198
April	2	15	214
May	14	30	231
June	71	74	173
July	133	105	129
August	141	56	140
September	98	74	107
October	31	44	135
November	12	33	114
December	14	25	133

5.5. Local Resources and Infrastructure

The La Colorada mine surface infrastructure is located on PAS owned land. No additional surface rights are anticipated being required over the life of the mine.

La Colorada has agreements in place with the national power utility, Comisión Federal de Electricidad (CFE), for the supply of 12.5 megawatts (MW) of power, an amount sufficient for the current operating plans. Electrical power is brought to the mine substation from the national power grid at 34.5 kilovolts (kV). A second, independent 34.5 kV transmission line was constructed to the mine in 2007 to meet increasing ventilation and dewatering demands and address power outages that resulted in part due to reliance on a single transmission line. Power is stepped down to 13.2 kV at the mine for distribution.

The mine also maintains three 1.2 MW diesel generators onsite to provide backup power for mine dewatering pumps during power outages. The reliability of power supplied by the national grid improved significantly with the second 34.5 kV line however, the diesel generators are still required from time to time, particularly in the rainy season.

The expansion project contemplates the construction of a new 42 kilometer long 115 KV power line along the existing power line right of way to the mine from Somberete at an estimated cost of $6.8 million. There is another 115 KV line under construction in the region and there is a possibility of a shorter 17 kilometer route to connect with this line. However, for the purpose of this PEA, the longer route to Somberete was selected.

La Colorada operates two separate tailings storage facilities (TSF). Both are permitted for oxide and sulphide ores however at present, oxide ore is stored in dam 6 and sulphide ore is stored in dam 7.

Initial construction of dam 6 was completed in June, 2003 and it has been raised several times since then. This dam is fully lined to reduce the risk of leakage as sodium cyanide is used in the treatment of the oxide ores. The life of mine plan presented in this PEA estimates that storage capacity will be required for a further 2.0 million tonnes of oxide tailings. The economic analysis for this PEA estimates a cost of $4 per tonne for storage of oxide tailings which is sufficient for the required expansion of dam 6.

Construction of the initial phase of dam 7 was completed in 2011. The second lift was completed in 2013 and the third lift is planned for 2014. The life of mine plan presented in this PEA estimates that storage capacity will be required for a further 6.6 million tonnes of sulphide tailings. The economic analysis for this PEA estimates a cost of $3 per tonne for the storage of sulphide tailings in dam 7.

The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the results of the PEA will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

The authors have recommended that additional engineering studies are undertaken in 2014 to determine if other options such as dry stacking of oxide tailings in dam 6, discontinuation of the liner in dam 7 and center line or upstream construction methods for dam 7 may prove to be environmentally and economically more efficient for tailings storage.

Waste disposal is currently not necessary as 100% of waste rock is used as backfill material for the cut and fill stope mining. The scoping study for the new shaft provided additional hoisting capacity for waste should the mining method change in the future or if it becomes economically attractive to use more sulphide tailings as backfill underground.

Water for the mining operation is supplied from the underground mine dewatering. As permitted by Mexican law, underground water is pumped to the surface and stored in head tanks for use in the milling process and for domestic services. Underground water is also pumped to a water treatment plant, which was constructed in 2002 and upgraded in 2008, to provide potable water. The current water supply is adequate for existing and planned future requirements of the mine.

A long history of silver mining in Zacatecas State has resulted in an experienced workforce in the region. La Colorada also has a camp on site to house 302 workers and provides daily transport locally for employees. The surface infrastructure portion of the expansion project includes capital cost estimates to provide additional camp accommodation and transportation for the estimated additional 138 employees that will be required.

6.0 HISTORY

The production history of the Chalchihuites district began during pre-colonial times when indigenous people produced silver and malachite. The village of Chalchihuites was founded during the 16th century Spanish colonization, and intermittent exploitation of the mineral deposits in the area commenced. By the 19th century, the Spanish mines were operating continuously and important silver production was recorded. The Mexican War of Independence curtailed production from this and many other silver producing areas between 1910 and 1920.

6.1. Prior Ownership

The La Colorada claims have changed hands several times, often with several companies owning different claims that now form the La Colorada mine:

1925 Dorado Family

1929 Candelaria y Canoas S.A. (“Candelaria Co.”), a subsidiary of Fresnillo S.A.,

1935 La Campaña de Industrias Peñoles

1949 Compañía Minas Victoria Eugenia S.A. de C.V. (“Eugenia”)

1994 Minas La Colorada S.A. de C.V. (“Minas”)

1997 Under option to Plata, the wholly owned subsidiary of PAS

1998 Plata, the wholly owned subsidiary of PAS

6.2. Historic Exploration

Exploration prior to PAS’ ownership consisted of 131 diamond drill holes for a total of 8,665 m completed by Minas. Historical exploration was in the form of development drifting on vein followed by exploitation. This work was successful to identify the structures but was limiting in estimating mineral reserves and mineral resources. The lack of information ahead of mining made mine planning risky.

Only four historic holes, for which PAS had core available for reassay, were used in Mineral Resource and Mineral Reserve estimation.

6.3. Historic Production

Historic production of the Chalchihuites district is believed to be on the order of 30 million ounces of silver and 39,000 ounces of gold. The relative distribution of metal by ore type is given in Table 8.

Table 8: Chalchihuites Historic Production

Ore type	Mt	Au (ppm)	Ag (ppm)	Pb (%)	Zn (%)
Veins	1.0	0.6	600	1.5	1.5
Breccia	2.0	0.3	150	3.0	3.0

note:

see Table 27 for La Colorada historic production from 2005 – 2013

7.0 GEOLOGICAL SETTING AND MINERALIZATION

Information in this section was excerpted and updated from Sharp, et.al. 2007.

7.1. Regional and Local Geology

The La Colorada property is located on the eastern flanks of the Sierra Madre Occidental at the contact between the Lower Volcanic Complex and the Upper Volcanic Supergroup. The La Colorada property lays 16 km southeast of Chalchihuites and 30 km south-southwest of Sombrerete, two mining camps with significant silver and base metal production from veins and associated skarn deposits.

The oldest rocks exposed in the mine area are Cretaceous carbonates and calcareous clastic rocks of the Cuesta del Cura and Indidura formations. Overlying the calcareous rocks is a conglomerate unit containing clasts derived mostly from the subadjacent sedimentary rocks. In the Chalchihuites district this unit is called the Ahuichila Formation and is of Early Tertiary age. Figure 3 is the chronological order of geological events at La Colorada Mine.

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Most of the outcrop in the mine area is represented by intermediate to felsic volcanic rocks (dacites) of the regional Lower Volcanic Complex. There are several subgroups within this unit, including plagioclase porphyry, crystal to crystal-lapilli tuffs, and volcanic breccias. Generally these sub-units are too small or inconsistent to be mapped.

The stratigraphically highest rock unit in the mine area are felsic tuffs within the Upper Volcanic Sequence. These tuffs unconformably overlie the dacite along the southern property boundary and are distinctly maroon coloured and show varying degrees of welding.

Thirteen breccia pipes have been mapped at surface or in underground workings. All of the pipes are located along or to the south of the HW and NC2 vein complexes. The pipes are round to ovoid in shape, up to 100 m in diameter, and can extend vertically more than 400 m below the surface. The breccias contain clasts of limestone and dacite (often mineralized) in an altered dacite matrix. Clasts of vein material have been found in the breccias suggesting that they postdate the vein emplacement.

The structures present at La Colorada represent a deformational sequence comprising at least three significant events, including Laramide folding and faulting, post-Laramide east to northeast trending faulting, and regional tilting events.

Figure 3: Chronology of Geological Events at La Colorada (Sharp, 2007)

Regional deformation during the Laramide Orogeny, which occurred between 80 and 35 million years ago, is expressed by the widespread development of folds and contractional faults within the Cretaceous-aged stratified sequence. These units show an abundance of folds and faults cutting shallowly to steeply across bedding where the rock units are exposed in the western portion of the La Colorada property and in the underground workings.

East to northeast striking faults form the dominant structures in the project area and play a strong role in local mineralization. Most of these faults dip moderately to steeply to the south and juxtapose younger hangingwall strata against older footwall rocks. Evidence suggests down-dip motion on these faults; however, most of the faults have been reactivated at some point, making the movement direction during the initial formation uncertain. Stratigraphic contacts are displaced from ten to over a hundred metres lower on down dropped blocks.

The dacite unit displays an eastward tilting that may reflect displacements on regional, orogen-parallel structures outside of the project area. This tilting probably reflects the final episode of deformation. The structural model for La Colorada, in which the mineralization and alteration occurred, is a low horizontal stress tectonic setting. In this regime, the four pre-existing steeply dipping structures were favourably orientated for re-activation and subsequent emplacement of mineralizing hydrothermal fluids. The dominantly eastern strike of the veins indicates slightly greater extension in a northerly direction. The north and north-easterly dipping faults accommodated mostly transverse movement associated with the dilation of the steeply dipping, easterly striking structures.

7.2. Mineralized Zones

There are four dominant styles of mineralization at La Colorada, including breccia pipes, vein-hosted mineralization, replacement mantos within limestone, and deeper seated transitional mineralization.

Mineralization in the breccia pipes generally has lower silver values and elevated base metal values. The majority of the Campaña Breccia was historically bulk mined with reported grades of 80 ppm Ag and 5% combined Pb and Zn. Mineralization is associated with intense silicification and occurs as disseminated galena and sphalerite with minor chalcopyrite and bornite. Sulphides are found in both the clasts and the matrix. These breccia pipes do not form part of the estimated mineral reserves or mineral resources.

Most mineralized veins on the property strike east to northeast and dip moderately to steeply to the south. Veins occur in the dacite and limestone units and cut across the bedding and contacts with little change in the width or grades of the vein. Mineralized widths in the veins are generally less than 2 m, but may be significantly wider. The HW corridor strikes east-west, dips moderately to the south, with average widths up to 15 m, but most of the mineralization of economic significance is located in quartz veins which are on average 1 to 2 m wide. In some cases the vein fillings consist of quartz, calcite, and locally barite and rhodochrosite. Where the veins are unoxidized, galena, sphalerite, pyrite, native silver and silver sulfosalts are present. The major mineralized veins are strongly brecciated and locally oxidized, obscuring original textural features. Less deformed veins show mineralogical layering, crystal-lined open vugs, and hydrofracture vein breccias, indicating typical multi-stage growth.

The depth to the surface and the permeability of the mineralized zone control the level of oxidation in the veins. These factors result in an uneven, but generally well-defined reduction oxidation (redox) boundary.

Manto style mineralization is found near vein contacts where the primary host rock is limestone. This style of mineralization was mined at Recompensa and can also be seen in areas of the Candelaria Mine.

The deep seated transition mineralization, also known as NC2 Deep, consists of both vein type mineralization and more diffuse stockwork and breccia zones. Lewis (1998) theorized that there are seven distinct zones within the transitional zone, and these can be sub-grouped into three main categories:

- vein mineralization, including the down dip extension of HW and NC2 and veins in the hangingwall and footwall of both;

- a peripheral stockwork vein zone that envelopes the NC2 structure; and

- sub-horizontal mantos-like stockwork zones in the NC2 hangingwall.

