UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

# FORM 20-F

☐ REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR (g) OF THE SECURITIES EXCHANGE ACT OF 1934

OR

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15 (d) OF THE SECURITIES EXCHANGE ACT OF 1934 **FOR THE FISCAL YEAR ENDED DECEMBER 31, 2021**

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

OR

☐ SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Date of event requiring this shell company report

For the transition period from ____________________ to ____________________

**Commission file number 001-32702**

**ALMADEN MINERALS LTD.**
(Exact name of Registrant as specified in its charter)

**British Columbia, Canada**
(Jurisdiction of incorporation or organization)

**1333 Johnston Street, #210, Vancouver, British Columbia V6H 3R9**
(Address of principal executive offices)

**Korm Trieu, ktrieu@almadenminerals.com, 1333 Johnston Street, #210, Vancouver, BC V6H 3R9**
(Name, Telephone, E-mail and/or Facsimile number and Address of Company Contact Person)

Securities registered or to be registered pursuant to Section 12(b) of the Act.

| Title of each class | Trading symbol | Name of each exchange on which registered |
|---|---|---|
| **Common shares without Par Value** | **AAU** | **NYSE American** |

Securities registered or to be registered pursuant to Section 12(g) of the Act.

**None**
(Title of Class)

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act.

**None**

Indicate the number of outstanding shares of each of the issuer's classes of capital or common shares as of the close of the period covered by the annual report.

**137,221,408**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

☐ Yes ☒ No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934.

☐ Yes ☒ No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

☒ Yes ☐ No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files).

☒ Yes ☐ No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer or a non-accelerated filer. See definition of "accelerated filer and large accelerated filer" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☐ Accelerated filer ☐ Non-accelerated filer ☒ Emerging Growth Company ☒

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards† provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☐

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP ☐ International Financial Reporting Standards as issued by the International Accounting Standards Board ☒ Other ☐

If “Other” has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow.

☐ Item 17 ☐ Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).

☐ Yes ☒ No

(APPLICABLE ONLY TO ISSUERS INVOLVED IN BANKRUPTCY PROCEEDS DURING THE PAST FIVE YEARS)

Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Section 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court.

☐ Yes ☐ No

Under the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"), Almaden is classified as an "Emerging Growth Company". The Company will continue to be deemed an emerging growth company until the earliest on the last day of our fiscal year during which (i) annual gross revenue exceeds $1.07 billion or (ii) the Company issues more than $1.0 billion in non-convertible debt in a three-year period. Almaden will lose its status as an emerging growth company on the last day of its fiscal year following the fifth anniversary of the date of the first sale of common equity securities pursuant to an effective registration statement. The Company will also lose its status as an emerging growth company if at any time it is deemed to be a large accelerated filer.

As an emerging growth company, Almaden is exempt from Section 404(b) of the Sarbanes-Oxley Act of 2002, as amended (the “Sarbanes-Oxley Act”), which requires a public company’s auditor to attest to, and report on, management’s assessment of its internal controls. The Company is also exempt from Sections 14A(a) and (b) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), which require companies to hold shareholder advisory votes on executive compensation and golden parachute compensation.

Almaden has elected to use the extended transition period for complying with new or revised accounting standards under Section 102(b)(2) of the Jobs Act, that allows the Company to delay the adoption of new or revised accounting standards that have different effective dates for public and private companies until those standards apply to private companies. As a result of this election, Almaden’s financial statements may not be comparable to companies that comply with public company effective dates.

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**Glossary of Geologic and Mining Terms**

**Adularia:** A colourless, moderate to low-temperature variety of orthoclase feldspar typically with a relatively high barium content. It is a prominent constituent of low sulphidation epithermal veins.

**Alkalic Intrusive:** An igneous rock emplaced below ground level in which the feldspar is dominantly sodic and or potassic.

**Alkalinity:** The chemical nature of solutions characterized by a high concentration of hydroxyl ions.

**Alteration:** Usually referring to chemical reactions in a rock mass resulting from the passage of hydrothermal fluids.

**Andesite**: A dark-coloured, fine-grained extrusive rock that, when porphyritic, contains phenocrysts composed primarily of zoned sodic plagioclase (esp. andesine) and one or more of the mafic minerals (eg. Biotite, horn-blende, pyroxene), with a ground-mass composed generally of the same minerals as the phenocrysts; the extrusive equivalent of *diorite*. Andesite grades into *latite* with increasing alkali feldspar content, and into *dacite* with more alkali feldspar and quartz. It was named by Buch in 1826 from the Andes Mountains, South America.

**Anomalous:** A geological feature, often subsurface, distinguished by geological, geochemical or geophysical means, which is detectably different than the general surroundings and is often of potential economic value.

**Anomaly:** Any concentration of metal noticeably above or below the average background concentration.

**Argillic**: A form of alteration characterized by the alteration of original minerals to clays.

**Arsenopyrite**: A sulphide of arsenic and iron with the chemical composition FeAsS.

**Assay:** An analysis to determine the presence, absence or quantity of one or more components.

**Axis:** An imaginary hinge line about which the fold limbs are bent. The axis of a fold can be at the top or bottom of the fold, can be tilted or horizontal.

**Batholith:** An intrusion, usually granitic, which has a large exposed surface area and no observable bottom. Usually associated with orogenic belts.

**Breccia:** Rock consisting of more or less angular fragments in a matrix of finer-grained material or cementing material.

**Brecciated:** Rock broken up by geological forces.

**Bulk sample:** A very large sample, the kind of sample to take from broken rock or of gravels and sands when testing placer deposits.

**Calc-silicate:** Calcium-bearing silicate minerals. These minerals are commonly formed as a result of the interaction of molten rock and its derived, hot hydrothermal fluids with very chemically reactive calcium carbonate (limestone). Calc-silicate minerals include garnet, pyroxene, amphibole and epidote. These minerals are commonly described as skarn and are genetically and spatially associated with a wide range of metals.

**Chert:** A very fine grained siliceous rock. Many limestones contain nodules and thin lenses of chert.

**Chip sample:** A sample composed of discontinuous chips taken along a surface across a given line.

**Claim:** That portion of public mineral lands, which a party has staked or marked out in accordance with provincial or state mining laws, to acquire the right to explore for the minerals under the surface.

**Clastic:** Consisting of rock material that has been mechanically derived, transported, and deposited. Such material is also called detrital.

**Cleavage:** The tendency of a crystal to split, or break, along planes of structural weakness.

**Concordant Bodies:** Intrusive igneous bodies whose contacts are parallel to the bedding of the intruded rock.

**Conglomerate:** Rock composed of mostly rounded fragments which are of gravel size or larger in a finer grained matrix.

**Craton:** A central stable region common to nearly all continents and composed chiefly of highly metamorphosed Precambrian rocks.

**Cretaceous:** Geological time period between 136 and 64 million years ago.

**Crystalline:** Means the specimen is made up of one or more groups of crystals.

**Cut-off grade:** The minimum grade of mineralization used to establish quantitative and qualitative estimates of total mineralization.

**Dacite:** A fine grained acid volcanic rock, similar to rhyolite in which the feldspar is predominantly plagioclase.

**Degradation:** The ongoing process of erosion in a stream.

**Diagenesis:** The changes that occur in a sediment during and after lithification. These changes include compaction, cementation, replacement, and recrystallization.

**Diamond drill:** A type of rotary drill in which the cutting is done by abrasion using diamonds embedded in a matrix rather than by percussion. The drill cuts a core of rock which is recovered in long cylindrical sections.

**Dilution:** Results from the mixing in of unwanted gangue or waste rock with the ore during mining.

**Dip:** Geological measurement of the angle of maximum slope of planar elements in rocks. Can be applied to beddings, jointing, fault planes, etc.

**Discordant Bodies:** Intrusive igneous bodies whose contacts cut across the bedding, or other pre-existing structures, to the intruded rock.

**Disseminated deposit**: Deposit in which the mineralization is scattered through a large volume of host rock, sometimes as separate mineral grains, or sometimes along joint or fault surfaces.

**Dyke:** A tabular, discordant, intrusive igneous body.

**Earn in:** The right to acquire an interest in a property pursuant to an Option Agreement.

**Ejecta:** Pyroclastic material thrown out or ejected by a volcano. It includes ash, volcanic bombs, and lapilli.

**Epithermal:** Epithermal deposits are a class of ore deposits that form generally less than 1 km from surface. These deposits, which can host economic quantities of gold, silver, copper, lead and zinc are formed as a result of the precipitation of ore minerals from up-welling hydrothermal fluids. There are several classes of epithermal deposits that are defined on the basis of fluid chemistry and resulting alteration and ore mineralogy. Fluid chemistry is largely controlled by the proximity to igneous intrusive rocks and as a result igneous fluid content.

**Extrusive Rock:** Igneous rock that has solidified on the earth's surface from volcanic action.

**Fault**: A fracture in a rock where there had been displacement of the two sides.

**Faults:** Breaks in rocks with noticeable movement or displacement of the rocks on either side of the break.

**Feldspar:** A group of aluminum silicate minerals closely related in chemical composition and physical properties. There are two major chemical varieties of feldspar: the potassium aluminum, or potash, feldspars and the sodium-calcium-aluminum, or plagioclase, feldspars. The feldspars possess a tetrahedral framework of silicon and oxygen, with the partial substitution of aluminum for the silicon. They make up about 60 percent of the earth's crust.

**Felsic:** Light colored silicate minerals, mainly quartz and feldspar, or an igneous rock comprised largely of felsic minerals (granite, rhyolite).

**Fluid inclusion:** Fluid inclusions are "bubbles" of fluid trapped within the host mineral during its deposition from its parent hydrothermal fluid. They are tiny remnants of the exact fluid from which the host mineral and its associated ore minerals deposited and they provide direct information about the fluid composition, temperature and pressure at which the hydrothermal deposit formed.

**Folds:** Are flexures in bedded or layered rocks. They are formed when forces are applied gradually to rocks over a long period of time.

**Fracture:** Breaks in a rock, usually due to intensive folding or faulting.

**Gangue:** Term used to describe worthless minerals or rock waste mixed in with the valuable minerals.

**Geochemical Anomaly:** An area of elevated values of a particular element in soil or rock samples collected during the preliminary reconnaissance search for locating favourable metal concentrations that could indicate the presence of surface or drill targets.

**Geochemistry:** The study of the chemistry of rocks, minerals, and mineral deposits.

**Geophysics:** The study of the physical properties of rocks, minerals, and mineral deposits.

**Gouge:** The finely ground rock that results from the abrasion along a fault surface.

**Grade:** The concentration of each ore metal in a rock sample, usually given as weight percent. Where extremely low concentrations are involved, the concentration may be given in grams per tonne (g/t) or ounces per ton (oz/t). The grade of an ore deposit is calculated, often using sophisticated statistical procedures, as an average of the grades of a very large number of samples collected from throughout the deposit.

**Granite:** A coarse grained, plutonic igneous rock that is normally pale pink, pale pink-brown, or pale grey, and composed of quartz, alkali feldspar, micas and accessory minerals.

**Granodiorite:** A course grained, plutonic igneous rock that is normally pale grey, and composed of quartz, calc-alkali feldspar, micas and accessory minerals.

**Grid:** A network composed of two sets of uniformly spaced parallel lines, usually intersecting at right angles and forming squares, superimposed on a map, chart, or aerial photograph, to permit identification of ground locations by means of a system or coordinates and to facilitate computation of direction and distance and size of geologic, geochemical or geophysical features.

**Hectare:** A square of 100 meters on each side.

**Host rock:** The rock within which the ore deposit occurs.

**Hydrothermal:** Of or pertaining to hot water, to the action of hot water, or to the products of this action, such as a mineral deposit precipitated from a hot aqueous solution; also, said of the solution itself. "Hydrothermal" is generally used for any hot water, but has been restricted by some to water of magmatic origin.

**Igneous:** Means a rock formed by the cooling of molten silicate material.

**Induced polarization (I.P.) method:** The method used to measure various electrical responses to the passage of alternating currents of different frequencies through near-surface rocks or to the passage of pulses of electricity.

**Intermediate:** An igneous rock made up of both felsic and mafic minerals (diorite).

**Intrusion**: General term for a body of igneous rock formed below the surface.

**Intrusive Rock:** Any igneous rock solidified from magma beneath the earth's surface.

**Joint venture agreement:** An agreement where the parties agree to the terms on which a property will be jointly explored, developed, and mined. (See also "Option agreement" and "Earn in").

**Jurassic:** Geological time period between 195 and 136 million years ago.

**Kriging:** (a) A statistical technique employed in calculating grade and tonnage of ore reserves from sampling data. The data are handled by computer. (b) A technique for interpolating which honors data points exactly. An output point is calculated as a linear combination of known data points. Kriging attempts to produce the best linear unbiased estimate. Used to interpolate between drill holes.

**K-silicate:** Potassium-bearing silicates. Potassium silicates are very common rock-forming minerals, however they are also formed by the interaction of hydrothermal fluids derived from the cooling intrusive rocks that are genetically and spatially associated with porphyry and epithermal deposits. Potassium feldspar (orthoclase) and potassium mica (biotite) are both commonly closely associated with copper-molybdenum ore in porphyry copper deposits.

**K-spar:** Potassium feldspar.

**Lava:** Means an igneous rock formed by the cooling of molten silicate material which escapes to the earth's surface or pours out onto the sea floor.

**Limestone:** Sedimentary rock that is composed mostly of carbonates, the two most common of which are calcium and magnesium carbonates.

**Lithosphere:** The crust and upper mantle, located above the asthenosphere and composing the rigid plates.

**Mafic:** A general term used to describe ferromagnesian minerals. Rocks composed mainly of ferromagnesian minerals are correctly termed melanocratic.

**Magma:** Naturally occurring molten rock material, generated within the earth and capable of intrusion and extrusion, from which igneous rocks have been derived through solidification and related processes. It may or may not contain suspended solids (such as crystals and rock fragments) and/or gas phases.

**Massive:** Implies large mass. Applied in the context of hand specimens of, for example, sulphide ores, it usually means the specimen is composed essentially of sulphides with few, if any, other constituents.

**Metamorphic:** Means any rock which is altered within the earth's crust by the effects of heat and/or pressure and/or chemical reactions. Pertains to the process of metamorphism or to its results.

**Metasediment**: A sediment or sedimentary rock that shows evidence of having been subjected to metamorphism.

**Metavolcanic:** An informal term for volcanic rocks that show evidence of having been subject to metamorphism.

**Mineral claim:** A legal entitlement to minerals in a certain defined area of ground.

**Mineral Deposit or Mineralized Material:** A mineralized underground body which has been intersected by sufficient closely spaced drill holes and/or underground sampling to support sufficient tonnage and average grade of metal(s) to warrant further exploration-development work. This deposit does not qualify as a commercially mineable ore body (Reserves), as prescribed under Commission standards, until a final and comprehensive economic, technical, and legal feasibility study based upon the test results is concluded.

**Mineral:** A naturally occurring, inorganic, solid element or compound that possesses an orderly internal arrangement of atoms and a unique set of physical and chemical properties.