Deep drilling in 2009 and 2012 has defined a restricted manto replacement body at the 1000 m level and remains open to depth. This new body has low precious metal (Ag-Au grades) and higher base metal (Pb-Zn grades). It is adjacent to the known vein system which continues at that depth.

Figure 4 is a geological map showing the main mineralized structures.

Figure 4: Site Geology with Main Mineralized Structures (PAS, 2013)

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Candelaria System

HW vein and HW corridor – The average orientation is 60°/075° (dip/dip direction). The HW vein is a one to two metre thick vein which transitions from oxide ore to sulphide ore at various depths along strike. This structure is cut by the Candelaria breccia at the east, but does continue on the other side. The strike length is over 1.1 km where it exits the La Colorada claims package. Mineral reserves are estimated down to the 700 level. Mineral resources are estimated to the west and inferred material below the 700 level.

The HW corridor consists of four additional structures. Two structures are brecciated-altered zones in the hangingwall of the HW vein, named the HW-footwall and HW-hangingwall. The other two structures of the footwall side are named FW and Intermedia 3, which are controlled by a broad mineralized shear in limestone containing one or more quartz veins parallel to the orientation of the shear. The majority of the silver mineralization in these structures is found in the quartz veins which average 2 m width at medium grades and widen up to 7 m at the intersections with the HW vein.

NC2 and splits – Average orientation 60°/135°. NC2 is a 1 to 7 m wide sulphide vein that contains a large part of the current sulphide resources. It has a strike length of over 900 m where it is cut by a trachyte dyke. 2012 drilling and drifting have confirmed its continuation in both width and grade on the other side of the dyke where it remains open to the east. NC2 is developed down to the 468 level and has been drilled to below the 600 level where inferred mineral resources have been estimated.

NC1, NC4, NC5, NC6, Intermedia 1 and Intermedia 2 are narrow (1.0 to 1.50 m) splits from vein NC2. They are formed due to extensional fracturing on the east side of the mine. They average in strike length between 50 to 140 m. Estimated mineral reserves are located between the 405 and 528 level.

NC3 – Average orientation 80°/175°. NC3 is a narrow (0.80 to 1.0 m average width), high grade split from NC2 vein to the southwest with a strike length of 200 m. It is currently developed below the 468 level. Estimated mineral reserves are located between the 320 and 528 levels with inferred mineral resources below the 528 level.

4235 – Average orientation 65°/165°. 4235 is approximately 1 m wide split of the NC3 vein with 140 m of strike length which dips in the opposite direction to the major veins. It has been exposed by development on the 295 level, recently developed on the 408 level and contains a small amount of mineral reserves.

Santa Juana – Average orientation 60°/145°. Part of the extensional fractures system between HW-NC2 and Amolillo vein, this vein has an average of 1 m width with a strike length from 200 m. This structure contains a small quantity of oxide mineral resources.

Veta 2 – Average orientation 60°/132°. A split on the south side of NC2, it has an average width of 1 m and a strike length from 300 m. This structure contains estimated oxide and sulphide mineral reserves between the 200 and 240 levels and mineral resources below the 240 level.

La Libertad – Average orientation 60°/160°. A parallels structure to the HW vein located 500 m to the south with an average width of 1.0 to 1.5 m and strike length of 400 m. This vein has small old mine workings near surface. It contains estimated inferred mineral resources.

San Fermin – Average orientation 65°/160°. San Fermin is a breccia at the junction of Santa Juana, San Juan and HW structures. It is sub-parallel to the HW vein, with an average width of 11 m and a strike length from 130 m.

Amolillo System

Amolillo – Average orientation 59°/150°. Amolillo is an oxide vein transitioning to sulfide ore at depth. It is located 500 m north of the NC2 and HW vein complex and to the east (approximately along strike) of the Recompensa vein with an average width of 1.5 m with a known strike of 1350 m and remains open on three sides. The vein lies mostly within dacite host rock transitioning into limestone hosted at depth. Significant drilling was completed during both 2012 and 2013 that resulted in a significant increase to the estimated mineral resource and mineral reserves.

Recompensa System

Recompensa – Average orientation 75°/355°. Recompensa is a combination of vein and manto mineralization located more than 1 km northwest of the NC2 and HW vein complex. The vein mineralization is narrow (less than 1 m and averages 1.8 m for the economic zone). Recompensa contains mostly sulphide material.

Erika Vein – Average orientation 85°/350°. Erika is a hangingwall split from the Recompensa vein and narrow (less than 1 m and averages 1.0 m for the economic zone). It contains only sulphide material.

8.0 DEPOSIT TYPES

La Colorada represents a typical epithermal silver/gold deposit, with a transition in the lower reaches of the deposit to a more base metal predominant system. The geological model used for exploration as well as the mineral resource estimation is that of an epithermal vein deposit. A local analogy of this type of deposit is the San Martin Mine, where

earlier in the mine life epithermal veins were mined and now the mine production comes from skarn mineralization hosted by the same limestone unit found in La Colorada Mine.

Deep drilling completed in 2012 confirmed the current vein structures containing similar grades down to 1500 m elevation (above sea), approximately 1,000m below surface. Skarn mineralization or indications of skarn mineralization have not yet been encountered. Further study is required to confirm the possibility of skarn mineralization or alteration at depth.

9.0 EXPLORATION

The La Colorada mine had been mined for several decades prior to any specific exploration work. During that time most major structures became known through mine development. The production mapping and sampling data were used by mine geologist to design the diamond drilling programs which comprises the bulk of the Plata exploration programs since 1997. For those reasons, there have been little surface sampling or geophysics and other surveys.

9.1. Surveys

During the September 1997 to March 1998 exploration program a geophysical survey was conducted by Plata as part of the project evaluation. The survey comprised orientation surveys using in-house very low frequency (VLF) capacity and induced polarization (IP) techniques. The results of both techniques were believed to be successful and included in the interpretation of mineralized structures.

9.2. Channel Sampling

Channel sampling is performed in all ore development workings and stopes. That information is used for ore control purposes and to collect close spaced data for mineral resource estimation. Channel sampling is performed every 3 m in development headings and every 5 m in stopes by sampling crews under the supervision of the section mine geologist.

The procedure is to measure the distance from a survey station where the samples are to be taken. Two parallel lines perpendicular to the structure are marked across the back or roof. Those lines are separated into individual sample width, usually at the lithological contacts, and marked with short paint lines. Vein and wall rock are sampled separately. The sampler uses a hammer and chisel to take a representative, approximately 2 kg sample, across the marked location. Samples are taken regardless of expected grade. A sample tag is inserted into the sample bag and the bag is closed to prevent contamination.

9.3. Sampling Results

The channel sample data is used to reconcile the mineral reserve to mined ore on a monthly basis. The results of these reconciliations are usually within ±5%. The channel sample results are also used to predict mill feed grade, reconciled to the plant head grade monthly, which are usually in the ±2% range. Reconciliation results since 2010 are listed in Table 9. Channel sample results are used, either on their own or in conjunction with diamond drill results for estimation of proven and probable mineral reserves or measured and indicated mineral resources.

Table 9: Reconciliation by Year

	Reserve	Mined	Plant

Year	tonnes	Ag (ppm)	tonnes	Ag (ppm)	tonnes	Ag (ppm)
2010	346,898	395	346,898	406	345,697	379
2011	382,046	368	402,745	385	404,533	369
2012	396,542	356	420,163	376	417,957	370
2013	434,603	388	448,075	381	448,659	361

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10.0 DRILLING

10.1. Diamond Drilling

All drilling at La Colorada is diamond core drilling. Drilling is performed using the industry standard wire line method from both surface and underground. The work is performed by either company employees with a company owned drill or by specialized drilling contractors. All diamond drilling is performed under the supervision of the La Colorada mine geology department.

The only drilling done prior to PAS were 131 holes completed by Minas in 1997. Of those only four holes, which were re-assayed by PAS, were used in the mineral resource and mineral reserve estimate.

PAS' initial program was from September 1997 to March 1998 while the property was under option from Minas. Drilling completed during that program included 2,039 m of underground core drilling, and 3,953 m of surface core drilling. Based on the results of this program the decision to acquire the property was made.

Since that first program PAS has used diamond drilling for exploration purposes. From 2007 to present, the objectives of the annual drilling programs are: to test potential at wide spacing and estimate inferred mineral resources, followed by infilling at tighter spacing to increase confidence allowing an upgrade to indicated and measured mineral resources. The measured and indicated mineral resources could then be converted to mineral reserves should they be economically minable.

Under PAS' management, as of 31 December, 2013, over 230 km length of core drilling has been completed. Between 1997 and September 2007, PAS drilled 154, NQ sized holes from surface and 225 holes from underground. Underground holes were drilled BQ size until 2000 when drilling in the HW corridor was changed to HQ size to improve core recovery. From 2008 to present the surface hole size has been increased to HQ and underground to HQ, NQ and BQ sizes depending on location and/or depth of the holes.

Table 10 lists the drill campaigns by year as surface drilling, underground drilling and total in both hole count and metres.

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Table 10: List of Drilling Campaigns by Year

Year	Surface Drilling # of Holes	Surface Drilling Metres	Underground Drilling # of Holes	Underground Drilling Metres	Total Drilling # of Holes	Total Drilling Metres
1997[1]	6	1,026	8	1,477	14	2,503
1998	28	8,026	28	7,853	56	15,879
1999	11	2,650	49	5,104	60	7,754
2000	-	-	42	5,228	42	5,228
2002	4	963	-	-	4	963
2005	17	2,380	-	-	17	2,380
2006	46	7,446	20	1,437	66	8,883
2007	33	4,608	61	5,056	94	9,664
2008	50	4,481	85	11,187	135	15,668
2009	27	4,564	102	13,522	129	18,086
2010	12	5,527	109	17,515	121	23,042
2011	22	8,921	82	13,902	104	22,822
2012	43	20,535	98	19,163	141	39,698
2013	81	31,935	145	25,713	226	57,648
Total	380	103,062	829	127,156	1,209	230,218

Notes: [1] These holes were drilled prior to PAS acquiring ownership of the La Colorada property.

10.2. Accuracy and Reliability

There were some problems of core recovery for underground drilling in the HW corridor prior to 2000 which was rectified by increasing the drilling core size from BQ to HQ. That change improved both core recovery and core quality. The sample data is considered by the author to be acceptable for mineral resource and mineral reserve estimation purposes. Available core recovery records begin in 2006 and are stated by year in Table 11Table.

Table 11: Core Recovery by Year

Year	Core Recovery
2006	93 %

2007	93	%
2008	90	%
2009	89	%
2010	94	%
2011	93	%
2012	96	%
2013	96	%

10.3. Author's Opinion

In the opinion of the authors of this Technical Report the samples are of an acceptable quality for mineral resource and mineral reserve estimation. To the best of the authors' knowledge, core recovery issues were rectified and the number and location of the affected holes are not material to the current mineral resource and mineral reserve estimate.

11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

Channel samples taken underground and core samples drilled either from underground or surface rigs are both used in mineral resource and mineral reserve estimations. Channel sample from underground are brought directly from one of the portals to the on-site laboratory. Core samples come from the core shack, which is fenced and locked when there are no geology department employees present.