**Mineralization:** Usually implies minerals of value occurring in rocks.

**Net profits interest:** A contractual granted right to some portion of the profits after deduction of expenses sometimes expressed as a form of royalty.

**Net smelter returns:** Means the amount actually paid to the mine or mill owner from the sale of ore, minerals and other materials or concentrates mined and removed from mineral properties. A royalty based on net smelter returns usually provides cash flow that is free of any operating or capital costs and environmental liabilities.

**Option agreement:** An agreement where the optionee can exercise certain options to acquire or increase an interest in a property by making periodic payments or share issuances or both to the optionor or by exploring, developing or producing from the optionor's property or both. Usually upon the acquisition of such interest, unless it is a 100% interest, all operations thereafter are on a joint venture basis.

**Ordinary kriging:** The basic technique of kriging and uses a weighted average of neighboring samples to estimate the 'unknown' value at a given location. Weights are optimized using the semi-variogram model, the location of the samples and all the relevant inter-relationships between known and unknown values. The technique also provides a "standard error" which may be used to quantify confidence levels.

**Ore:** A natural aggregate of one or more minerals which may be mined and sold at a profit, or from which some part may be profitably separated.

**Ore reserve:** The measured quantity and grade of all or part of a mineralized body in a mine or undeveloped mineral deposit for which the mineralization is sufficiently defined and measured on three sides to form the basis of at least a preliminary mine production plan for economically viable mining.

**Orogeny:** The process of forming mountains by folding and thrusting.

**Outcrop:** An in situ exposure of bedrock.

**Overburden:** A general term for any material covering or obscuring rocks from view.

**oz/t or opt:** Ounces per ton.

**Paleozoic:** An era of geologic time, from the end of the Precambrian to the beginning of the Mesozoic, or from about 570 to about 225 million years ago.

**Phenocrysts**: An unusually large crystal in a relatively finer grained matrix.

**Pluton:** Term for an igneous intrusion, usually formed from magma.

**Porphyry:** An igneous rock composed of larger crystals set within a finer ground mass.

**Pyroclastic rock:** A rock of volcanic origin consisting of highly variable mixture of rock fragments, cinders and ashes and bits of crystals and glass.

**Quartz monzonite:** A course grained, plutonic igneous rock that is normally pale pink, and composed of quartz, alkali feldspar, micas and accessory minerals.

**Rare Earth:** A group of rare metallic chemical elements with consecutive atomic numbers of 57 to 71.

**Reclamation bond:** A bond usually required by governmental mining regulations when mechanized work on a property is contemplated. Proceeds of the bond are used to reclaim any workings or put right any damage if reclamation undertaken does not satisfy the requirements of the regulations.

**Reserve:** That part of a mineral deposit which could be economically extracted or produced at the time of the reserve determination.

**Reserves:** A natural aggregate of one or more minerals which, at a specified time and place, may be mined and sold at a profit, or from which some part may be profitably separated.

**Reverse circulation drill:** A rotary percussion drill in which the drilling mud and cuttings return to the surface through the drill pipe.

**Rhyolite:** The fine grained equivalent of granite.

**Royalty interest:** A royalty, the calculation and payment of which is tied to some production unit such as ton of concentrate or ounce of gold or silver produced. A common form of royalty interest is based on the net smelter return.

**Sample:** Small amount of material that is supposed to be absolutely typical or representative of the object being sampled.

**Sandstone:** Composed of sand-sized fragments cemented together. As a rule the fragments contain a high percentage of quartz.

**Sedimentary:** A rock formed from cemented or compacted sediments.

**Sediments:** Are composed of the debris resulting from the weathering and breakup of other rocks that have been deposited by or carried to the oceans by rivers, or left over from glacial erosion or sometimes from wind action.

**Selvage:** A marginal zone, as in a dyke or vein, having some distinctive feature of fabric or composition.

**Sericite:** A fine-grained variety of mica occurring in small scales, especially in schists.

**Shale:** An argillaceous rock consisting of silt or clay-sized particles cemented together. Most shales are quite soft, because they contain large amounts of clay minerals.

**Silicate:** Most rocks are made up of a small number of silicate minerals ranging from quartz (SiO2) to more complex minerals such as orthoclase feldspar (KAlSi3O8) or hornblende (Ca2Na(Mg,Fe)4(Al,Fe,Ti)Si8)22(OH)2).

**Sill:** Tabular intrusion which is sandwiched between layers in the host rock.

**Skarn:** A thermally altered impure limestone in which material has been added to the original rock. Skarns are generally characterized by the presence of calcium and silica rich minerals. Many skarns contain sulphide minerals which in some cases can be of economic value.

**Stock:** An igneous intrusive body of unknown depth with a surface exposure of less than 104 square kilometres. The sides, or contacts, of a stock, like those of a batholith, are usually steep and broaden with depth.

**Stockwork:** A mineral deposit consisting of a three-dimensional network of closely spaced planar or irregular veinlets.

**Strike:** The bearing, or magnetic compass direction, of an imaginary line formed by the intersection of a horizontal plane with any planar surface, most commonly with bedding planes or foliation planes in rocks.

**Sulphide minerals**: A mineral compound characterized by the linkage of sulfur with a metal or semimetal; e.g., galena.

**Syncline:** A fold in which the bed has been forced down in the middle or up on the sides to form a trough.

**Tailings:** Material rejected from a mill after recoverable valuable minerals have been extracted.

**Tailings pond:** A pond where tailings are disposed of.

**Tonne:** Metric ton – 1,000 kilograms – equivalent to 1.1023 tons.

**Triassic:** Geological time period between 225 and 195 million years ago.

**Tuff:** A finer grained pyroclastic rock made up mostly of ash and other fine grained volcanic material.

**Veins:** The mineral deposits that are found filling openings in rocks created by faults or replacing rocks on either side of faults.

**Vuggy silica:** In a high sulphidation epithermal environment, the highly acidic waters have dissolved everything but silica resulting in a highly porous and pox marker rock which is a good host for gold deposition. It is an indicator mineralization typical of epithermal rocks.

**Waste:** Rock which is not ore. Usually referred to that rock which has to be removed during the normal course of mining in order to get at the ore.

## Glossary of Abbreviations

**Ag:** Silver
**Ag g/t:** Silver grade measured in grams per metric ton
Converts to ounces per ton by dividing by 34.286
**Au:** Gold
**Au g/t:** Gold grade measured in grams per metric ton
Converts to ounces per ton by dividing by 34.286
**Cu:** Copper
**g/t:** grams per tonne
**IP:** Induced Polarization geophysical survey
**masl:** meters above sea level
**MPa:** Megapascal or one million pascals.
**NGO:** Non-governmental organization
**NSR:** net smelter returns royalty
**Oz:** Troy ounce
**Pa:** one pascal
**QA/QC:** Quality Assurance/Quality Control
**tpd:** Tonnes per day
**ton:** Short ton (2,000 pounds)
**tonne:** Metric ton (1000 kilograms - 2204.62 pounds)

**Conversion Table**
Metric / Imperial
1.0 millimeter (mm) = 0.039 inches (in)
1.0 meter (m) = 3.28 feet (ft)
1.0 kilometer (km) = 0.621 miles (mi)
1.0 hectare (ha) = 2.471 acres (ac)
1.0 gram (g) = 0.032 troy ounces (oz)
1.0 metric tonne (t) = 1.102 short tons (ton)
1.0 g/t = 0.029 oz/ton

Unless otherwise indicated, all dollar ($) amounts referred to herein are in Canadian dollars.

## NOTE REGARDING MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

The U.S. Securities and Exchange Commission (the "SEC") has adopted final rules to amend and modernize the mineral property disclosure requirements for issuers whose securities are registered with the SEC. These new rules have rescinded the historical property disclosure guidance for mining registrants included in SEC Industry Guide 7 and replaced them with the disclosure requirements in subpart 1300 of SEC Regulation S-K ("S-K 1300"). Compliance is required for the first fiscal year beginning on or after January 1, 2021.

As a result of the adoption of the SEC Mining Modernization Rules, the SEC now recognizes estimates of Mineral Resources categories "Measured Mineral Resources," "Indicated Mineral Resources" and "Inferred Mineral Resources" in addition to the Mineral Reserve categories of "Proven Mineral Reserves" and "Probable Mineral Reserves".

***Mineral reserve*** is an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.

- ***Proven mineral reserve*** is the economically mineable part of a measured mineral resource and can only result from conversion of a measured mineral resource.

- ***Probable mineral reserve*** is the economically mineable part of an indicated and, in some cases, a measured mineral resource.

***Mineral resource*** is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. Mineral Resources that are not Mineral Reserves do not meet the threshold for reserve modifying factors, such as estimated economic viability, that would allow for conversion to Mineral Reserves. There is no certainty that all or any part of a Mineral Resource will be converted into a Mineral Reserve.

- ***Measured mineral resource*** is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve.

- ***Indicated mineral resource*** is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve.

- ***Inferred mineral resource*** is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve.

## CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Statements contained in this Annual Report on Form 20-F of Almaden Minerals Ltd. ("Almaden" or the "Company"), and the exhibits attached hereto that are not historical facts are forward-looking statements within the meaning of U.S. and Canadian securities legislation and the U.S. Private Securities Litigation Reform Act of 1995 that involve risks and uncertainties.

Such forward-looking statements include, but are not limited to, statements regarding the permitting review process for the Ixtaca Project ("Ixtaca" or the "Project") and the outcome of legal actions in Mexico that are based on assumptions about: the permitting and legal regimes in Mexico; economic and political conditions; success of exploration, development and environmental protection and remediation activities; the impact of the recent decision of the Supreme Court of Justice of Mexico ("SCJN"), the timing of the official notification of that decision to the Company, that the decision clarifies that the Company's mineral rights at the Ixtaca project are protected while the mining authorities conduct any necessary consultations prior to granting formal title, the timing and procedures for any consultation by the Ministry of the Economy with indigenous communities and the timing and procedures for the Ministry of the Economy to issue mineral titles to Almaden; the Company's plans to re-submit a revised environmental permit application ("MIA") to the Secretaría de Medio Ambiente y Recurso Naturales' ("SEMARNAT"); the potential timing of the MIA resubmission; the Company's intention to complete a Human Rights Impact Assessment ("HRIA") and the potential timing thereof; the Company's belief that Ixtaca will, long after final closure, make meaningful and enduring positive contributions to surrounding communities and beyond, the Company's expectation that the Project would employ over 400 people over an 11-year mine life and would also provide updated infrastructure to the region, the impact of the Project's proposed dry-stack tailing facilities, the Company's belief that the Ixtaca deposit can be an economically robust project that could provide the basis for further investment in the area. These statements relate to analyses and other information that are based on forecasts of future results, estimates of amounts not yet determinable and assumptions of management. Statements concerning Mineral Reserve and Mineral Resource estimates may also be deemed to constitute forward-looking statements to the extent that they involve estimates of the mineralization that will be encountered if a property is developed, and in the case of Mineral Reserves, such statements reflect the conclusion based on certain assumptions that the mineral deposit can be economically exploited. Any statements that express or involve discussions with respect to predictions, expectations, beliefs, plans, projections, objectives, assumptions or future events or performance (often, but not always, using words or phrases such as "expects" or "does not expect", "is expected", "anticipates" or "does not anticipate", "plans", "estimates" or "intends", or stating that certain actions, events or results "may", "could", "would", "might" or "will" (or the negative and grammatical variations of any of these terms and similar expressions) be taken, occur or be achieved) are not statements of historical fact and may be forward-looking statements. Forward-looking statements and forward-looking information are based, in part, on assumptions and factors that may change and are subject to a variety of known and unknown risks, uncertainties and other factors which could cause actual events or results, performance or achievements of the Company to differ materially from those expressed or implied by the forward-looking statements and forward-looking information. Some of the important risks, uncertainties and other factors that could affect forward-looking statements and forward-looking information include, but are not limited to, those described further in the sections entitled "ITEM 3. KEY INFORMATION - Risk Factors", "ITEM 4. INFORMATION ON THE COMPANY - Business Overview", "ITEM 4. INFORMATION ON THE COMPANY – Principal Property Interests" and "ITEM 5. OPERATING AND FINANCIAL REVIEW AND PROSPECTS" and in the exhibits attached to this Annual Report on Form 20-F. Should one or more of these risks, uncertainties and other factors materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those described in the Company's forward-looking statements or forward-looking information. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements and information. The forward-looking statements and forward-looking information are based on beliefs, expectations and opinions of the Company's management on the date of this Annual Report on Form 20-F and speak only as of the date hereof and the Company does not undertake any obligation to publicly update forward-looking statements or forward-looking information contained herein to reflect events or circumstances after the date hereof, except as required by law. For the reasons set forth above, investors should not place undue reliance on forward-looking statements.

Forward-looking statements and other information contained herein concerning the mining industry and the Company's expectations concerning the mining industry are based on estimates prepared by the Company using data from publicly available sources as well as from market research and industry analysis and on assumptions based on data and knowledge of this industry which the Company believes to be reasonable. However, this data is inherently imprecise, although generally indicative of relative market positions, market shares and performance characteristics. While the Company is not aware of any misstatements regarding any mining industry data presented herein, the industry involves risks and uncertainties and is subject to change based on various factors.

Certain historical and forward-looking information contained in this Annual Report on Form 20-F has been provided by, or derived from information provided by, certain persons other than the Company. Although the Company does not have any knowledge that would indicate that any such information is untrue or incomplete, the Company assumes no responsibility for the accuracy and completeness of such information or the failure by such other persons to disclose events which may have occurred or may affect the completeness or accuracy of such information, but which is unknown to the Company.

Please consult the Company's public filings at www.sec.gov for further, more detailed information concerning these matters.

# PART I

## Item 1. Identity of Directors, Senior Management and Advisors

Not applicable

## Item 2. Offer Statistics and Expected Timetable

Not applicable

## Item 3. Key Information

The following selected financial data of the Company for Fiscal 2021, Fiscal 2020, and Fiscal 2019 ended December 31st was derived from the consolidated financial statements of the Company included elsewhere in this Annual Report on Form 20-F. The selected financial data set forth for Fiscal 2018 and Fiscal 2017 ended December 31st are derived from the Company's audited consolidated financial statements, not included herein. The selected financial data should be read in conjunction with the consolidated financial statements and other information included immediately following the text of this Annual Report.

The consolidated financial statements of the Company have been prepared in accordance and compliance with International Financial Reporting Standards as issued by the International Accounting Standards Board ("IFRS").

The basis of preparation is described in Note 2 of the consolidated financial statements.