Upon being transferred to the laboratory a work order accompanies the samples. The work order is signed by a geology representative and, upon reception and verification of the samples, signed by the laboratory representative with two copies staying at the laboratory and the original being returned to the geology department.

Results are safeguarded using a secure database for which each user has only the access he or she requires. The geology database is directly linked to the laboratory information management system (LIMS) eliminating the need to manually enter or import the results. The samples are also labeled with bar codes which are read at regular points from reception of the sample through to the final results within the laboratory.

11.1. Sample Collection

Drill Core

The core is brought to the surface core shack and cleaned prior to logging by a geologist using industry standard methods. The geologist marks the beginning and end of the samples to be taken with a china marker. Each core box is photographed with a sign identifying the hole number, box number and the from and to depth of the core within the box. The digital photos are stored on the network drive for future reference.

Trained staff then cut the core of the marked samples in half using a diamond blade equipped saw. One half of the core is placed in a sample bag, and the other half is returned to the core box and stored in the core library. A two piece sample tag with bar code is filled out with information relevant to the sample. One half of the tag is inserted in the sample bag with the half core and the other section is used for scanning into the geology database. The samples are transported to the laboratory at the end of each shift or as needed during the shift. The core shack area is enclosed by a chain link fence and locked when no geology staff are present.

Channel Samples

The channel location is measured from a survey point. Two parallel lines are painted perpendicular to the structure strike, across the width of the drift or stope. The width from the left wall to the right wall is separated into individual samples based on lithology. One member of the sampling team holds the bag to catch the sample while the other takes the sample with a hammer and chisel. A two part sample tag is filled with relevant information with one half going in the sample bag and the other half brought to the office to be scanned into the geology database. The samples are transported from underground directly to the laboratory.

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11.2. Laboratory

All samples are prepared and analysed at the La Colorada mine laboratory, which is not a certified laboratory. The steps followed at the laboratory for each sample are as follows:

The samples are received at the laboratory with a corresponding work order signed by a geology employee. The work order lists the samples sent and the analysis to be completed. The laboratory representative verifies the delivery for sample condition, corresponding number sequence and quantity. Once satisfied with the delivery he or she signs the work order confirming receipt of the samples. One copy is returned to the geology office and the remaining two copies remain at the laboratory.

The samples are logged into laboratory information management system (LIMS) using a bar code reader.

Each sample bag is emptied into clean drying pan. The pans are placed in sequential order in a drying oven set between 110°C to 120°C. The drying time ranges from 3 to 5 hours depending on the humidity of the sample.

The dried samples are crushed to minus a 1/4 inch using a TM Engineering Terminator jaw crusher followed by a cone crusher. The resulting material size is 70% at minus 10 mesh. The crusher is cleaned with compressed between each samples and silica blank material is passed thru the crusher every 20 samples.

A 300 g portion of the sample is split using a Jones Splitter. A ring pulveriser is then used to reduce the particle size to at least 90% at -140 mesh. The pulverised sample is placed in an envelope which is labelled with a barcode sample sticker.

The samples are transferred to the weighing station where a 10g quantity is separated. The precise weight is automatically entered into LIMS by a direct connection to the scale and barcode reader. The sample rejects and remaining pulp are returned to geology and store for QA/QC checks by both internal and external laboratories.

The samples are analysed for gold and silver by fire assayed with gravity finish and for base metals (Pb, Zn, Cu, Fe, Mn) by acid digestion with atomic absorption finish.

All instruments, including scales and the atomic absorption spectrometer, are linked to LIMS eliminating manual data entry. The LIMS database transfers the results directly to the geology database. These processes eliminate transcription and other data entry related errors. La Colorada mine assay laboratory has an internal QA/QC program that includes the use of certified reference materials and blanks which are inserted into every batch of samples for both the AA and fire assay processes as control samples. Synthetic certified standards are also used to calibrate the AA equipment as per the standard operating procedures of the laboratory.

External laboratories, at this time, are used for check assaying pulps as part of the QA/QC program. In the past the following laboratories were used for analysing exploration samples:

ITS Bondar Clegg, 130 Pemberton Ave., North Vancouver, BC, Canada. This laboratory is registered to ISO 9001: 2000 for the “provision of assay and geochemical analytical services” by QMI Quality Registers. This laboratory has also received ISO 17025 accreditation from the Standards Council of Canada. This laboratory was acquired by ALS Chemex on December 01, 2001.

ALS Chemex, 212 Brooksbank Ave., North Vancouver, BC, Canada. This laboratory is registered to ISO 9001: 2000 for the “provision of assay and geochemical analytical services” by QMI Quality Registers. This laboratory has also received ISO 17025 accreditation from the Standards Council of Canada.

Luismin Laboratories, De Selenio y Aluminio, Cd Industrial Durango, Durango, México. Prior to 2003 Luismin laboratory was certified under ISO 9000. In February, 2006 the laboratory was acquired by SGS SA and operates as SGS de México S.A. de C.V. Laboratorio de Durango. The laboratory is currently in the process of re-certification.

ALS Chemex de México, Ignacio Salazar 688, Hermosillo, Sonora, México. This laboratory is used for sample preparation with prepared samples sent to the ALS Chemex laboratory in North Vancouver, British Columbia, Canada. This laboratory is registered to ISO 9001: 2000 for the “provision of assay and geochemical analytical services”.

ALS Guadalajara, Francisco Silva Romero 1140 San Carlos Guadalajara Jalisco 44460 Mexico. This laboratory is registered to ISO 9001: 2000 for the “provision of assay and geochemical analytical services”.

11.3. Quality Assurance / Quality Control (QA/QC)

The La Colorada mine geology department conducts a QA/QC program that is independent from the laboratory. The program includes insertion of standards and blanks, and pulp checks. The pulp checks are performed both with an external laboratory and by changing the sample numbers and resending them the mine laboratory.

The standard results are reviewed daily by the onsite geologist and presented in graphs showing warning lines at 2 standard deviations and action lines at 3 standard deviations. If a standard returns a result outside the action line, appropriate measures are taken by the laboratory like re-calibration of equipment and re-analyzing of the sample batch affected by the failed standard. The QA/QC results are reviewed monthly by Michael Steinmann P.Geo. The graphs in Figure 5 are the results of the oxide and sulphide standards analysis which demonstrate acceptable accuracy of the mine laboratory for silver analysis. Figure 6 is a graph of the pulp checks with an external laboratory showing acceptable precision for silver analysis.

Figure 5: QA/QC Standard Results

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Figure 6: La Colorada Laboratory Vs ALS Checks Samples

11.4. Author's Opinion

It is the author's opinion that the sample preparation, analysis, and security are to industry standard. Further the results of the QA/QC program demonstrate that the laboratory repeatability and accuracy is acceptable for mineral resource and mineral reserve estimation. It is the author's opinion that adequate measures are taken if problems are identified by the QA/QC program.

12.0 DATA VERIFICATION

The La Colorada geology database was audited by an external independent consultant, over several site visits, who was contracted by the author of this technical report. Only minor transcription errors were found. Any discrepancies in the data were verified with the original core logs or channel sample records and corrected.

The database software has built in validation tools that are used regularly along with visual verifications on plans and sections. Assay data is transferred directly from LIMS to the geology database eliminating possible errors from manual data entry.

It is the authors' opinion that the data quality and reliability is to industry standard and sufficient for use in mineral resource and mineral reserve estimation and mine planning.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1. Mineral Processing

Two distinct types of ore are being treated at the La Colorada mine, oxide ore and sulphide ore. Bench scale metallurgical testing and full-scale plant operations have determined optimum processing methods of cyanidation for the oxide ore and selective lead/zinc sulphide flotation for the sulphide ore. Table 12 illustrates the metal recovery estimates of the predicted head grades for La Colorada life of mine ("LOM") plan based on metal recoveries achieved in previous years and confirmed by bench scale metallurgical testing.

Table 12: Predicted Metal Recoveries

		2014 – 2024 Projected Plant Recoveries	
Sulphide Plant	***Silver Rec. %***	92.9	%
	Gold Rec. %	67.1	%
	Pb Rec. %	85.4	%

Oxide Plant	***Zn Rec. %***	82.3	%
	Silver Rec. %	77.2	%
	Gold Rec. %	69.2	%

Historical Plant Performance

Table 13 and Table 14 show the actual metal recoveries and actual grades achieved in the process plant during 2008, 2009, 2010, 2011, 2012 and 2013. The silver and other metals processed in the sulphide plant are recovered in the form of concentrates that are further treated at third party smelters. The silver and gold from the oxide plant is recovered in the form of doré bars that are further refined at third party refineries.

Table 13: Metal Recoveries Achieved 2008 - 2013

		2008	2009	2010	2011	2012	2013
	Tonnes	166,076	151,334	180,265	235,181	263,867	296,165
	Silver Rec. %	92.2 %	91.2 %	92.2 %	93.0 %	93.2 %	93.1 %
Sulphide Plant	Gold Rec. %	68.4 %	76.2 %	73.4 %	73.6 %	70.1 %	65.9 %
	Pb Rec. %	77.1 %	83.4 %	83.3 %	86.0 %	85.6 %	85.1 %
	Zn Rec. %	67.8 %	71.2 %	77.8 %	80.6 %	82.1 %	82.1 %
	Tonnes	211,768	173,582	165,432	169,352	155,724	152,494
Oxide Plant	Silver Rec. %	81.8 %	81.9 %	83.1 %	83.5 %	82.4 %	82.0 %
	Gold Rec. %	77.2 %	76.9 %	75.1 %	73.1 %	69.1 %	69.3 %

Table 14: Achieved Head Grades 2008 - 2013

		2008	2009	2010	2011	2012	2013
	Tonnes	166,076	151,334	180,265	235,181	263,867	296,165
	Silver ppm	397	414	390	400	397	379
Sulphide Plant	Gold ppm	0.43	1.22	0.68	0.45	0.41	0.25
	Lead %	0.79 %	0.96 %	0.91 %	0.12 %	1.26 %	1.32 %
	Zinc %	1.61 %	2.14 %	0.21 %	2.36 %	2.61 %	2.78 %
	Tonnes	211,768	173,582	165,432	169,352	155,724	152,494
Oxide Plant	Silver ppm	351	357	366	326	333	301
	Gold ppm	0.42	0.47	0.35	0.41	0.39	0.30

13.2. Laboratory Analysis

The metallurgical balance requires metal concentration information from the feed material, the final product, tailings and at various sampling points throughout the process. Two distinct analytical processes are used to determine those values. Head and tails grade analysis uses the procedure outlines in section 12.2 while slurry samples are analyzed as described below.

Slurry samples from the plant are received at the laboratory as solids suspended in solution. Those samples are taken to be representative and considered to be of good quality. Both the solids and the liquid contain metal concentrations and must both be analyzed independently. A rotary wet splitter is used to separate the solids from the liquids. The decanted solution is then analyzed using a lead boat or Chiddy method with atomic absorption (“AA”) finish for gold. Silver concentrations are high enough for analysis directly by AA. The solids are filtered, rinsed with neutral water,

dried, and then fire assayed with gravimetric finish.

Base metals analysis for ore material is performed by acid digestion with AA finish. Analysis of base metals in the concentrates is be done by volumetric titration due to the high base metal grades.

Doré and concentrate samples are taken by drilling and auguring respectively. The samples are handled as described in section 12.2.

13.3. 2012 Metallurgical Test Results

Table 15 and Table 16 shows the metallurgical testing results conducted with composite samples that are representative of the life of mine plan (LOM). Testwork was conducted at the metallurgical laboratory of the La Colorada mine under typical conditions.

Table 15: Metallurgical Test Work Results 2012

Sulphide Ore	Silver Rec. %	92.8%
	Gold Rec. %	70.8%
	Pb Rec. %	86.9%
	Zn Rec. %	87.4%
Oxide Plant	Silver Rec. %	80.6%
	Gold Rec. %	76.3%

Table 16: Composited Metallurgical Test Sample Grades 2012

Sulphide Plant	Silver ppm	415
	Gold ppm	0.37
	Lead %	2.53%
	Zinc %	4.75%
Oxide Plant	Silver ppm	353
	Gold ppm	0.41

13.4. Metallurgical Testing

The metallurgical assumptions used for the economic analysis in this Technical Report are based on historic plant performance and confirmed by metallurgical bench scale testing of samples collected to represent the LOM planned feed schedule. Bench scale metallurgical testing and full-scale plant operations have determined the optimum processing methods are cyanidation for oxide ore and selective lead/zinc sulphide flotation for sulphide ore at the La Colorada Mine. Projected future metal recoveries in the LOM plan are based on historic recoveries and confirmed by metallurgical testing conducted at La Colorada metallurgical laboratory. Historic metallurgical testwork was described by Sharp, et.al. 2007, and is summarized here in chronological order.

1999 Testwork

During 1999, metallurgical testwork is reported to be concentrated on flotation and cyanidation leach testing. Fresh samples of vein material were obtained from the 295 level drift and from diamond drill intercepts for both the oxide and sulphide ore types. These samples were representative of the mineralogy of the two ore types, namely sulphide ore and oxide ore.

Selective flotation tests were conducted by Process Research Associates Ltd. (“PRA”) on both ore types, as well as gravity plus cyanidation tests for the oxide ore.

Cyanide leach testing was conducted on oxide ore from a narrow zone above the 295 level drift. The grind used for the test was approximately 80% minus 70 micron. Silver recovery after 96 hours leaching was 92.7% from a head grade of 649 ppm of Ag. Gold recovery after 96 hour leaching was 89.5% from a head grade of 1.64 ppm of Au.

The sulphide ore test floated a clean bulk Ag-Pb concentrate with relatively high recoveries. Initially the production of a zinc concentrate in the test resulted in depressing the zinc, which reported to the lead concentrate. This problem was improved by additional tests with collectors. It was shown that flotation recovery and mineralogical conduct are affected by grind size and reagent use. With those test results the projected sulphide ore metal recoveries from the combined lead and zinc concentrates were 91.25% Ag and 85.8% Au, the Pb recovery of 85% in the lead concentrate, and Zn recovery of 80% in the zinc concentrate.

Bond work index tests were run for both oxide and sulphide ores from narrow veins. Results ranged from 15.9 to 20.0 kilowatt hours per tonne, with the majority of samples needing approximately 18 kilowatt hours per tonne. All flotation testwork after the initial scoping tests were conducted with a grind of 80% minus 74 micron targeted.

2000 Testwork

Testwork in 2000 was conducted by PRA in Vancouver, BC, Canada, on the NCP corridor drill core samples (Process Research Associates, May 2000). The work consisted of locked cycle bottle roll tests starting with flotation followed by cyanidation.

Six drill holes were shipped to PRA’s Vancouver facilities for testing consisting of drill holes PIC 35, 36, 37, 39, 40 and 41. All samples, except PIC 35, were complete mineralized intercepts. The drill holes were characterized geologically to represent material that ranged from mostly oxide to mixed oxide and sulphide mineralization.

Locked cycle bottle roll cyanidation testing results after 96 hours leaching were 83.8% recovery from a head grade of 266 ppm for silver, 69.5% recovery from a head grade of 0.40 ppm for gold from the oxide sample, 79.9% recovery from a head grade of 658 ppm for silver, and 69.0% recovery from a head grade of 0.70 ppm gold from the mixed sample.

Flotation testwork was conducted on each drill core samples and also on both composite samples. The oxide and mixed ore composites were subjected to separate flotation test for lead and zinc concentrates. Results from flotation of both the oxide and mixed samples were poor, especially the oxide samples. Silver recoveries in combined lead concentrate and zinc concentrate were 15.7% and 76.7% for the oxide and mixed sample respectively. These results confirm that the preferred method for treatment of oxide ore is cyanidation.

Pre-operational Oxide Plant Bench Scale Testing

Bench scale metallurgical test-work conducted prior to the commissioning of the oxide cyanidation plant in mid-2003 was completed at the La Colorada metallurgical laboratory and two independent commercial laboratories averaging 84.4% Ag recovery and 82.5% Au recovery.

2012 Testwork

Additional testing has been conducted on-site with samples representing the LOM planned feed. The samples used were the laboratory rejects (the part of the crushed sample split not used for analysis) of mineralized drill core. The testwork was conducted at the La Colorada metallurgical laboratory.

Representativity of LOM Samples for Metallurgical Testing 2012

The objective of the program was determining the metallurgical response of the different veins which are in the mineral reserve inventory of the La Colorada Mine over the LOM. The samples were selected on the premise that the main variations in mineralogical assembly (galena-sphalerite-chalcopyrite) and metal values of Ag-Au-Pb-Zn-Cu change relative to depth. The sampling methodology is considered an acceptable representation of the mineral reserves of the La Colorada Mine. General samples criteria and silver grades are presented in Table 17.

Table 17: Metallurgical Samples

Sample	Mine	Mineral Type	Level Taken	Ag (ppm)	Weight (kg)
1	Candelaria	Sulphide	360, 370,390, 425, 405, 438	355	80
2	Candelaria	Sulphide	445, 453, 468, 483, 498	495	157
3	Candelaria	Sulphide	528	474	284
4	Candelaria	Sulphide	558, 600	357	78
5	Candelaria	Oxide	423, 468, 498	376	56
6	Estrella	Oxide	245, 275, 305	440	80
7	Estrella	Oxide	335, 365, 395, 435	264	69
8	Estrella	Sulphide	435, 535	269	61
9	Recompensa	Sulphide	175	350	26

Sample Analysis, Test conditions and Results with LOM samples

Sample content for important metals are presented in Table 18 for the sulphide samples and in Table 19 for the oxide samples. Test conditions in the flotation circuit were targeting a grind size of 70% passing 200 mesh. The reagents additions for the flotation tests are presented in Table 20.

Table 18: Sulphide Sample Analysis

Sample Number	Au(ppm)	Ag(ppm)	Cu(%)	Pb(%)	Zn(%)	Fe(%)	Mn(%)
1	0.20	355	0.13	1.37	2.71	2.82	0.39

2	0.28	495	0.19	2.01	4.18	3.07	0.69
3	0.30	474	0.22	3.25	5.15	2.97	0.86
4	0.73	357	0.31	3.54	7.39	3.57	0.92
8	0.16	269	0.08	1.40	1.79	2.42	0.42
9	0.24	350	0.18	4.28	4.56	2.61	2.50

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Table 19: Oxide Sample Analysis

Sample Number	Au(ppm)	Ag(ppm)	Cu(%)	Pb(%)	Zn(%)	Fe(%)	Mn(%)
5	0.53	376	0.08	0.76	0.75	2.13	0.32
6	0.49	440	0.09	1.23	1.70	2.41	0.64
7	0.33	264	0.08	1.06	1.80	2.75	0.62

Table 20: Reagents for Sulphide Flotation Tests

Added	Complex 10% ppm	Aerophina 3407 direct ppm	Frother No. 603 ppm	Xanthate at 1% ppm	Copper Sulphate al 10 % ppm	Lime ppm
Mill	500	36				
Rougher		36	41	30		
Pb Cleaner	70					
Zn Rougher			14	31	600	2100
TOTAL	**570**	**72**	**55**	**61**	**600**	**2100**

Test results of each of the two sample types were consistent within their category. Summary of the test results are presented in Table 21 for sulphide samples and Table 22 for oxide samples.

Table 21: Flotation Test Results

	Recoveries, %			
Sulphide Samples	Au	Ag	Pb	Zn
1	65.1	91.9	82.1	84.2
2	70.0	95.4	85.8	87.7
3	72.3	92.6	88.1	85.2
4	78.1	91.3	91.8	93.7
8	56.2	92.3	86.4	79.1
8	68.3	92.8	80.2	87.7

Table 22: Cyanide Leach Test Results

			Recovery		Consumption NaCN	CaO
Oxide Sample	**Retention Time**	**NaCN Concentration**	**Au (%)**	**Ag (%)**	**kg/ton**	**kg/ton**
5	96 Hrs.	0.10% NaCN	78.0	76.7	1.53	4.8
6	96 Hrs.	0.10% NaCN	83.3	83.5	1.53	4.8
7	96 Hrs.	0.10% NaCN	69.2	78.1	1.22	4.8

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Continuous Testwork and Control

Metallurgical test programs are being conducted annually with representative samples to further evaluate the metallurgical variability, optimize metal extractions, reduce operating costs, and increase productivities.

13.5. Author's Conclusion and Recommendations

The metallurgical testing programs have shown:

- The primary characteristic of the ore deposit that controls the metallurgical responsiveness either in the cyanidation or flotation circuit is the degree of oxidation.
- The metallurgical performance of either the cyanidation or flotation circuits are inversely proportional to the intensity of grinding with marked metallurgical improvements obtained with finer grinds.
- The amount of clay material in the ore and the intensity of grinding can negatively impact the performance of the thickening wash circuit in the oxide plant.
- The concentration of "true-free" cyanide in the leaching and Merrill Crowe circuits is crucial to optimum cyanidation plant performance.

Additional flotation studies conducted on-site support the conclusions of the various historical laboratory test results presented above and support the estimations for future recoveries based on previous year's operational results.

Recommendations

Metallurgical performance in the existing plants is well established at La Colorada. The authors recommend continuing the ongoing metallurgical testing program and that any variation in the mineralization identified by the geology department or the process department be tested as part of the program.

For the sulphide plant expansion, it is recommended that updated comminution testing is conducted to confirm Bond Work indices, and SAG testing (JK drop weight test and subject to requirement MacPherson test) for crushing and grinding circuit design.

Solid / liquid separation testing (thickening and filtration) testing of oxide tailings may be required if further studies indicate that dry stack storage is a viable option.

14.0 MINERAL RESOURCE ESTIMATES

Mineral resources quoted in this Technical Report have been estimated using accepted industry practices and are in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum definitions on mineral resources and mineral reserves.

Mineral resources at the La Colorada mine as of December 31st, 2013 were estimated to be as shown in Table 23.