**Table No. 1**
**Selected Financial Data**
**International Financial Reporting Standards**
**(expressed in thousands of Canadian dollars, except share and per share data)**

| | Year Ended 12/31/2021 | Year Ended 12/31/2020 | Year Ended 12/31/2019 | Year Ended 12/31/2018 | Year Ended 12/31/2017 |
|---|---|---|---|---|---|
| Revenues | $ - | $ - | $ - | $ - | $ - |
| Other Income (loss) | 3,552 | 1,702 | 678 | 1,190 | 468 |
| Net loss and comprehensive loss | (2,668) | (3,129) | (3,763) | (3,512) | (5,231) |
| Basic net (loss) income per common share | (0.02) | (0.03) | (0.03) | (0.03) | (0.05) |
| Diluted net (loss) income per common share | (0.02) | (0.03) | (0.03) | (0.03) | (0.05) |
| Weighted average shares (000) | 133,843 | 117,264 | 111,727 | 107,584 | 95,873 |
| Working capital | 10,651 | 3,083 | 1,748 | 4,357 | 16,065 |
| Exploration and evaluation assets | 61,432 | 58,606 | 56,973 | 54,678 | 44,804 |
| Net assets | 80,184 | 71,178 | 68,585 | 71,365 | 64,730 |
| Total assets | 87,232 | 76,449 | 74,064 | 73,928 | 66,803 |
| Capital stock | 141,041 | 131,190 | 127,022 | 127,022 | 118,054 |
| Dividends declared per share | - | - | - | - | - |

***Canadian/U.S. Dollar Exchange Rates***

In this Annual Report, unless otherwise specified, all dollar amounts are expressed in Canadian dollars (CDN$).

Table No. 2 sets forth the exchange rate for the Canadian dollars at the end of the five most recent fiscal periods ended at December 31st, the average rates for the period, the range of high and low rates and the close for the period. Table No. 3 sets forth the range of high and low rates for each month during the previous six months. For purposes of this table, the rate of exchange means the noon buying rate in New York City for cable transfers in foreign currencies as certified for customs purposes by the Federal Reserve Bank of New York. The table sets forth the number of Canadian Dollars required under that formula to buy one U.S. Dollar. The average rate means the average of the exchange rates on the last day of each month during the period.

**Table No. 2**
**Canadian Dollar/U.S. Dollar Exchange Rates for Five Most Recent Financial Years**

| | Average | High | Low | Close |
|---|---|---|---|---|
| Fiscal Year Ended 12/31/2021 | $1.25 | $1.29 | $1.20 | $1.27 |
| Fiscal Year Ended 12/31/2020 | 1.34 | 1.45 | 1.27 | 1.27 |
| Fiscal Year Ended 12/31/2019 | 1.33 | 1.36 | 1.30 | 1.30 |
| Fiscal Year Ended 12/31/2018 | 1.30 | 1.36 | 1.23 | 1.36 |
| Fiscal Year Ended 12/31/2017 | 1.30 | 1.37 | 1.21 | 1.25 |

**Table No. 3**
**Canadian Dollar/U.S. Dollar Exchange Rates for Previous Six Months**

| | October 2021 | November 2021 | December 2021 | January 2022 | February 2022 | March 2022 |
|---|---|---|---|---|---|---|
| High | $1.27 | $1.28 | $1.29 | $1.28 | $1.28 | $1.29 |
| Low | 1.23 | 1.24 | 1.26 | 1.25 | 1.27 | 1.25 |

**The exchange rate was CDN$1.28/US$1.00 on April 28, 2022.**

*Risk Factors*

**Speculative Nature of Resource Exploration and Development**

Resource exploration and development is a speculative business, characterized by a number of significant risks including, among other things, unprofitable efforts resulting not only from the failure to discover mineral deposits but from finding mineral deposits which, though present, are insufficient in quantity and quality to return a profit from production. The marketability of minerals acquired or discovered by the Company may be affected by numerous factors which are beyond the control of the Company and which cannot be accurately predicted, such as market fluctuations, the proximity and capacity of milling facilities, mineral markets and processing equipment, and other factors such as government regulations, including regulations relating to royalties, allowable production, importing and exporting of minerals, and environment protection, the combination of which factors may result in the Company not receiving an adequate return on investment capital.

Presently, the Company is in the exploration and development stage and there is no assurance that a commercially viable ore deposit or mining operation will result in any of its properties or prospects until further work is done and a comprehensive economic evaluation based upon that work is concluded. In recent years the Company has financed its operations principally through the sale of equity securities. In the past, it has also financed its activities by entering into joint venture arrangements and through the sale of an inventory of gold. A commercially viable ore deposit and mining operation is dependent on the establishment of economically recoverable reserves, the ability of the Company to obtain the necessary financing and permitting to complete development and ultimately upon future profitable production or the realization of proceeds from the disposition of the properties.

**Uncertainty in Commercially Mineable Ore Deposits**

There is no certainty that the expenditures to be made by the Company in the exploration of its properties as described herein will result in discoveries of mineralized material in commercial quantities. Most exploration projects do not result in the discovery of commercially mineable ore deposits and no assurance can be given that any particular level of recovery of ore reserves will in fact be realized or that any identified mineral deposit will ever qualify as a commercially mineable (or viable) ore body which can be legally and economically exploited. Estimates of reserves, mineral deposits and production costs can also be affected by such factors as environmental permitting regulations and requirements, weather, environmental factors, unforeseen technical difficulties, unusual or unexpected geological formations and work interruptions. In addition, the grade of ore ultimately mined may differ from that indicated by drilling results. Short term factors relating to ore reserves, such as the need for orderly development of ore bodies or the processing of new or different grades, may also have an adverse effect on mining operations and on the results of operations. There can be no assurance that minerals recovered in small-scale tests will be duplicated in large-scale tests under on-site conditions or in production scale. Material changes in ore reserves, grades, stripping ratios or recovery rates may affect the economic viability of any project.

**History of Net Losses, Lack of Cash Flow and Assurance of Profitability; Need for Additional Capital**

The Company had net losses in a number of years since its date of incorporation. Due to the nature of the Company's business, there can be no assurance that the Company will be profitable. The Company had net losses of $2,668,254 in Fiscal 2021, $3,129,368 in Fiscal 2020, and $3,763,075 in Fiscal 2019.

The Company currently has no revenues from operations as all of its properties and prospects are in the exploration and development stage. There is no assurance that the Company will receive revenues from operations at any time in the near future. During Fiscal 2021, 2020 and 2019, the Company earned interest income and other income from Administrative service fees charged to Azucar Minerals Ltd. ("Azucar") and Almadex Minerals Ltd. ("Almadex").

At December 31, 2021, the Company had working capital of $10,651,264 including cash and cash equivalents of $10,170,376. Management estimates that the current cash position and expected future cash flows from the exercise of outstanding stock options and warrants and equity financing will be sufficient for the Company to carry out its anticipated exploration and operating plans for fiscal 2022 that includes further development of the Ixtaca Project. Although Management believes that the Company's cash resources are sufficient to meet its working capital and mineral exploration requirements for fiscal 2022, the Company may require additional capital in order to remain operational in the near future. There is the possibility that the Company may not receive such necessary funding, particularly during a down economy. Additional funding may not be available, or if it is available, may not be on favorable terms.

The Company has not paid dividends on its shares since incorporation and the Company does not anticipate doing so in the foreseeable future.

**Uncertainty of Obtaining Additional Funding Requirements**
If the Company's exploration and development programs are successful, additional capital will be required for the further development of an economic ore body and to place it in commercial production. The only material sources of future funds presently available to the Company are the sale of its equity capital, the incurring of debt, or the offering by the Company of an interest in its properties and prospects to be earned by another party or parties carrying out further development thereof.

Failure to obtain additional financing on a timely basis could cause the Company to forfeit its interest in such properties, dilute its interests in the properties and/or reduce or terminate its operations.

**Possible Dilution to Present and Prospective Shareholders**
The Company's plan of operation, in part, contemplates the financing of the conduct of its business by the issuance, for cash, of equity securities of the Company or incurring debt, or a combination of the two. Any transaction involving the issuance of previously authorized but unissued shares of common shares, or securities convertible into common shares, would result in dilution, possibly substantial, to present and prospective holders of common shares. The Company could also seek joint venture partners or funding sources such as royalties or streaming transactions. These approaches would dilute the Company's interest in properties it has acquired.

**Material Risk of Dilution Presented by Large Number of Outstanding Share Purchase Options and Warrants**
As of April 28, 2022, there were share purchase options outstanding allowing the holders of these options to purchase 11,990,000 shares of the Company's common shares and warrants allowing the holders of these warrants to purchase 22,168,504 shares of the Company's common shares. Directors and officers of the Company in the aggregate hold 9,450,000 of these share purchase options and 581,000 of these warrants. An additional 2,540,000 share purchase options are held by employees and consultants of the Company. Given the fact that as of April 28, 2022 there were 137,221,408 shares of common shares outstanding, the exercise of all of the existing share purchase options and warrants would result in dilution to the existing shareholders and could depress the price of the Company's shares. The exercise of all outstanding share purchase options and warrants would cause the number of issued and outstanding common shares to rise 25%.

**Emerging Growth Company Transition Period**
Pursuant to the JOBS Act of 2012 and Section 7(a)2(B) of the Securities Act, the Company is taking advantage of the extended transition period for Emerging Growth Companies. When an accounting standard is issued or revised and it has different application dates for public or private companies, the Company, as an emerging growth company, can adopt the standard for the private company. This may make comparison of the Company's financial statements with any other public company which is not either an emerging growth company nor an emerging growth company which has opted out of using the extended transition period difficult or impossible as different or revised standards may be used.

**Volatility of Share Price**
Market prices for shares of early stage companies are often volatile. Factors such as announcements of mineral discoveries, exploration and financial results, and other factors could have a significant effect on the price of the Company's shares.

**Mineral Prices May Not Support Corporate Profit**
The mining industry in general is intensely competitive and there is no assurance that, even if commercial quantities of mineral resources are developed, a profitable market will exist for the sale of same. Factors beyond the control of the Company may affect the marketability of any substances discovered. The price of minerals is volatile over short periods of time and is affected by numerous factors beyond the control of the Company, including international economic and political trends, expectations of inflation, currency exchange fluctuations, interest rates and global or regional consumption patterns, speculative activities and increased production due to improved mining techniques. Material changes in mineral prices may affect the economic viability of any project.

**Laws and regulations**
The Company's exploration activities are subject to extensive federal, provincial, state and local laws and regulations governing prospecting, development, production, exports, taxes, labour standards, occupational health and safety, mine safety and other matters in all the jurisdictions in which it operates. These laws and regulations

are subject to change, can become more stringent and compliance can therefore become more costly. These factors may affect both the Company's ability to undertake exploration and development activities in respect of future properties in the manner contemplated, as well as its ability to continue to explore, develop and operate those properties in which it currently has an interest or in respect of which it has obtained exploration and development rights to date. The Company applies the expertise of its management, advisors, employees and contractors to ensure compliance with current laws and relies on its land men and legal counsel in both Mexico and Canada.

Failure to comply with applicable laws and regulations may result in civil or criminal fines or penalties or enforcement actions, including orders issued by regulatory or judicial authorities enjoining, curtailing or closing operations or requiring corrective measures, installation of additional equipment or remedial actions, any of which could result in the Company incurring significant expenditures. The Company may also be required to compensate private parties suffering loss or damage by reason of a breach of such laws, regulations or permitting requirements. It is also possible that future laws and regulations, or a more stringent enforcement of current laws and regulations by governmental authorities, could cause additional expense, capital expenditures, restrictions on or suspensions of our operations and delays in the exploration and development of Ixtaca.

On December 21, 2020, the Company announced that it received notification from the Mexican federal permitting authority, SEMARNAT, that the Company's initial MIA, a required permit in order to proceed to construction and operation of the Ixtaca Project, did not receive approval. The Company originally submitted the MIA in early 2019.

There is no assurance that any future MIA permit application will be successful. Such an application may be subject to challenge or litigation by third parties, which may delay any decision in respect of the MIA application or which may inhibit the Company's ability to proceed with the Ixtaca Project even in the event of a positive outcome to the MIA application. Under Mexican law, in addition to the MIA permit, a number of additional permits from Federal, State, and Municipal authorities, including a Change of Use of Land permit, an explosives permit, a water usage permit, and permits relating to powerline construction and electrical use, among others, will be required in order to proceed to construction and operation of the Ixtaca Project. Almaden reiterates its commitment to comply with Mexican law.

On February 17, 2022, the Company announced that the SCJN reached a decision on February 16, 2022 in respect of the Mineral Title Lawsuit involving the Company's mineral claims (for background see Item 8. Financial Information, sub-heading "Legal Proceedings"). On April 27, 2022, the Company announced that the SCJN had published its final decision on this matter.

Almaden has reviewed the final decision of the SCJN. The decision determines that the Mexican mineral title law is constitutional, but that before issuing Almaden's mineral titles, the Ministry of the Economy should have provided for a consultation procedure with relevant indigenous communities. The decision orders the Ministry of the Economy to declare Almaden's mineral titles ineffective ("*insubsistentes*") and to then issue them to Almaden following the Ministry's compliance with its obligation to carry out the necessary procedures to consult with indigenous communities. The decision discusses the application of international law and jurisprudence to the implementation of consultation by Mexican authorities with relevant indigenous communities. It also provides some detail to Mexican authorities regarding the procedures required to be followed by those authorities in the performance of indigenous consultation prior to the grant of mineral claims. Furthermore, the decision clarifies that the Company's original claim applications were submitted pursuant to the legal framework in force at the time and as such Almaden's mineral rights at the Ixtaca project are safeguarded while the mining authorities comply with conditions and requirements prior to issuing the mineral titles. As previously disclosed, the Company has no interest in holding mineral claims over the indigenous community's land. The decision will take effect at the time of its official notification to the Company which is expected shortly.

Almaden intends to interact with Mexican government officials and local community officials in order to facilitate to the extent possible the government's execution of its responsibilities in the issuance of the mineral titles. At present there is no timeline for the consultation process.

**Political, economic and social environment**

The Company's mineral properties may be adversely affected by political, economic and social uncertainties which could have a material adverse effect on the Company's results of operations and financial condition. Areas in which the Company holds or may acquire properties may experience local political unrest and disruption which could potentially affect the Company's projects or interests. Changes in leadership, social or political disruption or unforeseen circumstances affecting political, economic and social structure could adversely affect the Company's property interests or restrict its operations. The Company's mineral exploration and development activities may be affected by changes in government regulations relating to the mining industry and may include regulations on production, price controls, labour, export controls, income taxes, expropriation of property, environmental legislation and safety factors.

Any shifts in political attitudes or changes in laws that may result in, among other things, significant changes to mining laws or any other national legal body of regulations or policies are beyond the control of the Company and may adversely affect its business. The Company faces the risk that governments may adopt substantially different policies, which might extend to the expropriation of assets or increased government participation in the mining sector. In addition, changes in resource development or investment policies, increases in taxation rates, higher mining fees and royalty payments, revocation or cancellation of mining concession rights or shifts in political attitudes in Mexico may adversely affect the Company's business.

The Company's relationship with communities in which it operates is critical to the development of the Ixtaca Project. Local communities may be influenced by external entities, groups or organizations opposed to mining activities. In recent years, anti-mining NGO activity in Mexico has increased. These NGOs have taken such actions as road closures, work stoppages and lawsuits for damages. These actions relate not only to current activities but often in respect to the mining activities by prior owners of mining properties. Such actions by NGOs may have a material adverse effect on the Company's operations at the Ixtaca Project and on its financial position, cash flow and results of operations.