Table 23: La Colorada Mineral Resources as at 31 December 2013

Measured and Indicated Resources

Category	**Tonnes (Mt)**	**Ag (ppm)**	**Ag Cont. (Moz)**	**Au (ppm)**	**Pb %**	**Zn %**
Oxide Measured	0.2	168	0.8	0.17	N/A	N/A
Sulphide Measured	0.3	161	1.3	0.14	0.64	1.05
Measured Resources	**0.4**	**164**	**2.2**	**0.15**	**0.40**	**0.65**
Oxide Indicated	0.8	232	6.2	0.19	N/A	N/A
Sulphide Indicated	0.8	278	7.6	0.39	1.02	1.64
Indicated Resource	**1.7**	**255**	**13.8**	**0.29**	**0.51**	**0.83**
M&I Oxide	1.0	222	7.0	0.19	N/A	N/A
M&I Sulphide	1.1	251	8.9	0.33	0.93	1.50
Total M&I Resources	**2.1**	**237**	**15.9**	**0.26**	**0.49**	**0.80**

Inferred Resources

Category	**Tonnes (Mt)**	**Ag (ppm)**	**Ag Cont. (Moz)**	**Au (ppm)**	**Pb %**	**Zn %**
Oxide Inferred	0.7	153	3.2	0.17	N/A	N/A
Sulphide Inferred	2.2	298	21.3	0.49	1.74	2.81
Total Inferred Resources	**2.9**	**265**	**24.5**	**0.42**	**1.34**	**2.17**

Notes:

1. CIM definitions were followed for mineral resources
2. Grades are shown as contained metal before mill recoveries are applied.
3. PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.
4. Mineral resources were diluted including minimum true vein width of 2.18 m, planned mining dilution, and floor dilution for stope ore.
5. Mineral resources have been estimated using a mining recovery of 85 to 95% (pillars are left in some thicker zones leading to lower mining recovery). Mineral resources were estimated based on the use of cut and fill mining methods.
6. Mineral resources were estimated using the polygonal method on longitudinal sections.
7. Mineral resources were estimated using a price of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc and $1,950 per tonne of lead.
8. There are no known metallurgical, environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues expected to materially affect the estimate of mineral resources.
9. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

14.1. Method and Parameters

Mineral resources were estimated using the polygonal method. This method, with some parameter updates, has been consistent since PAS took ownership of the property. The grades and tonnage of the structures are estimated based on the data collected and analysed from both diamond drilling and underground channel samples. The data is plotted on sections and plans, for review and interpretation by the geologist. Once the data is confirmed to represent the appropriate structure a long section is produced of each structure to visualize each structure in its entirety. The data is processed using Excel software structure by structure which is then combined to arrive at the total mineral resource estimate tonnage and grades.

The mineral resources are updated annually with new information and updated geological interpretations.

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14.2. Bulk Density

The bulk density of the oxide ore and sulphide ores are a function of the lead and zinc grade contained within the ore. The calculations are derived based on 302 samples which were measured for bulk density at the ALS-Chemex laboratory in Vancouver, Canada. Table 24 shows the bulk density formulas used to estimate the tonnes of mineral reserves and mineral resources for the La Colorada Mine.

Table 24: Bulk density

Ore Type	**Bulk density ore**	**Bulk density wallrock**
Oxides and Sulphides	= 2.7 + (%Pb + %Zn) * 0.0237	2.70

14.3. Dilution and Ore Loss

Dilution is applied for several different circumstances and reasons. First a minimum of 2.18 m true width is applied to the structure. This provides a minimum horizontal width of 2.4 m in order to permit access for the scoop trams. Veins of less than 2.18 m true thickness have added wall dilution to a total of 2.18 m true thickness. Planned dilution is then added to account for the mining method. Different quantities are used for the development phase and the stoping phase as shown in Figure 7 and Figure 8**.** Additional dilution of 3% is applied to account for backfill which is inadvertently mucked each lift during the cut and fill stoping. An additional 5% unplanned dilution is also applied which correlates to the reconciliation results.

Ore loss is considered to be between 5% and 15% depending on vein width (i.e. mining recovery is assumed to be between 85% ad 95%). This figure is based on experience and observation at the La Colorada Mine and takes into account losses of ore in permanent pillars, losses into the backfill and other losses such as those that may be caused by ground failures or other geomechanical conditions. The mine workers attempt, where possible, to recover all pillars, however, some crown pillar ore and some safety pillars inevitably remain to ensure safe working conditions for the miners in the stopes.

Figure 7: Development Dilution (La Colorada Geology Dept., 2010)

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Figure 8: Stope Dilution (La Colorada Geology Dept., 2010)

14.4. Disclosure Requirements

The mineral resource was estimated with the data cut off of December 31st, 2013. It was completed by the mine geology department at the mine site and under the supervision of the authors of this Technical Report.

- Resource classifications follow the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) guidelines. Classifications are based on proximity and density of geological and grade information, as well as the complexity of the geological interpretation.

- Measured mineral resource blocks are adjacent to mine excavations, either development or stopes, which have been channel sampled as described in item 9.2. Projected distances for measured resources are 50 m vertical and 30 m horizontal.

- Indicated mineral resource blocks are adjacent to measured blocks. They extend 30 m vertically from measured blocks, but do not extend horizontally further than measured blocks. Indicated blocks are also estimated where diamond drilling confirms grade and geological continuity and holes are spaced 50 m or closer to each other or to channel samples.

- Inferred mineral resource blocks are estimated where there is sufficient data, geological and grade, to reasonably assume continuity but not enough to confirm or verify said continuity.

14.5. Multiple Commodities

The procedure used to handle multiple commodities in the estimation is to give monetary value for each metal based on their respective grades and add them to give the total value per unit of weight. The term used for this is value per tonne (VPT). The VPT is calculated based on the net smelter return (NSR). The factors taken into account are the value paid for each metal, insurance, penalties, treatment cost, refining and transport, and are described in more detail in Section 19, Market Studies and Contracts. The VPT is a factor which is applied to the estimated value of each metal.

15.0 MINERAL RESERVE ESTIMATE

Mineral reserves in this Technical Report have been estimated using accepted industry practices and are in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum definitions on mineral reserves.

The mineral reserves were estimated with the data cut off of December 31st 2013. The estimate was completed by the mine geologists, at the La Colorada mine site, under the supervision of the authors of this Technical Report.

Mineral reserves at the La Colorada mine as of December 31st, 2013 were estimated to be as shown in Table 25.

Table 25: La Colorada Mineral Reserves as of 31 December 2013

Proven and Probable Reserves

Category	**Tonnes (Mt)**	**Ag (ppm)**	**Ag Cont. (Moz)**	**Au (ppm)**	**Pb %**	**Zn %**
Oxide Proven	0.7	350	7.8	0.32	N/A	N/A
Sulphide Proven	1.7	429	23.5	0.30	1.90	3.48
Proven Reserves	**2.4**	**406**	**31.2**	**0.31**	**1.35**	**2.47**
Sulphide Probable	1.3	378	16.2	0.29	N/A	N/A
Oxide Probable	2.8	377	34.0	0.44	1.92	3.47
Probable Reserves	**4.1**	**378**	**50.2**	**0.39**	**1.30**	**2.35**
Oxide Reserves	2.0	369	23.9	0.30	N/A	N/A
Sulphide Reserves	4.5	397	57.5	0.38	1.91	3.47
Total Reserves	**6.5**	**388**	**81.4**	**0.36**	**1.32**	**2.40**

Notes:

1. CIM definitions were followed for mineral reserves.
2. Grades are shown as contained metal before mill recoveries are applied.
3. PAS reports mineral resources and mineral reserves separately. Reported mineral resources do not include amounts identified as mineral reserves.
4. La Colorada mineral reserves have been estimated at a cut off value per tonne of $116.10 and $126.10 below 600 level for Candelaria oxides, $101.17 and $111.17 below 600 level for Candelaria sulphides, $100.79 for Estrella oxides, $85.82 for Estrella sulphides and $73.84 per tonne in the Recompensa mine (sulphide ore).
5. Mineral resources were diluted including minimum vein true width of 2.18 m, planned mining dilution, and floor dilution for stope ore.
6. Mineral reserves were estimated using a mining recovery of 85 to 95% (pillars are left in some thicker zones leading to lower mining recovery). Mineral reserves were estimated based on the use of cut and fill mining methods.
7. Mineral reserves were estimated using the polygonal method on longitudinal sections.
8. Mineral reserves were estimated using a price of $22.00 per ounce of silver, $1,300 per ounce of gold, $1,850 per tonne of zinc and $1,950 per tonne of lead.
9. There are no known metallurgical, environmental, permitting, legal, title, taxation, socio economic, political, marketing or other issues expected to materially affect the estimate of mineral reserves.

15.1. Method and Parameters

Mineral resources are converted to mineral reserves if they can be economically mined. Some mineral resources may not be converted to mineral reserves for various reasons including poor location, accessibility, mining recovery, or because the grade of the resource is not economic to mine. The estimated full break even production costs, when the expansion project has been completed have been used to define the economic limit. The actual production costs from the previous year and the budgeted costs for the current year have been used as a basis for this calculation. This is a change from previous methodology where the variable costs were calculated from the actual costs of the previous year to define the economic limit. In order to account for the increased costs of pumping and ventilation in the hot, wet conditions at depth, separate cut off grades have been calculated for the Candelaria oxides and sulphides between the 600 and 740 levels. The cut off value for the different structure and/or ore types are as stated in Table 26.

Table 26: Reserve Cut Offs

Location /Ore Type	VPT Cut Off for Dec 31, 2012	VPT Cut Off for Dec 31, 2013
Candelaria Oxides above 600 level	$ 98.49	$ 116.10
Candelaria Oxides 600 to 740 level		$ 126.10
Candelaria Sulphides above 600 level	$ 82.92	$ 101.17
Candelaria Sulphides 600 to 740 level		$ 111.17
Estrella Oxides	$ 99.10	$ 100.79
Estrella Sulphides	$ 83.53	$ 85.82
Recompensa Sulphides	$ 73.84	$ 73.84

15.2. Classification

Mineral reserve classifications follow the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) guidelines. Classifications are based on proximity and density of geological and grade information, as well as continuity.

Proven mineral reserve blocks are those measured mineral resource blocks, and probable mineral reserve blocks are those Indicated mineral resource blocks, that are economic and are mineable. The grade of the proven or probable mineral reserve block must be equal to or higher than the VPT cut off for the respective location shown in Table 26. The proven or probable mineral reserve block must also be located such that it can support the cost of the development and infrastructure necessary to mine that block. In the deeper parts of the La Colorada mine the provision of ventilation and pumping water are significant costs. The author (M. Wafforn) has placed limits on the depth to which a measured or indicated mineral resource block may be converted to a proven or probable mineral

reserve block until data is available to allow a reasonable projection of those costs. For the December 31, 2013 estimate of mineral reserves, the deepest mineral reserves are to the 678 level in the west part of the NC2 and HW veins in Candelaria. The deepest mineral resource included in the LOM plan is to the 738 level in the west part of the Candelaria mine. PAS continues to monitor water inflows, rock temperature and ambient air quality in order to determine future ventilation and pumping requirements and costs. The increased capital and operating costs necessary to purchase and install a system for mine refrigeration is not expected to be required in order to mine the mineral reserves presented in this Technical Report, although with continued exploration success at depth it is a possibility in the future (Orellana Wiarco, 2010, 2011 and 2012).