**Risks related to International Labour Organization ("ILO") Convention 169 Compliance**

The Company may, or may in the future, operate in areas presently or previously inhabited or used by indigenous peoples. As a result, the Company's operations are subject to national and international laws, codes, resolutions, conventions, guidelines and other similar rules respecting the rights of indigenous peoples, including the provisions of ILO Convention 169. ILO Convention 169 mandates, among other things, that governments consult with indigenous peoples who may be impacted by mining projects prior to granting rights, permits or approvals in respect of such projects. Therefore, consultation with indigenous communities by Mexican authorities and the Company may be required for the Ixtaca Project.

ILO Convention 169 has been ratified by Mexico. It is possible however that Mexico may not (i) have implemented procedures to ensure their compliance with ILO Convention 169 or (ii) have complied with the requirements of ILO Convention 169 despite implementing such procedures.

As noted in Item 8. Financial Information, sub-heading "Legal Proceedings", the Mexico's SCJN has recently determined that before issuing Almaden's mineral titles, the Ministry of the Economy should have provided for a consultation procedure with relevant indigenous communities. The decision orders the Ministry of the Economy to declare Almaden's mineral titles ineffective and to issue them to Almaden following the Ministry's compliance with its obligation to carry out the necessary procedures to consult with indigenous communities. The decision will take effect at the time of its official notification to the Company.

The standards for local implementation of the obligations assumed by Mexico under ILO Convention 169 regarding the human right to free, prior, informed consultation of indigenous communities are currently evolving. The SCJN decision may halt or result in a significant delay in project development notwithstanding the extensive engagement already conducted by the Company in relevant communities.

Government compliance with ILO Convention 169 can result in delays and significant additional expenses to the Company arising from the consultation process with indigenous peoples in relation to the Company's exploration, mining or development projects. Moreover, any actual or perceived past contraventions, or potential future actual or perceived contraventions, of ILO Convention 169 by Mexico creates a risk that the permits, rights, approvals, and other governmental authorizations that the Company has relied upon, or may in the future rely upon, to carry out its operations or plans could be challenged by or on behalf of indigenous peoples.

Such challenges may result in, without limitation, additional expenses with respect to the Company's operations, the suspension, revocation or amendment of the Company's rights or mining, environmental or export permits, a delay or stoppage of the Company's development, exploration or mining operations, the refusal by governmental authorities to grant new permits or approvals required for the Company's continuing operations until the settlement of such challenges, or the requirement for the responsible government to undertake the requisite consultation process in accordance with ILO Convention 169.

As a result of the inherent uncertainty in respect of such proceedings, the Company is unable to predict what the results of any such challenges would be; however, any ILO Convention 169 proceedings relating to the Company's operations in Mexico may have a material adverse effect on the business, operations, and financial condition of the Company.

**As a result of social media and other web-based applications, companies today are at much greater risk of losing control over how they are perceived**

Damage to the Company's reputation can be the result of the actual or perceived occurrence of any number of events, and could include any negative publicity, whether true or not. Although the Company places a great emphasis on protecting its image and reputation, it does not ultimately have direct control over how it is perceived by others. Campaigns aimed at damaging the Company's reputation can generally be expected to be launched or intensified during important permitting and legal procedures, such as those in which the Company is currently engaged. Reputation loss may lead to increased challenges in developing and maintaining community relations, decreased investor confidence and act as an impediment to the Company's overall ability to advance its projects, thereby having a material adverse impact on the Company's business, financial condition or results of operations.

**The Company may be subject to legal proceedings that arise in the ordinary course of business**

Due to the nature of its business, the Company may be subject to regulatory investigations, claims, lawsuits and other proceedings in the ordinary course of its business. The Company's operations are subject to the risk of legal claims by employees, unions, contractors, lenders, suppliers, joint venture partners, shareholders, governmental agencies or others through private actions, class actions, administrative proceedings, regulatory actions or other litigation. Plaintiffs may seek recovery of very large or indeterminate amounts, and the magnitude of the potential loss relating to such lawsuits may remain unknown for substantial periods of time. Defense and settlement costs can be substantial, even with respect to claims that have no merit. The results of these legal proceedings cannot be predicted with certainty due to the uncertainty inherent in litigation, including the effects of discovery of new evidence or advancement of new legal theories, the difficulty of predicting decisions of judges and juries and the possibility that decisions may be reversed on appeal. The litigation process could, as a result, take away from the time and effort of the Company's management and could force the Company to pay substantial legal fees or penalties. There can be no assurances that the resolutions of any such matters will not have a material adverse effect on the Company's business, financial condition and results of operations.

**Title to mineral properties**

While the Company has investigated title to its mineral properties, this should not be construed as a guarantee of title. The properties may be subject to prior unregistered agreements or transfers and title may be affected by undetected defects. Title to Almaden's mining concessions may also be adversely affected by the Amparo as discussed in Item 8 under the heading "Legal Proceedings". There are significant risks that the impact of the decision of the SCJN may not be known for an extended period of time, and that the Company may lose the ownership of some or all of its mineral claims.

There is a risk that title to the mining concessions, the surface rights and access rights comprising Ixtaca and the necessary infrastructure, may be deficient or subject to additional disputes. The procurement or enforcement of such rights, or any dispute with respect to such rights, can be costly and time consuming. In areas where there are local populations or landowners, it may be necessary, as a practical matter, to negotiate surface access. Even in the event that the Company has the legal right to access the surface and carry on construction and mining activities, the Company may not be able to negotiate satisfactory agreements with existing landowners/occupiers for such access, and therefore it may be unable to carry out activities as planned. In addition, in circumstances where such access is denied, or no agreement can be reached, this could have a material adverse effect on the Company and the Company may need to rely on the assistance of local officials or the courts in such jurisdictions or pursue other alternatives, which may suspend, delay or impact mining activities as planned.

There is also a risk that the Company's exploration, development and mining authorizations and surface rights may be challenged or impugned by third parties. In addition, there is a risk that the Company will not be able to renew some or all its licenses in the future. Inability to renew a license could result in the loss of any project located within that license.

**Impact of COVID-19 Pandemic**

The Company's business could be significantly adversely affected by the effects of a widespread global outbreak of contagious disease, including the recent outbreak of respiratory illness caused by COVID-19. The Company cannot accurately predict the impact COVID-19 and its variants will have on third parties' ability to meet their obligations with the Company, including due to uncertainties relating to the ultimate geographic spread of the virus, the severity of the disease, the duration of the outbreak, and the length of travel and quarantine restrictions imposed by governments of affected countries. In particular, the continued spread of COVID-19 and its variants globally could materially and adversely impact the Company's business including without limitation, employee health, limitations on travel, the availability of industry experts and personnel, restrictions to planned exploration and drill programs, receipt of necessary government approvals, regulatory compliance, and other factors that will depend on future developments beyond the Company's control. In addition, a significant outbreak of contagious diseases in the human population could result in a widespread health crisis that could adversely affect the economies and financial markets of many countries (including those in which the Company operates), resulting in an economic downturn that could negatively impact the Company's operations and ability to raise capital.

**Environmental, Climate Change, Health and Safety Regulation Compliance**

The Company's exploration and development activities are subject to extensive laws and regulations governing environmental protection and employee health and safety promulgated by governments and government agencies.

Environmental (inclusive of climate change) and health and safety laws and regulations are complex and have become more stringent over time. Failure to comply with applicable environmental and health and safety laws may result in injunctions, damages, suspension or revocation of permits and imposition of penalties. Environmental regulation is evolving in a manner resulting in stricter standards and the enforcement of, and fines and penalties for, non-compliance are becoming more stringent.

The Company is also subject to various reclamation-related conditions. Reclamation requirements are designed to minimize long-term effects of mining exploitation and exploration disturbance by requiring the operating company to control possible deleterious effluents and to re-establish to some degree pre-disturbance land forms and vegetation. The Company is subject to such requirements in connection with its activities at Ixtaca. Any significant environmental issues that may arise, however, could lead to increased reclamation expenditures and could have a material adverse impact on the Company's financial resources.

There can also be no assurance that closure estimates prove to be accurate. The amounts recorded for reclamation costs are estimates unique to a property based on estimates provided by independent consulting engineers and the Company's assessment of the anticipated timing of future reclamation and remediation work required to comply with existing laws and regulations. Actual costs incurred in future periods could differ from amounts estimated. Additionally, future changes to environmental laws and regulations could affect the extent of reclamation and remediation work required to be performed by the Company. Any such changes in future costs could materially impact the amounts charged to operations for reclamation and remediation.

Climate change regulations may become more onerous over time as governments implement policies to further reduce carbon emissions, including the implementation of taxation regimes based on aggregate carbon emissions. Some of the costs associated with reducing emissions can be offset by increased energy efficiency and technological innovation. However, the cost of compliance with environmental regulation and changes in environmental regulation has the potential to result in increased costs of operations, reducing the potential profitability of the Company's future operations.

Due to increased global attention regarding the use of cyanide in mining operations, regulations may be imposed restricting or prohibiting the use of cyanide and other hazardous substances in mineral processing activities. If such legislation were to be adopted in a region in which the Company relies on the use of cyanide, it would have a significant adverse impact on the Company's results of operations and financial condition as there are few, if any, substitutes for cyanide in extracting metals from certain types of ore.

While the Company intends to fully comply with all applicable environmental and health and safety regulations there can be no assurance that the Company has been or will at all times be in complete compliance with such laws, regulations and permits, or that the costs of complying with current and future environmental and health and safety laws and permits will not materially and adversely affect the Company's future business, results of operations or financial condition.

**Uncertainty in Development of a Commercially Mineable Ore Deposit**
The properties and prospects in which the Company has an interest are not in commercial production. A commercially viable ore deposit is dependent on the establishment of economically recoverable reserves, the ability of the Company to obtain the necessary financing and permitting to complete development, and ultimately upon future profitable production or the realization of proceeds from the disposition of the properties.

**Uncertainty of Reserves and Mineralization Estimates**
There are numerous uncertainties inherent in estimating proven and probable reserves and mineralization, including many factors beyond the control of the Company. The estimation of reserves and mineralization is a subjective process and the accuracy of any such estimates is a function of the quality of available data and of engineering and geological interpretation and judgment. Results of drilling, metallurgical testing and production and the evaluation of mine plans subsequent to the date of any estimate may justify revision of such estimates. No assurances can be given that the volume and grade of reserves recovered and rates of production will not be less than anticipated. Assumptions about prices are subject to greater uncertainty and metals prices have fluctuated widely in the past. Declines in the market price of base or precious metals also may render reserves or mineralization containing relatively lower grades of ore uneconomic to exploit. Changes in operating and capital costs and other factors including, but not limited to, short-term operating factors such as the need for sequential development of ore bodies and the processing of new or different ore grades, may materially and adversely affect reserves.

**Dependence on Key Personnel**
The Company depends highly on the business and technical expertise of its management and key personnel. There is little possibility that this dependence will decrease in the near term. As the Company's operations expand, additional general management resources may be required. The Company maintains no "Key Man" insurance coverage, and the loss or unavailability of any of its key personnel could have a negative effect on the Company's ability to operate effectively.

**Conflict of Interest**
Some of the Company's directors and officers are directors and officers of other natural resource or mining-related companies. Duane Poliquin, Morgan Poliquin, Douglas McDonald, and Korm Trieu also serve as directors and/or officers of Azucar Minerals Ltd. and Almadex Minerals Ltd. Elaine Ellingham also serves as a director of Alamos Gold Inc., and Omai Gold Mines Corp. Kevin O'Kane also serves on the Board of SolGold Plc, IAMGOLD Corporation and NorthIsle Copper and Gold Inc. These associations may give rise from time to time to conflicts of interest, as a result of which, the Company may miss the opportunity to participate in certain transactions.

**Foreign Operations**
The Company currently has development projects located in Mexico. The Company's foreign activities are subject to the risks normally associated with conducting business in foreign countries, including exchange controls and currency fluctuations, foreign taxation, laws or policies of particular countries, labor practices and disputes, and uncertain political and economic environments, as well as risks of war and civil disturbances, or other risks that could cause exploration or development difficulties or stoppages, restrict the movement of funds

or result in the deprivation or loss of contract rights or the taking of property by nationalization or expropriation without fair compensation. Foreign operations could also be adversely impacted by laws and policies of the U.S. affecting foreign trade, investment and taxation.

**Changes to Mexican Mining Taxes**

In October 2013, the Mexican Congress approved a package of tax reforms which included significant changes to the country's mining royalties and tax structure. These new laws had an effective date of January 1, 2014. The changes include a 7.5% special mining royalty on earnings before interest, taxes, depreciation and amortization ("EBITDA") and an additional 0.5% royalty on gross revenues from precious metal production. The new law also increases annual taxes on certain inactive exploration concessions by 50% to 100%. These changes may result in increased holding costs to the Company for its existing mineral concessions. These new taxes and royalties, any future increases to tax and royalty rates, or any new taxes imposed by the Mexican governmental authorities may materially and adversely affect the potential to define economic reserves on any Mexican properties and result in the Company's Mexican properties being less attractive to potential optionees or joint-venture partners.

**Foreign Currency Fluctuations**

At the present time, a majority of the Company's activities are carried on outside of Canada. Accordingly, it is subject to risks associated with fluctuations of the rate of exchange between the Canadian dollar and foreign currencies.

The Company is currently not engaged in currency hedging to offset any risk of exchange rate fluctuation and currently has no plans to engage in currency hedging.

**Operating Hazards and Risks Associated with the Mining Industry**

Mining operations generally involve a high degree of risk, which even a combination of experience, knowledge and careful evaluation may not be able to overcome. Hazards such as unusual or unexpected geological formations and other conditions are involved. Operations in which the Company has a direct or indirect interest will be subject to all the hazards and risks normally incidental to exploration, development and production of minerals, any of which could result in work stoppages, damage to or destruction of mines and other producing facilities, damage to or loss of life and property, environmental damage and possible legal liability for any or all damage or loss. The Company may become subject to liability for cave-ins and other hazards for which it cannot insure or against which it may elect not to insure where premium costs are disproportionate to the Company's perception of the relevant risks. The payment of such insurance premiums and the incurring of such liabilities would reduce the funds available for exploration activities.

**The Ability to Manage Growth**

Should the Company be successful in its efforts to develop its mineral properties or to raise capital for such development or for the development of other mining ventures it will experience significant growth in operations. If this occurs, management anticipates that additional expansion will be required in order to continue development. Any expansion of the Company's business would place further demands on its management, operational capacity and financial resources. The Company anticipates that it will need to recruit qualified personnel in all areas of its operations. There can be no assurance that the Company will be effective in retaining its current personnel or attracting and retaining additional qualified personnel, expanding its operational capacity or otherwise managing growth. The failure to manage growth effectively could have a material adverse effect on the Company's business, financial condition and results of operations.

**Competition**

There is competition from other mining exploration companies with operations similar to those of the Company's. Many of the mining companies with which the Company competes have operations and financial strength many times greater than that of the Company. Such competitors could outbid the Company for such projects, equipment or personnel, or produce minerals at a lower cost which would have a negative effect on the Company's operations and financial condition.

**Lack of a Dividend Policy**

The Company does not intend to pay cash dividends in the foreseeable future, as any earnings are expected to be retained for use in developing and expanding its business. However, the actual amount of dividends which the Company may pay will remain subject to the discretion of the Company's Board of Directors and will depend on results of operations, cash requirements and future prospects of the Company and other factors.

**ESTMA Risks**
The Extractive Sector Transparency Measures Act (Canada) ("ESTMA") requires public disclosure of certain payments to governments by companies engaged in the commercial development of minerals which are publicly listed in Canada. Mandatory annual reporting is required for extractive companies with respect to payments made to foreign and domestic governments, including aboriginal groups. ESTMA requires reporting on the payments of any taxes, royalties, fees, production entitlements, bonuses, dividends, infrastructure reporting or structuring payments to avoid reporting. If the Company becomes subject to an enforcement action or is in violation of ESTMA, this may result in significant penalties or sanctions which may also have a material adverse effect on the Company's reputation.

**Cybersecurity Risks**
As is typical of modern businesses, the Company is reliant on the continuous and uninterrupted operation of its information technology ("IT") systems. User access and security of all Company sites and IT systems can be critical elements to its operations, as is cloud security, security of all of the Company's IT systems, and protection against cyber security incidents. Any IT failure pertaining to availability, access or system security could potentially result in disruption of the activities of the Company and its personnel, and could adversely affect the reputation, operations or financial performance of the Company.

Potential risks to the Company's IT systems could include unauthorized attempts to extract business sensitive, confidential or personal information, denial of access extortion, corruption of information or disruption of business processes, or by inadvertent or intentional actions by the Company's employees or vendors. A cybersecurity incident resulting in a security breach or failure to identify a security threat could disrupt business and could result in the loss of sensitive, confidential or personal information or other assets, as well as litigation, regulatory enforcement, violation of privacy or securities laws and regulations, and remediation costs, all of which could materially impact the Company's business or reputation.

**Foreign Incorporation and Civil Liabilities**
The Company was created under amalgamation under the laws of the Province of British Columbia, Canada. With the exception of Alfredo Phillips, who is a resident of Mexico, and Laurence Morris, who is a resident of Nicaragua and a citizen of the United Kingdom, all of the Company's directors and officers are residents of Canada, and all of the Company's assets and its subsidiaries are located outside the U.S. Consequently, it may be difficult for U.S. investors to affect service of process in the U.S. upon those directors and officers who are not residents of the U.S., or to realize in the U.S. upon judgments of U.S. courts predicated upon civil liabilities under applicable U.S. laws.

**The Company could be deemed a passive foreign investment company which could have negative consequences for U.S. investors.**
The Company could be classified as a Passive Foreign Investment Company ("PFIC") under the United States tax code. If the Company is a PFIC, then owners of the Company's shares who are U.S. taxpayers generally will be required to include distributions or any gain realized upon a disposition or deemed disposition of shares, as ordinary income and to pay an interest charge on a portion of such distribution or gain, unless the taxpayer timely makes a qualified electing fund ("QEF") election or a mark-to-market election with respect to the Company's shares.

## Item 4. Information on the Company

**History and Development of the Company**
The head office of the Company is located at 1333 Johnston Street, Suite 210, Vancouver, British Columbia, Canada, V6H 3R9. The address of the registered office of the Company is 1177 West Hastings Street, Suite 1710, Vancouver, British Columbia, Canada, V6E 2L3.

Computershare Investor Services Inc., at its offices in Vancouver, B.C. and Toronto, Ontario, is the registrar and transfer agent of the Company's Common Shares.

The contact person is Korm Trieu, Chief Financial Officer. The telephone number is (604) 689-7644. The fax number is (604) 689-7645. The email address is ktrieu@almadenminerals.com. The web-site address is www.almadenminerals.com.

The Company was formed by amalgamation under the laws of the Province of British Columbia of its predecessor companies, Almaden Resources Corporation and Fairfield Minerals Ltd., on February 1, 2002. The Company operates under the *Business Corporations Act* (British Columbia).

Effective July 31, 2015, the Company effected a corporate reorganization pursuant to a statutory plan of arrangement ("Plan of Arrangement") involving the Company's then wholly owned subsidiary, Azucar, as described below.

The Company's common shares began trading on The Toronto Stock Exchange ("TSX") under the symbol "AMM" on February 11, 2002 and on the NYSE American (formerly the NYSE MKT), under the symbol "AAU" on December 19, 2005. Almaden Resources Corporation's initial public offering on the Vancouver Stock Exchange was pursuant to a prospectus dated October 10, 1986. The shares of Fairfield Minerals Ltd. began trading on the Vancouver Stock Exchange on July 18, 1986 and on The Toronto Stock Exchange on May 21, 1990.

There have been no public takeover offers by third parties in respect of the Company's shares and the Company has made no public takeover offers in respect of any other company's shares.

**Organizational Structure**

The Company currently has three wholly-owned (direct or indirect) subsidiaries. These subsidiaries are:

| Subsidiaries | Jurisdiction | Nature of operations |
|---|---|---|
| Puebla Holdings Inc. | Canada | Holding company |
| Minera Gorrion, S.A. de C.V. | Mexico | Exploration company |
| Molinos de Puebla, S.A. de C.V. | Mexico | Holding company |

**Business of the Company**

The Company is engaged in the business of the acquisition, exploration and when warranted, development of mineral properties. The Company currently has one material property in Mexico. The Company's property is at the exploration and development stage. The Company has not generated any revenues from operations.

**Corporate Reorganization**

The Company entered into an Arrangement Agreement dated May 11, 2015 involving the spinout, pursuant to a statutory Plan of Arrangement, of Almaden's early stage exploration projects, royalty interests and other non-core assets into a new public company called Azucar (formerly Almadex Minerals Limited), which trades on the TSX Venture Exchange under the symbol "AMZ" and the OTCQX marketplace under the symbol "AXDDF", pursuant to which Azucar acquired the following key assets:

- a 100% interest in the El Cobre copper-gold porphyry exploration project in Mexico and the Willow copper-gold porphyry exploration project in Nevada, in addition to a portfolio of 20 other exploration projects;
- a 2% NSR on the Company's Tuligtic property in Mexico, which hosts the Company's Ixtaca gold-silver development project;
- a 1.5% NSR on the Caballo Blanco gold deposit in Mexico, a development project operated by Timmins Gold Corp.;
- a 2% NSR on the Elk gold deposit in Canada, an advanced exploration project operated by JDL Gold Corp. (formerly Gold Mountain Mining Corp.);
- a portfolio of 21 additional NSRs on exploration projects in Mexico, Canada and the United States identified through the Company's past prospect generator activities;
- equity holdings in several publicly-listed companies;
- 1,597 ounces of gold bullion; and
- approximately $3 million in cash.

On July 31, 2015, all conditions to the statutory Plan of Arrangement regarding the spinout were satisfied or waived and the spinout was effective. Almaden's shareholders approved the Plan of Arrangement and exchanged their existing common shares of Almaden for one "new" Almaden common share and 0.6 common share of Azucar.

The Company entered into an Administrative Services Agreement with Azucar dated May 15, 2015, as amended by First Amending Agreement dated December 16, 2015 (the "Agreement"). Under the Agreement, the Company is the sole and exclusive manager of Azucar, and provides Azucar with general management services and day-to-day operation of Azucar. These services include:

- Office space;
- Executive personnel and human resources;
- Geological technical support; and
- Accounting and financial services.

Azucar compensates the Company 27% (2020 – 60%) of the Company's actual monthly cost of rent for any shared facilities, and 27% (2020 – 60%) of any shared personnel's fees and/or wages. Azucar pays the Company any reasonable fees or costs incurred on behalf of Azucar by the Company which were approved by Azucar.

Effective May 18, 2018, Azucar effected a corporate reorganization pursuant to a statutory plan of arrangement involving Azucar's then wholly owned subsidiary, Almadex. Consequent upon this corporate reorganization the Company entered into an Administrative Services Agreement with Almadex dated March 29, 2018 (the "Almadex Agreement"). Under the Almadex Agreement, the Company is the sole and exclusive manager of Almadex, and provides Almadex with general management services and day-to-day operation of Almadex. These services include:

- Office space;
- Executive personnel and human resources;
- Geological technical support; and
- Accounting and financial services.

Almadex compensates the Company 39% (2020 – 30%) of the Company's actual monthly cost of rent for any shared facilities, and 39% (2020 – 30%) of any shared personnel's fees and/or wages. Almadex pays the Company any reasonable fees or costs incurred on behalf of Almadex by the Company which were approved by Almadex.

Both the Agreement and the Almadex Agreement (together, the "Administrative Services Agreements") have initial 5-year terms, with subsequent automatic 1-year renewals unless terminated pursuant to the terms permitted under the Administrative Services Agreements. The Administrative Services Agreements include a Change of Control clause. If either party is subject to a Change of Control during the term of the respective Administrative Services Agreement, the Administrative Services Agreement shall automatically terminate within 48 hours of the Change of Control unless agreed to in writing by both parties. The target of the Change of Control shall then pay the other party $2 million as compensation for the unplanned termination of the Company's engagement and significant disruption to the other party's business. "Change of Control" means the date upon which, without the written concurrence of the target of the Change of Control, any person (as that term is defined in the *Securities Act* (British Columbia)) makes and does not withdraw a take-over bid (as that term is defined in the *Securities Act* (British Columbia)) or acquires, directly or indirectly, that number of common shares of the target which equals or exceeds twenty percent (20%) of the then issued common shares of the target.

**Available Information**
The SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC on www.sec.gov. You can also find information on our website www.almadenminerals.com. The information contained on our website is not a part of this annual report.

***Business Overview***

The Company is engaged in the business of the acquisition, exploration and when warranted, development of mineral properties. The Company currently has one material property in Mexico. The Company's property is at the exploration and development stage. The Company has not generated any revenues from operations.

Maintaining properties

The following is a general statement about government requirements for holding mineral properties in the jurisdictions where the Company currently holds material mineral property interests.

In Mexico, mining law is a federal matter. The government requires annual assessment work and expenditures per hectare which increase with the size and age of the claim. Under the tax reforms effective January 1, 2014, if a concession holder has not conducted exploration or exploitation activities during a two-year period, the concession holder would have to pay an additional 50% of the taxes payable per hectare if within the last 11 years, and an additional 100% of the taxes payable if after year 12. Land taxes per hectare also have to be paid by January 31 and July 31 each year. Both amounts are subject to inflation accounting and the inflation adjustment number for each fiscal period is published in the official gazette. Under the Mexican Constitution and the mining and environmental laws of Mexico, all mining projects are subject to Federal legal control. This control is exercised from the exploration phase through the closure phase of a mining project. Prior to the initiation of exploration activities, concession owners are required to file a notice of commencement of exploration activities in conformity with Mexican Official Norm 120 (NOM-120); prior to initiation of construction activities (and also in some more intrusive exploration activities), mining projects are required to apply for and obtain an environmental impact authorization and a land use permit from the Mexican Federal environmental agency SEMARNAT (Secretaria de Medio Ambiente y Recursos Naturales). This requires the presentation of an environmental impact manifest and a technical study which deals with the impacts, the environmental mitigation, and habitat compensation to the satisfaction of the authorities having environmental jurisdiction.

Competition

The mineral property exploration and development business, in general, is intensively competitive and there is not any assurance that even if commercial quantities of ore are discovered, a ready market will exist for sale of same. Numerous factors beyond the Company's control may affect the marketability of any substances discovered. These factors include market fluctuations; the proximity and capacity of natural resource markets and processing equipment; and government regulations, including regulations relating to prices, taxes, royalties, land tenure, land use, importing and exporting of minerals and environmental protection. The exact effect of these factors cannot be accurately predicted, but the combination of these factors may make it difficult for the Company to receive an adequate return on investment.

The Company competes with many companies possessing greater financial resources and technical facilities for the acquisition of mineral concessions, claims, leases and other mineral interests as well as for the recruitment and retention of qualified employees.

Seasonality

The Company's project is in central Mexico. In Mexico, the climate in the project area is marked by dry, cold winters and a distinct rainy season. The rainy season typically begins in May or June and continues until late September to October. In most years, roads remain passable and exploration can be done throughout the rainy season. Seasonal changes do not have a material impact on the Company's exploration expenditures.

Exploration Program Protocols

*General Sample Handling and Quality Control Program for Exploration Programs*

The Company employs a strict quality control program for samples taken during its exploration programs. For drilling programs, a quality control program is in place which includes the insertion of blanks, field duplicates and certified standards into the sample stream.

Chain of Custody
Samples of rock and drill core and cuttings are sealed by the sampler and kept under control of a qualified person until they are shipped to a laboratory.

Sample Handling
Sample handling for drilling programs is described more fully below. Soil and stream sediment samplers have been trained to industry standard levels of sampling methodology. In general, the Company sieves stream

sediment samples to -20 mesh in the field during preparation. Samplers are required to not wear any jewellery or clothing or use equipment which may contaminate the sample. All sample locations are geographically located at the time of sampling using the Global Positioning System. The Company has prepared standardized sample information cards for samplers to record information concerning the sample location, type and medium. Outcrop, float and dump rock samples are collected by geologists who record similarly ordered geologic information relating to the sample taken.

Blanks

Blank material, a sample of crushed and pulverized rock, known to contain very low or non-detectable concentration of gold and silver, is inserted as a pulp into the sample stream on an interval of every 20 samples. Blanks are intended to detect possible contamination.

Duplicates

During drill programs the Company routinely includes a field duplicate into the sample stream, spaced at 20 sample intervals. Field duplicate samples are splits of drill core or reverse circulation cuttings from the sample interval. The resulting two field duplicate samples are submitted with separate sample numbers "blind" to the assay lab and separately treated as normal samples. The samples are taken randomly with no regard to rock type, geographic position or degree of alteration or mineralization. These field duplicates are then used to detect the cumulative uncertainties associated with the entire sampling and analytical process.

Standards

During drill programs the Company routinely includes a certified standard into the sample stream, spaced at 20 sample intervals. Certified standards are purchased from CDN Resource Laboratories of Langley, BC and are prepared by this professional third-party lab according to industry standard and accepted methodologies. Standards are utilized to monitor the accuracy of the laboratory work.

*Sample Handling for Drill Programs*

Core Box Preparation

Plastic core boxes are used for the storage of core. Each box is labelled by the drillers at the drill rig with the drill-hole number, a box number and an arrow to mark the start of the tray and the down-hole direction. Wooden core blocks, with the meterage in black marker pen, are inserted by the drillers at the end of each core run (usually 3 m or less). These core run intervals are checked and recorded by the geologist during mark up (see below). When filled with core the boxes are sealed with a plastic lid by the drillers and transported to the core logging facility.