16.0 MINING METHOD

La Colorada produces oxide and sulphide ores from three separate underground mines: Candelaria accessed via Las Minas and San Fermin portals, Estrella and Recompensa. The El Aguila shaft is used for extracting mineral from the Candelaria mine and in 2012 a ramp was developed between the Candelaria and Estrella mines that allow the extraction of mineral from the Estrella mine via the shaft. Figure 9 is a general site plan showing the location of the three mines relative to one another and surface infrastructure.

Figure 9: La Colorada Mine General Site Plan with Infrastructure (PAS, 2013)

In prior years, oxide ore accounted for 60% of the total tonnes processed. In 2013, sulphide ore accounted for 66% of the tonnes processed and going forward, sulphide ore will account for nearly 77% of total tonnes processed due to depletion of the oxide resource as mining progresses deeper.

In all three mines, overhand cut and fill stoping is used for ore extraction. Mechanized and semi-mechanized overhand cut and fill mining method as used at La Colorada is also employed at many underground mines, especially in Mexico. This method of mining is considered safe and efficient for the type of geologic conditions found at La Colorada.

Cut and fill stoping requires good-to-fair stability of the footwall and hanging wall surrounding the ore zone. When these conditions are present, cut and fill stoping provides improved ore recovery and selectivity from irregular, steeply dipping veins. The method also provides ground support by backfilling the voids creating by mining with development rock or mill tailings as ore extraction advances. The backfill also provides a stable floor to work from. All of the conditions for efficient cut and fill stoping are present in the La Colorada Mine and the method is applied in all mining areas.

Table 27 provides actual mine production data by ore type and total ore for years 2005 through 2013.

Table 27: Historic Production areas at La Colorada

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	To
Oxide Ore										
Tonnes Mined	211,854	213,187	211,714	211,769	173,582	165,432	169,352	155,724	152,407	1
Ag g/t	513	539	429	351	357	365	324	333	301	3
Au g/t	0.55	0.59	0.51	0.42	0.47	0.33	0.37	0.39	0.30	0
Sulphide Ore										
Tonnes Mined	0	20,557	119,353	166,075	151,334	180,265	235,181	263,867	295,668	1
Ag g/t	0	462	451	397	414	390	400	397	379	4
Au g/t	0.00	0.50	0.45	0.43	1.22	0.68	0.45	0.41	0.25	0
Pb%	0.00	1.05	0.76	0.79	0.95	0.91	1.18	0.79	1.32	1
Zn%	0.00	1.51	1.50	1.61	2.14	2.09	2.36	1.64	2.78	2
Total Ore										
Tonnes Mined	211,854	233,744	331,067	377,844	324,916	345,697	404,533	419,591	448,659	3
Ore Type										
Oxide	100 %	91 %	64 %	56 %	53 %	48 %	42 %	37 %	34 %	5
Sulphide	0 %	9 %	36 %	44 %	47 %	52 %	58 %	63 %	66 %	4
Ore Source										
Candelaria	100 %	100 %	82 %	77 %	72 %	82 %	79 %	79 %	75 %	8
Estrella	0 %	0 %	18 %	22 %	18 %	6 %	11 %	13 %	23 %	1
Recompensa	0 %	0 %	0 %	1 %	10 %	12 %	9 %	8 %	1 %	5

Overhand cut and fill stoping begins at the bottom of the ore zone and works upward in horizontal slices that follow the strike, dip and width of the ore zone. Prior to mining, stopes are developed by preparing access, water drains and

ventilation raises. Ore extraction begins by cutting a slice from the bottom of the ore zone and removing the broken ore from the stope. As each successive slice of the stope is taken, the void below is backfilled to support the hanging wall and foot wall and to provide a stable working platform for mining the next ore slice. At La Colorada, individual slices through the ore zone are designed to be 2 meters thick.

Figure 10 presents the typical La Colorada mining sequence. (1) The cut sequence begins with drilling. Using ore broken in the previous advance as a work platform, miners use jacklegs and stopers to drill blastholes into the face above the work platform. (2) After drilling, blasting agent is loaded into the holes, the material is broken and dropped to the floor below. This material then becomes the working platform for advancing the cut. (3) After blasting, and after the atmosphere in the stope is determined to be safe, roof support is completed by removing loose rocks from the newly exposed area and installing rock bolts. (4) As the drill face advances, broken ore is removed from the stope. Ore removal lags approximately 10 meters behind the drill platform to provide a safe working distance between drilling and ore extraction. (5) The “fill” sequence is completed by bringing in backfill material and placing in the void created by ore extraction. The advancing face of the backfill material is separated from the ore to limit ore dilution. The complete cut and fill cycle is made up of steps 1 through 5, which are repeated to advance the length of the planned stope. Each cycle of the full sequence results in an approximate 2.5 meter advance. Typically, blasting occurs twice per shift in each active stope. Mining is conducted on two ten hour shifts per day, seven days per week.

Figure 10: La Colorada- Mining Sequence (La Colorada Planning Dept. 2012)

Ground Support

Typical ground support at La Colorada is split set friction rock bolts, with the addition of cemented rock bolts, mesh, and shotcrete as needed in specific areas. In areas with high clay content, cement grout cartridges are inserted into the split set bolts in order to improve their pull out strength.

During ground support operations, drillers are required to set mechanical roof jacks for additional roof support.

Mine Equipment

Mining equipment used at La Colorada consists of single-boom electric hydraulic drill jumbos and hand operated jackleg type drills for drilling; 1.5 cubic meter, 2.0 cubic meter and 3.75 cubic meter scoop trams for tramming ore and rock backfill to and from stopes; and low-profile 9-tonne to 12-tonne capacity haul trucks for underground ore haulage. Table 28 lists the current La Colorada fleet of mobile mining equipment and the estimated post expansion fleet.

Table 28: La Colorada Mobile Mine Equipment Fleet

Type	Description	Manufacturer and Model	Current Number in Fleet	Estimated post Expansion Fleet
Drill Jumbo	Single Boom Rock Drill	Atlas Copco S1 D	3	5
Scoop Tram	1.5 C. Meter Scoop	Sandvik LH 203 & Toro 151D	14	20
Scoop Tram	3.0 C. Meter Scoop	Sandvik LH 307 & Toro 6	6	10
Haul Truck	15 Tonne Load	Sandvik TH315 & EJC 417	7	11
Scissor Lift	3.5 Meter Lift	Normet 6330 X	1	3
Personnel Trans.	Light transport	Kubota RTV900	24	26
Tractor	Personnel and Service	Various	24	26

16.1. Underground Infrastructure

Mine Access and Development

Personnel and equipment access into all mines is by a decline ramp. The Candelaria Mine and the Estrella Mine have two access ramps each; the Recompensa Mine is accessed by a single ramp.

Main access ramps and haulage drifts are designed to be 3.5 m wide by 3.5 m high with a maximum gradient of 15%. Cross cuts to access ore stopes are designed to be 2.4 m wide by 2.4 m tall. In the ore stopes, minimum cut dimensions are 2.4 m wide by 2.0 m tall. The first cut ore extraction and backfill ramps into the stopes are carried at a maximum grade of 22%. Secondary egress from a stope is required at each 100 m of stope length. Main levels at Candelaria have a vertical interval of 30 meters in order to provide dewatering in advance of mining. Main levels at Estrella are planned to be at 45 meter vertical intervals as the area has been dewatered by pumping of the Candelaria mine.

Mine development occurs concurrently with stope mining to provide an uninterrupted flow of ore to the mill. At the time of this report, La Colorada has approximately 24 months of ore developed ahead of production stoping.

Ore Streams

At La Colorada, ore is segregated into oxide or sulphide types for processing. Mixed ore, a combination of the two ore types that occurs in transition zones, is typically processed through the oxide circuit.

Both primary ore types, oxide and sulphide, are shipped to the mill from the Candelaria Mine. The majority of ore produced from the Estrella Mine is shipped and treated as oxide, however small zones of sulphide ore have been encountered and shipped to the mill in the past. All ore produced from the Recompensa Mine is treated as sulphide.

Ore Transport to Surface

Ore extracted from the Candelaria Mine is hoisted to the surface through the El Aguila Shaft. The ore is dumped from the 438 haulage level into one of two 300 t underground dump pockets. The two bins are used to segregate sulphide and oxide/mixed ore. Ore from the dump pockets is transferred to a skip and hoisted approximately 450 m to surface, where it is dumped into one of two 200 t coarse ore storage bins, which again correspond to ore type. The ore is removed from the bins and hauled to the appropriate mill crusher stockpile by 12 t surface haul trucks. When required, Candelaria ore can be hauled up to the surface using one of the mine access ramps.

Ore extracted from the Estrella and Recompensa Mines is hauled to the surface by the La Colorada underground mine truck fleet. Estrella and Recompensa ores are stockpiled on the surface near the mine portals. The ore is then reclaimed from the stockpile and hauled to the appropriate mill crusher stockpile by 12 t surface haul trucks.

In 2007, the Candelaria ore hoist was replaced to increase hoisting capacity and provide improved reliability. The current hoist is a 1.68 m diameter double drum, two skip unit powered by a 400 horsepower (hp) drive. Each skip carries approximately 3 t per trip, with the actual load dependent on the density of the material hoisted. The hoist system is capable of delivering approximately 1,200 t per day to the surface. Mechanical and electrical availability of the hoist system exceeds 85%.

New Shaft

Cementation completed a scoping study into new borehole hoisting shaft in January, 2013 the results of that study are as summarized in this section (Project 100796, Rev 2 for Pan American Silver Corp. La Colorada Mine Borehole Hoisting Scoping Study, January 25, 2013 by Cementation Canada Inc.). The estimate is based on a 5 meter final excavation diameter borehole from surface to 618 meters below surface where the underground mine will provide access for attaching the reamer and removing the rock cuttings from the reaming process. Borehole shaft steel sets will be anchored using 1 meter concrete rings spaced every 6 meters. The reamed borehole walls will be self-supporting requiring only local ground support typically bolts and screen between the concrete rings. Borehole cables will be limited to leaky feeder, hoist control cable, signal cable and a ground conductor. The shaft will contain 2 conveyances running in balance on fixed steel guides, with a single deck cage (14 man capacity) under one skip. As there will be no ladder way in the shaft, a small hydrostatic escape hoist will be provided for emergency egress during shaft inspection.

The borehole will be as vertical as possible with a maximum permissible borehole deviation of 600 mm included in the excavation diameter. Hole deviation from vertical during the pilot hole drilling process will be minimized with the use of rotary directional drilling equipment located directly behind the pilot bit. The deviation is often corkscrew in nature due to the spiraling travel of the pilot hole bit as it bores downward. As the reaming head of the raise drill machine will follow the pilot hole this will result in small undulations in the bore hole wall over the length of the hole. This is mitigated in the hoisting system design by including an allowance in the final borehole excavation diameter to accommodate the deviation. Cementation recently completed a similar project of a 460 meter pilot hole with a maximum deviation through the length of the bore hole of less than or equal to 75 mm.