Sample and Core Box Markup

Once at the core logging facility, the core boxes are marked up with the starting and ending meterage, written at the ends of the trays with a marker. The start and end of each selected sample interval is marked with a red wax pencil mark across the core and sample numbers are written on the edge of the core box channels at the start and end of each sample interval. Intervals denoting the position in the sample tag sequence of field duplicate, blank and analytical standards are also marked on the core box. A cut line was marked on the core as a guide for sawing of half-core samples for assay. The cut line position is marked by fitting the ends of the core together, to align them as they came out of the hole, and using a ruler to draw a line down the core axis with a red wax pencil. This mark-up is done after the trays are photographed. Cut line positions are selected by the logging geologist to produce two halves with equal proportions of mineralization. Typically, this is done by marking the cut line down the long axis of the ellipses described by the intersection of the veins with the core circumference. Each tray is digitally photographed before core cutting and sampling.

Core Logging

Before cutting and sampling the core, the following tables of data are entered into the Company drill hole database system:

Geotechnical Logging

1. Core box record sheet: Beginning and end from/to intervals for each core box.

2. For each core run (from and to) a record of the core size, meters of core recovered for the interval, RQD (the

total length of pieces of core in the interval that are twice the width of the core divided by the length of the interval, times 100) and hardness (on a scale from 1 to 10, from hardest to softest).

3. A drilling daily control sheet showing the progress of the drill rig for each shift.

Geological Logging

1. Geology Log: Intervals selected by the geologist recording a detailed description of the lithology, texture, alteration, mineral assemblage and intensity and level of oxidation/weathering. Structural measurements (i.e. the angle of structures to the core axis) are also recorded. The cover sheet includes details such as surveyed collar co-ordinates, downhole survey data, core size depths, drilling dates and sample number series.

2. Veining and Mineralization: Estimates of the percent veining and the percentage of different minerals represented in either vein, breccia or disseminated form, i.e. quartz, carbonates, pyrite etc.

3. Sample Sheet: A record of the sample intervals, sample numbers and duplicate, blank and analytical standard numbers.

4. Hole Summary: An abbreviated hole log that summarizes the important features of a drill hole. A summary drill hole trace giving the geologist the opportunity to summarize the hole and sketch in structural orientations in a form easily transferred to sections. All logs are saved on the server along with the core photos and other data from each hole.

Sample Interval Selection

All strongly altered or mineralized intervals of core were sampled. Sampling always began at least 5 samples above the start of mineralization. Sample intervals were selected using the following criteria.

- Maximum sample length of 2 m in unmineralized lithologies.
- Maximum sample length of 1 m in mineralized lithologies.
- Minimum sample length of 50 cm. Geological changes in the core such as major mineralization/alteration intensity and lithology changes were used as sample breaks.
- Core size changes and any zones of core loss were used as sample breaks.
- Large discrete veins that might possibly be modeled or mined as separate structures were sampled separately.

The begin/end marks were placed so that the entire vein ended up in the sample(s) and the vein is not smeared into samples on either side.

Sampling Procedure

All samples were originally cut in half using custom-made, gasoline engine-powered diamond core saws. All were recently changed to electric powered saws. Each saw has sliding trays and customized “core cradles” sized for each core diameter in order to ensure a straight cut down the cut line and to minimize the loss of friable core during cutting. Areas of very soft rock (e.g. fault gouge), are cut with a machete, using the side of the core channel to ensure a straight cut. Areas of very broken core (pieces <1 cm) were sampled using spoons. The following standard sampling procedures were employed:

The right-hand side of the core (looking down the hole) was always sampled. After cutting, half the core was placed in a new plastic sample bag and half was placed back in the core box. Between each sample, the core saw and sampling table areas were washed to ensure no contamination between samples. Field duplicate, blank and analytical standards were added into the sample sequence as they were being cut. After cutting of samples containing visible gold, a piece of abrasive quartz sandstone was cut to clean the diamond blade. This was done to prevent contamination of the following sample with gold that may have become smeared onto the blade.

Sample numbers were written on the outside of the sample bags twice and the tag from the sample book was placed inside the bag with the half core. The bags were sealed using single-use plastic cable ties.

Sample numbers on the bags were checked against the numbers on the core box and the sample book.

The core cutting area is within the core logging shed and the logging geologists regularly checked the precision of the core cutting and sampling. The sealed plastic sample bags were placed in large plastic twine (rice) sacks (usually between 8 and 10 samples per sack) and sealed using single-use plastic cable ties. The sacks were weighed and the sack number, sample numbers, sack weight and date written on the outside of the sacks.

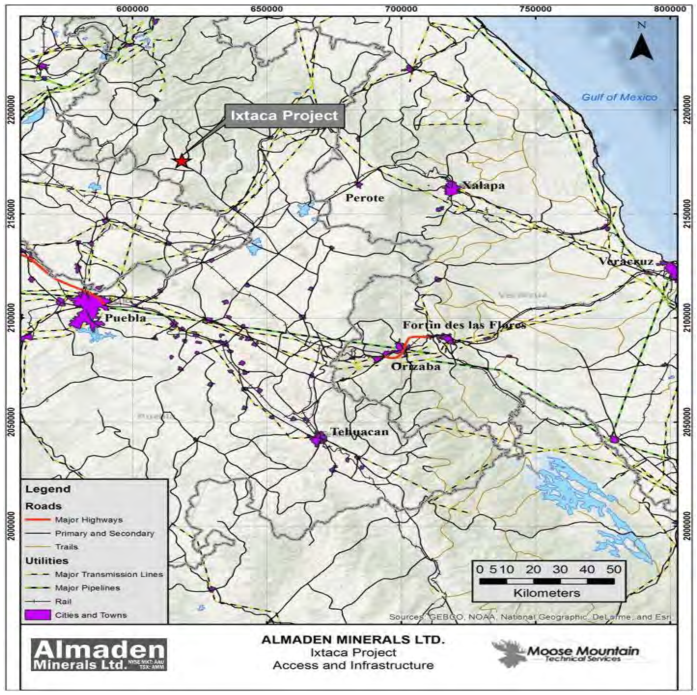
**Company's Principal Properties**
The Tuligtic Project, which hosts the Company's Ixtaca discovery, is the only project material to the Company. The Tuligtic Project property (the "Tuligtic Property" or the "Property") is located in Puebla State, Mexico.

***PROPERTY, PLANTS AND EQUIPMENT***

**The Tuligtic Property/Ixtaca Project – Mexico**

***Location and Access***
The Ixtaca deposit, the epithermal gold-silver target within the Tuligtic Property, is located 8 km northwest of the town of San Francisco Ixtacamaxtitlán, the county seat of the municipality of Ixtacamaxtitlán, Puebla State. The Ixtaca Project is accessible by driving 40 km east along Highway 119 from Apizaco, an industrial center located approximately 50 km north of Puebla City by two-lane Highway, and then north approximately 2 km along a paved road to the town of Santa Maria. The trip from Apizaco to site can be driven in approximately 1.5 hours. There is also access to the Tuligtic Property using gravel roads from the northeast via Tezhuitan and Cuyoaco, from the south via Libres and from the northwest via Chignahuapan. The Xicohtencatl Industrial complex lies 30 km southwest by paved road from the Ixtaca Project, and houses agricultural, chemical, biomedical and industrial manufacturing facilities and is serviced by rail. Puebla, the fourth largest city in Mexico has a population in excess of 4 million people, and includes one of the largest Volkswagen automotive plants outside Germany.

The Topography on the Tuligtic Property is generally moderate to steep hills with incised stream drainages. Elevation ranges from 2,300 meters (m) above sea level in the south to 2,800 m in the north. Vegetation is dominantly cactus and pines and the general area is also somewhat cultivated with subsistence vegetables, bean and corn crops. The Ixtaca Zone exploration area has been previously cleared and logged. The region has a temperate climate with mean monthly temperatures ranging from 16°C in June to 12°C in January. The area experiences approximately 714 mm of precipitation annually with the majority falling during the rainy season, between June and September. Annual evapotranspiration is estimated to be 774 mm. Exploration can be conducted year-round within the Tuligtic Property; however, road building and drilling operations may be impacted by weather to some degree during the rainy season. Electricity is available on the Tuligtic Property from the national electricity grid that services nearby towns such as Santa Maria and Zacatepec. The surface rights locally are privately owned and Almaden has negotiated voluntary surface land use agreements with surface landowners within the exploration area prior to beginning activities. To date Almaden has secured through purchase agreements over 1,139 hectares, from numerous independent owners.




***Claims and Title***

The Tuligtic Property was staked by Almaden in 2001, following the identification of surficial clay deposits that were interpreted to represent high-level epithermal alteration. The Property originally consisted of approximately 14,000 hectares (the "**Original Concessions**"), as shown below:

| Claim Name | Claim Number | Area (hectares) | Valid Until Date |
|---|---|---|---|
| Cerro Grande | 219469 | 11,202 | March 5, 2053 |
| Cerro Grande 2 | 233434 | 3,028 | February 23, 2059 |
| ***Total*** | | ***14,230*** | |

On April 7, 2015, Ejido Tecoltemi, a community granted communal agrarian lands by the Mexican Government and whose lands (the "Ejido Lands") overlap a small portion (~330 Ha) of the far southeastern corner of the Original Concessions, initiated legal proceedings (the "Amparo") in a lower court in Puebla state against Mexican mining authorities seeking a declaration that Mexico's mineral title system is unconstitutional because indigenous consultation is not required before the granting of mineral title.

Shortly after the Amparo was filed, the lower court ordered the suspension of Almaden from conducting exploration and exploitation work over those portions of the Original Concessions which overlap with the Ejido Lands. Mineral tenure over the Ejido Lands is not material to Almaden. The Ejido Lands do not overlap the Ixtaca Project or its environmental or social area of impact. Almaden has never tried to negotiate access to the Ejido Lands, never conducted exploration work on the Ejido Lands, and has no interest in conducting any future exploration or development work over the Ejido Lands.

On April 15, 2019, the lower court in Puebla State issued a ruling in the Amparo case, stating that Mexico's mineral title system is unconstitutional. The Original Concessions were ruled to be illegal, but the mineral rights over that land were ordered to be held for Almaden until such time as indigenous consultation can be completed. This ruling was appealed by the Mexican Congress, Senate, Secretary of Economy and mining authorities, as well as Almaden as an interested party.

On February 17, 2022, the Company announced that the SCJN reached a decision on February 16, 2022 in respect of the Mineral Title Lawsuit involving the Company's mineral claims. On April 27, 2022, the Company announced that the SCJN had published its final decision on this matter.

Almaden has reviewed the final decision of the SCJN. The decision determines that the Mexican mineral title law is constitutional, but that before issuing Almaden's mineral titles, the Ministry of the Economy should have provided for a consultation procedure with relevant indigenous communities. The decision orders the Ministry of the Economy to declare Almaden's mineral titles ineffective and to then issue them to Almaden following the Ministry's compliance with its obligation to carry out the necessary procedures to consult with indigenous communities. The decision discusses the application of international law and jurisprudence to the implementation of consultation by Mexican authorities with relevant indigenous communities. It also provides some detail to Mexican authorities regarding the procedures required to be followed by those authorities in the performance of indigenous consultation prior to the grant of mineral claims. Furthermore, the decision clarifies that the Company's original claim applications were submitted pursuant to the legal framework in force at the time and as such Almaden's mineral rights at the Ixtaca project are safeguarded while the mining authorities comply with conditions and requirements prior to issuing the mineral titles. As previously disclosed, the Company has no interest in holding mineral claims over the indigenous community's land. The decision will take effect at the time of its official notification to the Company which is expected shortly.

Almaden intends to interact with Mexican government officials and local community officials in order to facilitate to the extent possible the government's execution of its responsibilities in the issuance of the mineral titles. At present there is no timeline for the consultation process

Claim Reduction Efforts

After learning of the Amparo in 2015, Almaden filed applications to reduce the aggregate claim size at Tuligtic by approximately 7,000Ha to those areas still considered prospective (the "New Concessions"), as shown below, and cancel any of its claims overlapping the Ejido Lands. The applicable Mexican mining authorities issued the New Concessions and accepted the abandonment of the Original Concessions in May and June of 2017.

| Claim Name | Claim Number | Area (hectares) | Valid Until Date |
|---|---|---|---|
| Cerro Grande R1 | 245486 | 2,773.00 | March 5, 2053 |
| Cerro Grande R3 | 245488 | 824.06 | March 5, 2053 |
| Cerro Grande R4 | 245489 | 540.00 | March 5, 2053 |
| Cerro Grande R5 | 245490 | 784.97 | March 5, 2053 |
| Cerro Grande R6 | 245491 | 937.79 | March 5, 2053 |
| Cerro Grande 2 R2 | 245493 | 652.00 | February 23, 2059 |
| Cerro Grande 2 R3 | 245494 | 708.00 | February 23, 2059 |
| ***Total*** | | ***7,219.82*** | |

In June 2017, the Ejido Tecoltemi filed a legal complaint regarding the granting of the New Concessions, and on February 1, 2018, the court reviewing the complaint ruled the Ejido's complaint was founded, and this decision was appealed by the Company in the upper (Collegiate) court in October, 2019.

On December 21, 2018, the General Directorate of Mines issued a resolution, which has never been officially notified to the Company, that the New Concessions are left without effect, and the Original Concessions are in full force and effect. On February 13, 2019, the General Directorate of Mines delivered, to the court hearing the Amparo, mining certificates stating that the Original Concessions are valid, and the New Concessions are cancelled. On December 16, 2019, the General Directorate of Mines provided mineral title certificates to Almaden which reflected the position that the Original Concessions (the subject matter of the Amparo) were active and owned by Almaden (through its Mexican subsidiary) and that the New Concessions were "left without effect".

On December 1, 2020, the Company announced that the upper court denied the appeal filed by the Company in October 2019 objecting to the reinstatement by the Mexican mining authorities of approximately 7,000 Ha of mineral claims surrounding the Ixtaca Project, which the Company had previously dropped. This court decision upheld the action of Mexican mining authorities that reinstated the Company's Original Concessions as the Company's sole mineral claims over the Ixtaca Project, and that left the New Concessions the Company was awarded in 2017 as "held without effect". However, the decision also stated that the Company had the right to defend the New Concessions through the applicable legal procedures (which have been initiated through the two Administrative Challenges referred to below).

The Company has initiated two Administrative Challenges against the Mexican mining authorities for revoking

the Company's lawfully reduced New Concessions. These challenges are based in part on Mexican legal advice that the Company cannot be forced to own mineral rights that it does not wish to own. These Administrative Challenges remain in process.
Almaden continues to file taxes and assessment reports on the basis of the reduced area defined by the New Concessions. These taxes have been accepted by the Mexican mining authorities, and Almaden has not received any notifications from the Mexican mining authorities regarding taxes on the Original Concessions.

Further information on the Amparo is provided in Item 8 below under the heading "Legal Proceedings".

The claims owned by Almaden with respect to the Tuligtic Property are held 100% by Minera Gorrion S.A. de C.V., a subsidiary of Almaden Minerals Ltd. through the holding company, Puebla Holdings Inc., subject to a 2% NSR in favour of Almadex Minerals Ltd.

To maintain a claim in good standing, the holder is required to meet annual exploration or exploitation expenditure requirements. Currently, based on the New Concessions, the Tuligtic Property is subject to expenditure requirements of approximately US$997,000 per year. However, the Company has substantial historic expenditures which have historically been used to offset the annual requirements.

***Geological Setting of the Tuligtic Project and Ixtaca Zone***
The Ixtaca Project is situated within the Trans Mexican Volcanic Belt (TMVB), a Tertiary to recent intrusive volcanic arc extending approximately east-west across Mexico from coast to coast and ranging in width from 10 to 300km. The TMVB is the most recent episode of a long lasting magmatic activity which, since the Jurassic, produced a series of partially overlapping arcs as a result of the eastward subduction of the Farallon plate beneath western Mexico (Ferrari, 2011). The basement rocks of the eastern half of the TMVB are Precambrian terranes, including biotite orthogneiss and granulite affected by granitic intrusions, grouped into the Oaxaquia microcontinent (Ferrari et al., 2011; Fuentes-Peralta and Calderon, 2008). These are overlain by the Paleozoic Mixteco terrane, consisting of a metamorphic sequence known as the Acatlan complex and a fan delta sedimentary sequence known as the Matzitzi formation. Another sedimentary complex is found on top of the Mixteco terrane, represented by various paleogeographic elements such as the Mesozoic basins of Tlaxiaco, Zongolica, Zapotitlan, and Tampico-Misantla (Fuentes-Peralta and Calderon, 2008). The subducting plates associated with the TMVB are relatively young, with the Rivera plate dated at 10Ma (million years) and the Cocos plate at 11 to 17Ma.
.
The stratigraphy of the Tuligtic area can be divided into two main sequences: a Mesozoic sedimentary rock sequence related to the Zongolica basin and a sequence of late Tertiary igneous extrusive rocks belonging to the TMVB (Fuentes-Peralta & Calderon, 2008; Tritlla et al., 2004). The sedimentary sequence is locally intruded by plutonic rocks genetically related to the TMVB. The sedimentary complex at Tuligtic corresponds to the Upper Tamaulipas formation (Reyes-Cortes 1997). This formation, Late Jurassic to Early Cretaceous in age, is regionally described (Reyes-Cortes, 1997) as a sequence of grey-to-white limestone, slightly argillaceous, containing bands and nodules of black chert. The drilling conducted by Almaden allows for more detailed characterisation of the Upper Tamaulipas Formation carbonate units in the Tuligtic area. The sequence on the Project consists of clastic calcareous rocks. The limestone unit variably bedded, generally light grey but locally dark grey to black, with local chert rich sections graded into what have been named transition units and shale (also black shale). The transition units are brown calcareous siltstones and grainstones. These rocks are not significant in the succession but mark the transition from limestone to underlying calcareous shale. Typical of the transition units are coarser grain sizes. The lower calcareous "shale" units exhibit pronounced laminated bedding and is typically dark grey to black in colour, although there are green coloured beds as well. The shale units appear to have been subjected to widespread calc-silicate alteration.

Both the shale and transition units have very limited surface exposure and may be recessive. The entire carbonate package of rocks has been intensely deformed by the Laramide orogeny, showing complex thrusting and chevron folding in the hinge zones of a series of thrust-related east verging anticlines in the Ixtaca area (Tritlla et al., 2004; Coller, 2011). The calcareous shale units appear to occupy the cores of the anticlines while the thick bedded limestone units occupy the cores of major synclines identified in the Ixtaca zone.

The Tamaulipas Formation carbonate rocks are intruded in the mid-Miocene by a series of magmatic rocks. The compositions are very variable, consisting of hornblende-biotite-bearing tonalites, quartz-plagioclase-hornblende diorites, and, locally, aphanitic diabase dykes (Carrasco-Nunez et al., 1997). In the central part of the Tuligtic Property porphyry mineralization is hosted by and associated with a hornblende-biotite-quartz phyric granodiorite body. The contact between the granodiorite and the limestone is marked by the development of a prograde skarn.

In the Ixtaca deposit epithermal area of the Project, the limestone basement units are crosscut by intermediate dykes that are often intensely altered. In the vicinity of the Ixtaca zone these dykes are well mineralized especially at their contacts with limestone country rock. Petrography has shown that epithermal alteration in the dykes, marked by illite, adularia, quartz and pyrite overprints earlier calc-silicate endoskarn mineralogies (Leitch, 2011). Two main orientations are identified for dykes in the Ixtaca area; 060 degrees (parallel to the Main Ixtaca and Ixtaca North zones) and 330 degrees (parallel to the Chemalaco Zone).

An erosional unconformity surface has been formed subsequent to the intrusion of the porphyry mineralization-associated granodiorites. This paleo topographical surface locally approximates the current topography. Although not well exposed the unconformity is marked by depression localised accumulations of basal conglomerate comprised of intrusive and sedimentary boulders.

Two styles of alteration and mineralization have been identified in the area: (1) copper-molybdenum porphyry style alteration and mineralization hosted by diorite and quartz-diorite intrusions; (2) silver-gold low-sulphidation epithermal quartz-bladed calcite veins hosted primarily by carbonate rocks and spatially associated with overlying volcanic hosted texturally destructive clay alteration and replacement silicification.

Outcropping porphyry-style alteration and mineralization is observed in the bottoms of several drainages where the altered intrusive complex is exposed in erosional windows beneath post mineral unconsolidated ash deposits. Multiple late and post mineral intrusive phases have been identified crossing an early intensely altered and quartz-veined medium-grained feldspar phyric diorite named the Principal Porphyry. Other intrusive types include late and post mineral mafic dykes and an inter-mineral feldspar-quartz phyric diorite. Late mineral mafic dykes are fine grained and altered to chlorite with accessory pyrite. Calc-silicate (garnet-clinopyroxene) altered limestone occurs in proximity to the intrusive contacts and is crosscut by late quartz-pyrite veins. Early biotite alteration of the principal porphyry consists of biotite-orthoclase flooding of the groundmass. Quartz veins associated with early alteration have irregular boundaries and are interpreted to be representative of A-style porphyry veins. These are followed by molybdenite veins which are associated with the same wall rock alteration. Chalcopyrite appears late in the early alteration sequence. Late alteration is characterized by intense zones of muscovite-illite-pyrite overprinting earlier quartz-K-feldspar-pyrite ± chalcopyrite veining and replacing earlier hydrothermal orthoclase and biotite. Stockwork quartz-pyrite crosscuts the A-style veins and is associated with muscovite-illite alteration of biotite. The quartz-sericite alteration can be texturally destructive resulting in white friable quartz veined and pyrite rich rock. Pyrite is observed replacing chalcopyrite and in some instances chalcopyrite remains only as inclusions within late stage pyrite grains.

Epithermal mineralization on the Tuligtic Property is considered to have no genetic relationship to the porphyry alteration and mineralization described above. The epithermal system is well preserved and there is evidence of a paleosurface as steam heated kaolinite and replacement silica alteration occur at higher elevations where the upper part of the Coyoltepec pyroclastic deposit is preserved.

The Upper Tamaulipas formation carbonates (limestone and shale units), the dykes that crosscut it and the upper Coyoltepec volcanic subunit (variously referred to as volcanics, tuff or ash) are the host rocks to the epithermal system at Ixtaca. The epithermal alteration occurs over a roughly 5 by 5 kilometre area and occurs as intense kaolinite-alunite alteration and silicification in volcanic rocks. This alteration is interpreted to represent the upper portion of a well preserved epithermal system. The bulk of the mineralisation occurs in the carbonate (limestone and shale) as colloform banded epithermal vein zones. Unlike many epithermal vein systems in Mexico, the bulk of the veining in the Ixtaca zone has low base metal contents and gold and silver occur as electrum and other sulphides. SEM work has demonstrated that silver does not occur with galena or tetrahedrite in any significant way. In the main limestone unit (80% of recoverable metal in the FS) the silver to gold ratio of the mineralisation is roughly estimated to average ~65:1 while in the shale it is roughly estimated to be slightly higher at ~75:1.

***History of Past Work***

To the Company's knowledge, no modern exploration has been conducted on the Ixtaca Project prior to Almaden's acquisition of claims during 2001 and there is no record of previous mining; as such, this is a maiden discovery.

During January 2003, Almaden completed a program of geologic mapping, rock, stream silt sampling and induced polarization (IP) geophysical surveys at the Tuligtic Property (then known as the "Santa Maria Prospect"). The exploration identified both a porphyry copper and an epithermal gold target within an approximately 5 x 5km area of intensely altered rock. At the porphyry copper target, stockwork quartz-pyrite veins associated with minor copper mineralization overprint earlier potassic alteration within a multi-phase intrusive body. A single north-south oriented IP survey line identified a greater than 2km long elevated chargeability response coincident with the exposed altered and mineralized intrusive system. Volcanic rocks exposed 1km to the south of the mineralized intrusive display replacement silicification and sinter indicative of the upper parts of an epithermal system (the "Ixtaca Zone"). Quartz-calcite veins returning anomalous values in gold and silver and textural evidence of boiling have been identified within limestone roughly 100m below the sinter. The sinter and overlying volcanic rocks are anomalous in mercury, arsenic, and antimony.

Additional IP surveys and soil sampling were conducted in January and February 2005, further defining the porphyry copper target as an area of high chargeability and elevated copper, molybdenum, silver and gold in soil. A total of eight (8) east-west oriented lines, 3km in length, spaced at intervals of 200m have been completed over mineralized intrusive rocks intermittently exposed within gullies cutting through the overlying unmineralized ash deposits.

The Tuligtic Property was optioned to Pinnacle Mines Ltd. in 2006 and the option agreement was terminated in 2007 without completing significant exploration.

The Property was subsequently optioned to Antofagasta Minerals S.A. (Antofagasta) on March 23, 2009. During 2009 and 2010 Antofagasta, under Almaden operation, carried out IP geophysical surveys and a diamond drill program targeting the copper porphyry prospect. Three additional IP survey lines were completed, and in conjunction with the previous nine (9) IP lines, a 2 x 2.5km chargeability high anomaly, open to the west and south, was defined. The 2009 drilling consisted of 2,973m within seven (7) holes that largely intersected skarn type mineralization.

On February 16, 2010, Almaden announced that Antofagasta terminated its option to earn an interest in the Property.

In July 2010, Almaden initiated a preliminary diamond drilling program to test epithermal alteration within the Tuligtic Property, resulting in the discovery of the Ixtaca Zone. The target was based on exploration data gathered by Almaden since 2001 including high gold and silver in soil and a chargeability and resistivity high anomaly (derived from an IP geophysical survey conducted by Almaden) topographically beneath Cerro Caolin, a prominent clay and silica altered hill. This alteration, barren in gold and silver, was interpreted by Almaden to represent the top of an epithermal system which required drill testing to depth. The first hole, TU-10-001 intersected 302.42 metres of 1.01g/t gold and 48g/t silver and multiple high grade intervals including 44.35 metres of 2.77g/t gold and 117.7g/t silver.

***Present Condition of Project***

**Geology and Mineral Resources**

The veining of Ixtaca epithermal system displays characteristics representative of low and intermediate sulphidation deposits. These include typical mill feed and gangue mineralogy (electrum Ag-sulphides, sphalerite, galena, adularia, quartz and carbonates), mineralization dominantly in open space veins (colloform banding, cavity filling).

At the base of the overlying clay altered volcanics disseminated gold-silver mineralisation occurs in association with pyrite and minor veining. Locally this mineralisation can be high grade but largely associated with lower Ag:Au ratios roughly estimated to average 20:1.

To date two main vein orientations have been identified in the Ixtaca deposit:

- 060 trending sheeted veins hosted by limestone;
- 330 trending veins hosted by shale;

The bulk of the resource and over 80% of the mill feed is hosted by the limestone in the Main Ixtaca and Ixtaca

North zones as swarms of sheeted and anastomosing high grade banded epithermal veins. There is no disseminated mineralisation within the host rock to the vein swarms, which is barren and unaltered limestone. To the northeast of the limestone hosted mineralisation, the Chemalaco zone, a 330 striking and west dipping vein zone hosted by shale, also forms part of the deeper resource.

**Rock Creek Mill**

Almaden entered into an option agreement to acquire the Rock Creek Mill in October 2015. The Rock Creek Mill is a completed mill that was located outside of Nome, Alaska and which only operated for several months before its owner suspended its mining operation in 2008. The mill has been kept in excellent condition on care and maintenance.

The Rock Creek Mill was built to process 7,000 tonnes per day. It includes a three-stage crushing plant, gravity circuit, ball mill, floatation cells and leaching facilities. Also included in the option agreement are conveyors, metallurgical and chemical fire assay laboratories, a water treatment plant, full electrical circuitry and generators, and spare parts.

Almaden exercised its right and option under the option agreement and has purchased the Rock Creek Mill and related assets for a total of US$6,500,000, subject to adjustment under certain circumstances.

In addition to the cash payments, Almaden also issued to the optionor 407,997 Almaden common shares valued at $273,358 upon receipt of regulatory approval, which were issued on November 25, 2016.

During the year ended December 31, 2018, Almaden obtained ownership and title to the mill equipment, which remains located in Nome, Alaska.

The Rock Creek Mill has been incorporated into the Ixtaca economic studies.

**Amended Preliminary Economic Assessment**

On January 22, 2016, Almaden's independent consultants prepared a Technical Report titled "Preliminary Economic Assessment of the Ixtaca Project", which provided further detail to its December 9, 2015 press release summarizing the results of integrating the optioned Rock Creek Mill and a smaller, higher grade, payback focused pit on potential mine economics. An amended technical report was completed on April 13, 2016 (the "Amended PEA"); however the amendments were not material changes and the Report's data, inputs, interpretation, conclusions and results all remained unchanged. This report was prepared in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101"). NI 43-101 is a rule developed by the Canadian Securities Administrators that establishes standards for all public disclosure an issuer makes of scientific and technical information concerning mineral projects. These standards differ from the mining property disclosure rules specified in Subpart 1300 of Regulation S-K under the United States Securities Act of 1933 ("Subpart 1300") promulgated by the SEC.

The Amended PEA followed the historical PEAs released in 2014 and 2015 ("Historical PEAs") which evaluated larger throughput development alternatives. The primary reasons for providing an update to the Historical PEAs were to show the impact of significantly reduced initial capital cost on project economics and, given the significant decrease in precious metals prices, to demonstrate the viability of a mine plan which focused on the near surface high grade limestone hosted portions of the Ixtaca Zone deposit.

This mine plan was a smaller higher grade scenario than those described in Almaden's Historical PEA studies. In addition, the Amended PEA incorporated the optioned Rock Creek mill as well as results from various engineering studies related to the project which had been conducted since the Historical PEAs were completed. The Amended PEA incorporated:

- The same resource model as the Historical PEAs;
- The Rock Creek Mill, which was optioned by the Company in October 2015, with average throughput of 7,500 tonnes per day;
- A smaller, near surface and payback focussed pit;

- A mine production schedule which targets higher grades earlier;
- Optimised waste placement and tailings management facilities;
- A 2% NSR now held by Almadex Minerals Ltd.