The hoisting design criteria was to provide the capacity for 2,300 tonnes per day from 1,000 meters deep with time provided for men and materials. The shaft design has been deliberately oversized in order to avoid it becoming a

future choke point and to provide the capacity in case it is deepened in the future. Hoisting time of 4 hours per shift (based on operating 2 – 12 hour shifts per day) has been reserved for winder inspection/testing and personnel movement of up to 125 persons per shift. Rock hoisting will be 14.4 hours per day (based on 90% winder availability). Hoist will be a double drum 3.048 meter diameter hoist. The skips will operate in balance and be 5.8 tonne capacity, hoisting rope will be 1 3/8” diameter 1,770 MPa. Hoisting speed from 1000 meter level will be 12.19 m/s, this will be reduced to 11.18 m/s when hoisting from the 600m horizon in order to reduce power costs. The initial study had concluded the 5 tonne capacity skips would be sufficient, however when PAS asked for additional capacity Cementation estimated that the resultant effect of the skip capacity change would have an insignificant result on the project cost estimate per “Memo re project 100796 re hoisting capacity by Cementation dated October 16, 2013”.

A 36 meter high open frame steel construction headframe will be required, with skips dumping directly to a 250 tonne capacity ore bin. The chute arrangement will be such that waste will pass over the ore chute and onto a pad on the ground. The ore bin will have a chute for either conveyor loading or truck loading. The collar house will be an open sided structure 5.6 meters wide by 10 meters long and 10.5 meters high with a structure with suspended monorails for conveyance removal. The hoist house will be of steel frame construction with an attached electrical control room.

Underground rock handling will be via 2 dumps located on the 558 level. The dumps will have grizzlies with 300 mm by 300 mm openings that will allow truck dumping and a fixed rock breaker on each dump. Below each grizzly will be a 300 tonne capacity rock bin feeding a common transfer conveyor via chute and pan feeder arrangements on the 588 level. The transfer conveyor will feed a transfer gate that in turn feeds twin 5.8 tonne capacity chutes. The transfer conveyor and loading pocket will be amenable to full automation.

Dewatering

The Candelaria Mine requires dewatering to mine the deeper levels of the mine. Dewatering of the Estrella and Recompensa Mines is not required for mining (as the Candelaria mine is deeper).

The Candelaria pump station is currently located on the 558 level, which will support mining until the next main pump station is constructed at or about the 660 level of the mine. The pump station is comprised of sixteen 150 hp pumps, which includes a set of fully redundant standby units for periods of peak flows and maintenance. The pumps are connected to the mine power distribution system, with three 1.2 MW generators located on surface for backup. Water from the mine is collected in and pumped from a 7,000 m^3 sump. Mine dewatering during 2012 was approximately 50% of installed capacity averaging 605 m^3 of water per hour.

Mine Ventilation

La Colorada has an engineered air ventilation network at all three mines to prevent build-up of dangerous gasses, provide fresh air to the mines, and to cool hot areas.

Up to a point, excess heat in a mine can be dealt with in the same manner as contaminant gasses by providing enough ventilating air volumetric flow rate to reduce heat to an acceptable level. When the heat becomes so high that it is no

longer economic to provide increasing ventilating air volumetric flow rate then refrigeration of the ventilating air is considered.

The heat sources in a mine include the heat generated by diesel and electrical equipment, heat transferred from the rock, oxidation of minerals, auto compression of air, people and in the case of La Colorada heat from ground water. The Candelaria mine (the deepest) is divided with oxide mineralization to the west and sulphide mineralization to the east. The veins in both zones are permeable and allow water flow, in the deeper levels the water in the sulphide areas currently flows into the mine at 44° C and the water in the oxide areas is 36° C.

The mine ventilation system is designed to deal with the heat in the mine and the conclusion of the ventilation studies, conducted by a third party consultant, is that refrigeration of the ventilating air will not be required to develop and mine the mineral reserves stated in this technical report (Orellana Wiarco, 2012). However, as mineralization at the La Colorada mine has been shown by diamond drilling information to extend some 425 meters below the deepest level being developed at the time of this report it is possible that refrigeration will be required beyond the mine life presented in this technical report.

The Candelaria Mine has two 2.4 m bored ventilation raises, current ventilation volume is 286,000 CFM.

Ventilation for the Estrella mine is currently provided by a single 150,000 cfm exhaust fan on a 2.4 m diameter bored raise as well as via the access ramp and the 360 level access to the Candelaria mine. An additional 3.1 m diameter ventilation raise has been bored and is currently being supported. When completed a second primary exhaust fan will be in place for the Estrella mine.

Ventilation for the Recompensa mine is provided by a single 170,000 cfm fan.

Stope Backfill

Wherever possible waste development rock is stored underground for use as backfill in the cut and fill stopes.

In 2011, La Colorada commissioned a new hydraulic backfill plant to provide material for backfilling sulphide stopes in the Candelaria Mine. The plant processes sulphide mill tailings to separate a coarse size fraction for use as backfill underground. Plant equipment includes cyclones, a slurry pumping station, slurry stock tank and agitator. The plant is located at the Candelaria mill and backfill is returned to the mine through the El Aguila shaft.

Cement is added to the first section of backfill placed at the bottom of the stopes to facilitate mining of ore left in pillars between stopes.

Power

Electrical power is distributed underground at 4.16 kV and 2.30 kV. Local transformers reduce the voltage to 480 v as needed.

Compressed Air and Drill Water

Compressed air for mining is supplied by electric powered air compressors located on the surface at each mine. The Candelaria Mine compressed air plant is comprised of two compressors, each capable of supplying 45 ft^3 per minute of air. The compressed air plants at the Estrella and Recompensa Mines are comprised of one compressor at each mine, each capable of supplying 45 ft^3 per minute of air. Compressed air is distributed underground through a network of steel pipes.

Water for drilling is provided by the mine dewatering system. Water is distributed throughout the mines via a network of steel and high density polyethylene (HDPE) pipes.

16.2. Life of Mine Plan (LOM)

Long Term Production Plan

La Colorada reviews and updates mineral reserves and long term production plans on an annual basis. Planning at La Colorada relies on historical productivities achieved at the property for ore extraction and stope development. Mining of individual ore stopes is scheduled to provide reasonably consistent ore quality for processing and maintaining consistent silver production levels.

The current long term plan spans the period from 2013 to 2027 inclusive. In this plan, the rate of extraction increases to 1,800 tpd in 2018 from the 1,250 tpd projected for 2014. The plan includes provisions for ongoing underground development to support the planned extraction. The Candelaria Mine supplies 66% of total mill feed going forward, the Estrella mine supplies 34% of the mill feed and 0% is sourced from the Recompensa Mine.

The mine plan projects that material shipped to the mill will be 23% oxide and 77% sulphide during the remainder of the currently planned mine life.

Upon completion of the expansion in 2018, the mine plan projects shipping an average of 400 tonnes per day of oxide materials and 1,400 tonnes per day of sulphide materials to the mill for the remainder of the planned mine life.

Underground mine personnel, including mining, development, maintenance, and supervision, is currently 395. This is planned to increase to 533 in 2018 with the completion of the mine expansion as shown in Table 29.

Table 29: Underground Mine Personnel

Underground Personnel	Current	Additional	Post Expansion
Equipment Operator	54	45	99
Driller	184	48	232
Mechanical	58	18	76
Electrical	14	9	23
Shift Supervisor	13	6	19
Mechanical Supervisor	3	6	9
Electrical Supervisor	1	6	7
Others	68	0	68
Total	395	138	533

Table 30 presents selected data summarizing the current long term mine plan.

Table 30: La Colorada Long Term Plan

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2
Oxide										
Tonnes Mined	146,000	146,000	146,400	146,000	146,000	146,000	146,400	146,000	146,000	
Ag g/t	307	333	316	383	401	367	380	392	392	
Au g/t	0.35	0.35	0.34	0.39	0.44	0.48	0.47	0.45	0.46	
Sulphide										
Tonnes Mined	310,250	310,250	402,700	401,325	511,000	511,006	512,400	511,000	511,000	
Ag g/t	397	389	379	360	410	421	418	417	407	
Au g/t	0.26	0.27	0.29	0.29	0.31	0.29	0.31	0.36	0.42	
Pb%	1.51	1.37	1.53	1.60	2.26	2.06	2.45	2.28	1.73	
Zn%	2.73	2.63	2.81	2.86	3.98	3.53	4.37	4.46	2.83	
Total Tonnes Mined	456,250	456,250	549,100	547,325	657,000	657,006	658,800	657,000	657,000	
Material Type										
Oxide	32 %	32 %	27 %	27 %	22 %	22 %	22 %	22 %	22 %	
Sulphide	68 %	68 %	73 %	73 %	78 %	78 %	78 %	78 %	78 %	
Material Source										
Candelaria	78 %	73 %	76 %	73 %	80 %	80 %	73 %	68 %	67 %	
Estrella	22 %	27 %	24 %	27 %	20 %	20 %	27 %	32 %	33 %	
Recompensa	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
Development Meters	4,795	4,844	5,098	5,309	5,245	4,990	4,571	4,768	4,904	
Site Headcount										
Employees	618	619	672	672	725	730	732	740	745	
Contractors	114	84	82	80	80	80	35	0	0	

The PEA mine plan is based on La Colorado's estimated mineral reserves and resources as of December 31, 2012 adjusted for production information available as of mid-2013. The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the results of the PEA, including the expanded mine plan, will be realized. Mineral resources that are not mineral reserves have no demonstrated economic viability.

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17.0 RECOVERY METHODS

Ore processing at La Colorada is comprised of separate oxide and sulphide circuits. Except for a common crushing plant, the two ore processing streams operate independently. The daily processing capacity of the oxide plant is 650 tpd and the capacity of the sulphide plant is currently 750 tpd. The crushing plant currently does not have sufficient capacity to supply both plants to their maximum capacity.

Mixed ore from the mine, comprising material mined from the transition zone between the oxide and sulphide zones, is typically treated as oxide ore for processing.

Ore processing is conducted on two twelve hour shifts per day, seven days per week. The crushing plant is also staffed for two twelve hour shifts per day, seven days per week; however, eighteen hours of operation is typically sufficient to maintain mill feed.

Ore Processing Rate

The ore processing rate at La Colorada has steadily increased over time. In 2003, the year before startup of the oxide processing plant, La Colorada processed a total of 56,000 tonnes of ore. In 2007, 331,000 tonnes of ore was processed and in 2013 449,000 tonnes of ore was processed.

In addition to increasing processing rates, the relative mix of oxide and sulphide ore processed at La Colorada is also changing with time. In 2003, 100% of the ore processed was sulphide. In 2007, 64% of the total ore processed was treated as oxide. In 2013, 66% of the total ore processed was treated as sulphide. This trend of increasing sulphide ore will continue as oxide mineral reserves become depleted at La Colorada. Figure 11 is a chart that shows, in both actual and estimated numbers, annual tonnes processed and the relative breakdown of mill feed by ore type for the years 2001 through 2027 inclusive.

Figure 11: Processing Rate (Actual and Estimated) by Material Type

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Table 31 summarizes ore processing production statistics realized during the years 2008 through 2013.

Table 31: Plant Production 2008-2012

Year	2008	2009	2010	2011	2012	2013	Total
Oxide							
Tonnes Processed	211,769	173,582	165,432	169,352	155,724	152,494	1,028,353
Ag g/t	351	357	366	326	333	301	340
Au g/t	0.42	0.47	0.35	0.41	0.39	0.30	0.39
Ag Recovery, %	81.8	81.9	83.0	83.5	82.4	82.0	82.41
Au Recovery, %	77.9	76.9	75.0	73.1	69.1	69.3	73.86
Ag Produced, t oz	1,956,649	1,629,647	1,616,583	1,481,688	1,371,153	1,207,675	9,263,395
Au Produced, t oz	2,209	2,014	1,393	1,611	1,270	1,029	9,526
Sulphide							
Tonnes Processed	166,075	151,334	180,265	235,181	263,867	296,165	1,292,887
Ag g/t	397	414	390	400	397	379	394
Au g/t	0.43	1.22	0.68	0.45	0.41	0.25	0.52
Pb%	0.79	0.95	0.91	1.18	1.26	1.32	1.11
Zn%	1.61	2.14	2.09	2.36	2.61	2.78	2.35
Ag Recovery, %	92.2	91.2	92.2	93.0	93.2	93.1	92.65
Au Recovery, %	68.7	76.2	73.5	73.6	70.0	65.9	70.77
Pb Recovery, %	77.2	83.4	83.5	86.0	85.7	85.1	83.94
Zn Recovery, %	68.5	71.2	78.0	80.6	82.1	82.1	78.21
Ag Produced, t oz	1,954,182	1,838,209	2,084,986	2,814,095	3,059,958	3,358,702	15,110,132
Au Produced, t oz	1,565	4,540	2,919	2,493	2,309	1,550	15,375
Pb Produced, dmt	1,011	1,205	1,366	2,388	2,766	3,324	12,060
Zn Produced, dmt	1,835	2,311	2,940	4,466	5,599	6,759	23,910
MaterialType Processed							
Oxide	56 %	53 %	48 %	42 %	37 %	34 %	44 %
Sulphide	44 %	47 %	52 %	58 %	63 %	66 %	56 %
Combined Production	3,910,831	3,467,856	3,701,569	4,295,783	4,431,111	4,566,377	24,373,527

Ag Produced, t oz	3,774	6,554	4,312	4,104	3,578	2,579	24,901
Au Produced, t oz	1,011	1,205	1,366	2,388	2,795	3,324	12,089
Pb Produced, dmt	1,835	2,311	2,940	4,466	5,538	6,759	17,090
Zn Produced, dmt							
Overall Recoveries (Pb & Zn Sulphide Only)							
Ag Recovery, %	86.7	86.6	88.0	89.5	89.6	89.8	88.2
Au Recovery, %	73.8	76.4	74.0	73.4	69.7	66.4	59.2
Pb Recovery, %	77.2	83.4	83.5	86.0	85.7	85.1	83.9
Zn Recovery, %	68.5	71.2	78.0	80.6	82.1	82.1	78.2

Metallurgical Recovery

Metallurgical recoveries at La Colorada have been relatively constant over the past six years of production. For the period from January 2008 through the year end 2013, silver recovery has averaged 82.4% from the oxide processing circuit and 92.7% from the sulphide processing circuit.

Metallurgical recoveries at La Colorada are tracked by ore type and ore zone. Recoveries assumed for the long term plan are based on actual recoveries achieved for each ore type, ore zone and results from metallurgical testing. Recoveries are assigned to each ore type and ore zone identified in the mine plan and the overall recovery reported for a given period is a function of the planned processing mix. Table 32 and Table 33 provide historic and projected recoveries for each payable metal by ore type.

Table 32: Oxide Circuit Recovery

	Ag Recovery, %		Au Recovery, %	
Year	Actual	LTP	Actual	LTP
2008	81.8 %	—	77.9 %	—
2009	81.9 %	—	76.9 %	—
2010	83.0 %	—	75.0 %	—
2011	83.5 %	—	73.1 %	—
2012	82.4 %	—	69.1 %	—
2013	82.0 %	—	69.3 %	—
2014	—	78.8 %	—	69.2 %
2015	—	78.3 %	—	69.2 %
2016	—	78.4 %	—	69.2 %
2017	—	78.5 %	—	69.2 %
2018	—	78.6 %	—	69.2 %
2019	—	77.4 %	—	69.2 %
2020	—	75.7 %	—	69.2 %
2021	—	76.2 %	—	69.2 %
2022	—	75.0 %	—	69.2 %
2023	—	75.0 %	—	69.2 %
2024		75.0 %		69.2 %
2025		75.0 %		69.2 %
2026		75.0 %		69.2 %
2027	—	82.4 %	—	69.2 %
Average	82.4 %	77.1 %	73.9 %	69.2 %

Table 33: Sulphide Circuit Recovery

	Ag Recovery, %		Au Recovery, %		Pb Recovery, %		Zn Recovery, %	
Year	Actual	LTP	Actual	LTP	Actual	LTP	Actual	LTP
2008	92.2	—	68.6	—	77.2	—	68.5	—
2009	91.2	—	76.2	—	83.4	—	71.2	—
2010	92.2	—	73.5	—	83.5	—	78.0	—
2011	93.0	—	73.6	—	86.0	—	80.6	—
2012	93.2	—	70.0	—	85.7	—	82.1	—
2013	93.1	—	65.9	—	85.1	—	82.1	—
2014	—	92.9	—	67.1	—	85.4	—	82.3
2015	—	92.9	—	67.1	—	85.4	—	82.3
2016	—	92.9	—	67.1	—	85.4	—	82.3
2017	—	92.9	—	67.1	—	85.4	—	82.3

2018	—	92.9	—	67.1	—	85.4	—	82.3
2019	—	92.9	—	67.1	—	85.4	—	82.3
2020	—	92.9	—	67.1	—	85.4	—	82.3
2021	—	92.9	—	67.1	—	85.4	—	82.3
2022	—	92.9	—	67.1	—	85.4	—	82.3
2023	—	92.9	—	67.1	—	85.4	—	82.3
2024	—	92.9	—	67.1	—	85.4	—	82.3
2025	—	92.9	—	67.1	—	85.4	—	82.3
2026	—	92.9	—	67.1	—	85.4	—	82.3
2024	—	92.9	—	67.1	—	85.4	—	82.3
Avg	92.7	92.9	70.8	67.1	83.9	85.4	78.2	82.3

Hydraulic Backfill Plant

La Colorada constructed and commissioned a new hydraulic backfill plant in 2011. The new plant:

- Provides an alternative to the use of development waste for stope backfill. The discovery of additional mineral reserves and mineral resources means that there continues to be a good supply of development waste. However, when the development eventually winds down the hydraulic backfill can be utilized.
- Reduces storage and re-handle cost of development waste underground.
- Improves stope cycle times by providing a ready source of backfill material.
- Reduces the cost of surface tailings storage by returning sulphide tailings underground versus building additional surface storage capacity.

Operation of the plant and use of sulphide tailings for backfill underground has been reviewed and approved by the Mexican regulatory agencies responsible for this activity.

Planned manpower for ore processing, including plant and tailings operations, plant maintenance and supervision, totals 106 regular employees through the year 2019, the period when the oxide and sulphide plants are running. Processing of oxide ore is scheduled to end in the year 2019, and planned manpower for ore processing decreases to 86 for the balance of the current long term plan. Planned manpower levels are consistent with current staffing levels.

17.1. Crushing Plant

A single, two-stage crushing plant is used to crush oxide and sulphide ore at La Colorada. The material is batched through the plant, and after crushing, the product is stored separately by process type (oxide versus sulphide). Table 34 lists the major crushing equipment installed at La Colorada. A description of unit operations is provided in the following sections.

Table 34: La Colorada Crushing Equipment

Equipment Type/Function	Manufacturer	Description	Number in Circuit
Primary Feeder	Svedala	FW 434 apron feeder	1
Primary Crusher	Minyu	600 mm x 900 mm jaw	1
Secondary Crusher	Symons	1.3 m short head cone	1
Final Product Size Classifier	Deister	1.8 m x 4.3 m vibrating screen	1

Ore is reclaimed from the coarse ore stockpile by loader and passed through a stationary grizzly with 600 mm x 900 mm openings for sizing prior to crushing. Primary crushing is performed with a 900 mm x 600 mm jaw crusher. Product from the jaw crusher is conveyed to a 1.8 m x 4.3 m vibrating screen for size classification. Material off the screen oversize deck reports to a 1.3 m secondary cone crusher in a closed loop for further size reduction.

Depending on material type, the screen undersize material reports to a fine ore stockpile (oxide) or fine ore bin (sulphide) for grinding. Material is directed to the proper fine ore stockpile or bin by a diverter gate and pant leg chute.

17.2. Oxide Plant

The oxide plant is a conventional cyanide leach flowsheet comprised of crushing, grinding, leaching, Merrill Crowe zinc precipitation and on-site refining to produce precious metal doré. Construction of the oxide plant began in July 2002 and the first production of doré occurred in August 2003. The oxide plant was originally designed for a rated capacity of 600 t per day; however incremental operating improvements realized since start-up have provided an additional 50 t per day in oxide ore processing capacity over original design.

Table 35 lists the major equipment used for processing oxide ore at La Colorada and Figure 12 provides the current flow sheet for the oxide plant.

Table 35: Oxide Plant Equipment

Equipment Type/Function	**Manufacturer**	**Description**	**Number in Circuit**
Ball Mill	Norberg	2.9 m x 3.4 m	1
Ball Mill	Norberg	2.4 m x 3.0 m	1
Leach Thickeners	Eimco	7.9 m x 2.4 m	2
Leach Tanks w/ Mixers	Philadelphia (Mixers)	7.6 m x 8.4 m	11
Countercurrent Rinse Tanks	Eimco	7.9 m x 2.4 m	4

Figure 12: Oxide Flow Diagram (La Colorada Processing Dept., 2012)

Crushing

Crushing equipment and operations are the same for oxide and sulphide ore. After crushing oxide ore, the final crushed ore product is delivered to a fine ore stockpile, where it is held for processing through the oxide circuit.

Grinding

Crushed ore is reclaimed from the fine ore stockpile by a 610 mm variable speed belt feeder and conveyed to a 2.9 m x 3.4 m ball mill that is charged with 76 mm diameter grinding balls for grinding. Product from this mill is pumped to a bank of 510 mm diameter cyclones for size classification. Cyclone underflow, the coarser grinding product, reports to a second 2.4 m x 3.0 m ball mill that is charged with 64 mm diameter balls for additional grinding. Cyclone overflow, the finer grinding product, reports to the primary leach thickener ahead of the leach circuit. Product from the second mill returns to the cyclone for classification to form a closed loop within the grinding circuit. The grinding feed rate is automatically controlled by a belt scale installed on the ball mill feed conveyor. Dilute cyanide solution is used in the grinding circuit to initiate leaching of gold and silver.

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Leaching

Following grinding, slurry from the cyclone overflow reports to a 7.9 m x 2.4 m primary leach thickener. Clear solution overflow from this thickener reports to the pregnant solution tank and slurry underflow reports to a series of seven agitated leach tanks. Normally, five of the seven tanks are used for leaching and two tanks are on standby. The slurry passes through each tank in series for leaching and after passing through the active leach tanks, the slurry reports to a 7.9 m x 2.4 m intermediate leaching thickener. Clear solution overflow from the thickener reports to the pregnant solution tank and th