**Pre-Feasibility Study ("PFS")**

Upon completion of the Amended PEA, Almaden began the work required for a Pre-Feasibility Study on the Ixtaca Project. During 2016, Almaden completed the necessary geotechnical, geomechanical, and hydrologic field programs, and also optimized site layout through updated waste placement and facilities locations. A new metallurgical program was also completed on the limestone domain, which represents approximately 82% of the total gold equivalent ounces produced over the life of the mine in the PFS. This report was also prepared in accordance with NI 43-101, the standards for which differ from the mining property disclosure rules specified in Subpart 1300 promulgated by the SEC.

The completed PFS is dated May 17, 2017 and included an updated resource model. The mine production schedule also included the optioned Rock Creek Mill while targeting higher grades earlier, using smaller, payback focused starter pits.

**Feasibility Study ("Study")**

Upon completion of the PFS, Almaden began the work required for a Feasibility Study on the Ixtaca Project. The Study and resulting mine plan incorporate significant changes from the PFS including filtered (dry stack) tailings, ore sorting, increased throughput and an improved mine schedule. Collectively the changes result in a reduced project footprint and improved economics.

Almaden engaged a team of consultants led by Moose Mountain Technical Services ("MMTS") to undertake this Study. As of the date of the Study and of the date hereof, the aforementioned Named Experts or, as applicable, Designated Professionals, to the best of the Company's knowledge, after reasonable inquiry, beneficially own, directly or indirectly, less than 1% of the Common Shares of the Company or any of the Company's associates or affiliates, and none of them have any registered or beneficial ownership, direct or indirect, of property of the Company or any of the Company's associates or affiliates.

The completed Study is dated January 24, 2019, and an update to the FS is dated October 3, 2019. The Study was prepared in accordance with NI 43-101, the standards for which differ from the mining property disclosure rules specified in Subpart 1300 promulgated by the SEC. A technical report summary which summarises the Study in a manner intended to be in accordance with Subpart 1300 of Regulation S-K (the "TRS") has been filed as an exhibit to this Annual Report. The TRS is a review and summary of the previous technical work carried out up to the date of the Study. No significant technical work has been conducted subsequent to this Study and all exploration, legal, permitting and other project updates subsequent to the Study are provided elsewhere in this 20F. The Study was filed as a Feasibility Study under 43-101 standards. However, since Subpart 1300 standards are different than 43-101 standards, such as a lower range for cost estimates and contingencies, the Study likely would not meet Subpart 1300 requirements for a Feasibility-level study.

**TRS HIGHLIGHTS**
(All values shown in this section discussing the TRS are in $US unless noted otherwise. Base case uses $1275/oz gold and $17/oz silver prices. Gold and silver equivalency calculations assume 75:1 ratio).

- Average annual production of 108,500 ounces gold and 7.06 million ounces silver (203,000 gold equivalent ounces, or 15.2 million silver equivalent ounces) over first 6 years;

- After-tax internal rate of return ("IRR") of 42% and after-tax payback period of 1.9 years;

- After-tax net present value ("NPV") of $310 million at a 5% discount rate;

- Initial Capital of $174 million;

- Conventional open pit mining with a Proven and Probable Mineral Reserve of 1.39 million ounces of gold and 85.2 million ounces of silver;

- Pre-concentration uses ore sorting to produce a total of 48 million tonnes of mill feed averaging 0.77 g/t gold and 47.9 g/t silver (2.03 g/t gold equivalent over first 6 years, 1.41 g/t gold equivalent over life of mine);
- Average life-of-mine ("LOM") annual production of 90,800 ounces gold and 6.14 million ounces silver (173,000 gold equivalent ounces, or 12.9 million silver equivalent ounces);
- Operating cost $716 per gold equivalent ounce, or $9.55 per silver equivalent ounce;
- All-in Sustaining Costs ("AISC"), including operating costs, sustaining capital, expansion capital, private and public royalties, refining and transport of $850 per gold equivalent ounce, or $11.30 per silver equivalent ounce;
- Elimination of tailings dam by using filtered tailings significantly reduces the project footprint and water usage

**Capital and Operating Costs**

Initial capital cost for the Ixtaca gold-silver project is $174 million and sustaining capital (including expansion capital) is $111 million over the LOM. The estimated expansion capital of $64.5 million will be funded from cashflow in Year 4 for the throughput ramp-up in Year 5. Estimated LOM operating costs are $26.8 per tonne mill feed. The following tables summarize the cost components:

Initial Capital Costs ($ millions)

| | |
|---|---|
| Mining | 22.2 |
| Process | 80.2 |
| Onsite Infrastructure | 24.3 |
| Offsite Infrastructure | 7.5 |
| Indirects, EPCM, Contingency and Owner's Costs | 39.9 |
| **Total** | **174.2** |

Expansion Capital Costs ($ millions)

| | |
|---|---|
| Mining | $1.2 |
| Process | $56.9 |
| Infrastructure | $1.5 |
| Indirects, EPCM, Contingency and Owner's Costs | $5.0 |
| **Total** | **$64.5** |

LOM Average Operating Costs ($)

| | | |
|---|---|---|
| Mining costs | $/tonne milled | $15.2 |
| Processing | $/tonne milled | $10.5 |
| G&A | $/tonne milled | $1.1 |
| **Total** | **$/tonne milled** | **$26.8** |

**Economic Results and Sensitivities**

A summary of financial outcomes comparing base case metal prices to alternative metal price conditions are presented below. The TRS base case prices are derived from current common peer usage, while the alternate cases consider the project's economic outcomes at varying prices witnessed at some point over the three years prior to the Study.

Summary of Ixtaca Economic Sensitivity to Precious Metal Prices (Base Case is Bold)

| Gold Price ($/oz) | 1125 | 1200 | **1275** | 1350 | 1425 |
|---|---|---|---|---|---|
| Silver Price ($/oz) | 14 | 15.5 | **17** | 18.5 | 20 |
| Pre-Tax NPV 5% ($million) | 229 | 349 | **470** | 591 | 712 |
| Pre-Tax IRR (%) | 35% | 46% | **57%** | 67% | 77% |
| Pre-Tax Payback (years) | 2.0 | 1.8 | **1.6** | 1.4 | 1.3 |
| After-Tax NPV 5% ($million) | 151 | 233 | **310** | 388 | 466 |
| After-Tax IRR (%) | 25% | 34% | **42%** | 49% | 57% |
| After-Tax Payback (years) | 2.6 | 2.1 | **1.9** | 1.7 | 1.5 |

**Mineral Resource Estimate**

On January 31, 2013 the Company announced a maiden resource on the Ixtaca Zone, which was followed by a resource update on January 22, 2014 and another on May 17, 2017. Since that time an additional 104 holes have been completed, and this data is also included in the Mineral Resource Estimate which is summarised in the table below. The data available for the resource estimation consisted of 649 drill holes assayed for gold and silver. Wireframes constraining mineralised domains were constructed based on geologic boundaries defined by mineralisation intensity and host rock type. Higher grade zones occur where there is a greater density of epithermal veining. These higher grade domains have good continuity and are cohesive in nature.

Of the total drill holes, 558 intersected the mineralised solids and were used to make the resource estimate. Capping was completed to reduce the effect of outliers within each domain. Uniform down hole 3-meter composites were produced for each domain and used to produce semivariograms for each variable. Grades were interpolated into blocks 10 x 10 x 6 meters in dimension by ordinary kriging. Specific gravities were determined for each domain from drill core. Estimated blocks were classified as either Measured, Indicated or Inferred based on drill hole density and grade continuity.

Table showing the Measured, Indicated and Inferred Mineral Resource Statement with the Base Case 0.3 g/t AuEq Cut-Off highlighted from the 8 July 2018 Resource Statement. Also shown are the 0.5, 0.7 and 1.0 g/t AuEq cut-off results. AuEq calculation is based on average prices of $1250/oz gold and $18/oz silver.

Ixtaca Zone Measured, Indicated and Inferred Mineral Resource Statement

| MEASURED RESOURCE | | | | | | | |
|---|---|---|---|---|---|---|---|
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **43,380,000** | **0.62** | **36.27** | **1.14** | **862** | **50,590** | **1,591** |
| 0.50 | 32,530,000 | 0.75 | 44.27 | 1.39 | 788 | 46,300 | 1,454 |
| 0.70 | 25,080,000 | 0.88 | 51.71 | 1.63 | 711 | 41,700 | 1,312 |
| 1.00 | 17,870,000 | 1.06 | 61.69 | 1.95 | 608 | 35,440 | 1,118 |
| INDICATED RESOURCE | | | | | | | |
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **80,760,000** | **0.44** | **22.67** | **0.77** | **1,145** | **58,870** | **1,994** |
| 0.50 | 48,220,000 | 0.59 | 30.13 | 1.02 | 913 | 46,710 | 1,586 |
| 0.70 | 29,980,000 | 0.74 | 37.79 | 1.29 | 715 | 36,430 | 1,240 |
| 1.00 | 16,730,000 | 0.96 | 47.94 | 1.65 | 516 | 25,790 | 888 |

| INFERRED RESOURCE | | | | | | | |
|---|---|---|---|---|---|---|---|
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **40,410,000** | **0.32** | **16.83** | **0.56** | **412** | **21,870** | **726** |
| 0.50 | 16,920,000 | 0.44 | 25.43 | 0.80 | 237 | 13,830 | 436 |
| 0.70 | 7,760,000 | 0.57 | 33.80 | 1.06 | 142 | 8,430 | 264 |
| 1.00 | 3,040,000 | 0.79 | 43.64 | 1.42 | 77 | 4,270 | 139 |

Notes pertaining to Measured, Indicated and Inferred Mineral Resource Estimates:

1. *Ixtaca Mineral Resources Estimate have an effective date of 8 July 2018.*
2. *Base Case 0.3 g/t AuEq Cut-Off grade is highlighted. Also shown are the 0.5, 0.7 and 1.0 g/t AuEq cut-off results. AuEq calculation based on average prices of $1250/oz gold and $18/oz silver. The Base Case cut-off grade includes consideration of the open pit mining method, 90% metallurgical recovery, mining costs of $1.82/t, average processing costs of $11.7, G&A costs of $1.81/t*
3. *Mineral Resources are reported inclusive of those Mineral Resources that have been converted to Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
4. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal or other relevant issues. The Mineral Resources have been classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves in effect as of the date of 8 July 2018.*
5. *All figures were rounded to reflect the relative accuracy of the estimates and may result in summation differences.*

**Mineral Reserve Estimate**

Mineral Reserves in the table below have been developed by MMTS with an effective date of November 30, 2018, The Mineral Reserves are based on an engineered open pit mine plan.

Mineral Reserves

| | **Tonnes** | **Diluted Average Grades** | | **Contained Metal** | |
|---|---|---|---|---|---|
| | **(millions)** | **Au (g/t)** | **Ag (g/t)** | **Au - '000 ozs** | **Ag - '000 ozs** |
| Proven | 31.6 | 0.70 | 43.5 | 714 | 44,273 |
| Probable | 41.4 | 0.51 | 30.7 | 673 | 40,887 |
| **TOTAL** | **73.1** | **0.59** | **36.3** | **1,387** | **85,159** |

- *Mineral Reserves have an effective date of November 30, 2018. The qualified person responsible for the Mineral Reserves is Jesse Aarsen, P.Eng of Moose Mountain Technical Services.*
- *The cut-off grade used for ore/waste determination is NSR>=$14/t*
- *All Mineral Reserves in this table are Proven and Probable Mineral Reserves. The Mineral Reserves are not in addition to the Mineral Resources but are a subset thereof. All Mineral Reserves stated above account for mining loss and dilution.*
- *Associated metallurgical recoveries (gold and silver, respectively) have been estimated as 90% and 90% for limestone, 50% and 90% for volcanic, 50% and 90% for black shale.*
- *Reserves are based on a US$1,300/oz gold price, US$17/oz silver price and an exchange rate of US$1.00:MXP20.00.*
- *Reserves are converted from resources through the process of pit optimization, pit design, production schedule and supported by a positive cash flow model.*
- *Rounding as required by reporting guidelines may result in summation differences.*

Legal, political, environmental, or other risks that could materially affect the potential development of the Mineral Reserves are provided in this Form 20-F under the heading “Risk Factors”.

**Mine Plan**

The Ixtaca gold-silver project is planned as a typical open pit mining operation using contractor mining. Initial production will ramp up to a mill feed rate of 7,650 tonnes per day followed by an expansion to 15,300 tonnes per day from Year 5 onwards.

An ore control system is planned to provide field control for the loading equipment to selectively mine ore grade material separately from the waste.

Mining operations will be based on 365 operating days per year with three 8 hour shifts per day.

**Processing**

The TRS reflects the Rock Creek process plant which has been purchased by Almaden. Run of mine ore will be crushed in a three-stage crushing circuit to -9 mm.

The TRS also incorporates ore sorting, test work for which has shown the ability to separate barren or low grade limestone host rock encountered within the vein swarm from vein and veined material (see Almaden news release of July 16th 2018). Product from the secondary crusher will be screened in to coarse (+20mm), mid-size (12 to 20 mm), and fine (-12mm) fractions. Coarse and mid-size ore will be sorted by an XRT ore sort machine to eject waste rock. Fine ore will bypass the ore sorting and is sent directly to the mill.

Ore sort waste from Limestone and Black Shale is below waste/ore cutoff grade and is placed in the waste rock dump. Ore sort 'waste' from the Volcanic unit is low grade ore and will be stockpiled for processing later in the mine life. Ore sorting pre-concentration increases the mill feed gold and silver grades by 32% and 31% respectively compared to run of mine (ROM) grades. The table below shows ROM grades with ore sort waste removed from the ROM, and the resulting mill feed.

Ore Sort Mill Feed grade improvement

| | | **ROM Ore** | **Ore sort Waste** | **Mill Feed** |
|---|---|---|---|---|
| Limestone | million tonnes | 51.5 | 18.8 | 32.7 |
| | Au g/t | 0.572 | 0.24 | 0.763 |
| | Ag g/t | 37.5 | 12.0 | 52.2 |
| Black Shale | million tonnes | 12.2 | 6.3 | 5.8 |
| | Au g/t | 0.517 | 0.25 | 0.806 |
| | Ag g/t | 44.4 | 20.0 | 70.8 |
| Volcanic | million tonnes | 9.4 | - | 9.4 |
| | Au g/t | 0.790 | - | 0.790 |
| | Ag g/t | 18.6 | - | 18.6 |
| **TOTAL** | million tonnes | 73.1 | 25.1 | 48.0 |
| | Au g/t | 0.591 | 0.24 | 0.773 |
| | Ag g/t | 36.3 | 14.0 | 47.9 |

Crushed ore is transported to the grinding circuit by an over land conveyor. Grinding to 75 microns is carried out with ball milling in a closed circuit with cyclones. Cyclone underflow is screened and the screen undersize is treated in semi-batch centrifugal gravity separators to produce a gravity concentrate.

The gravity concentrate will be treated in an intensive leach unit with gold and silver recovered from electrowinning cells.

The cyclone overflow will be treated in a flotation unit to produce a flotation concentrate. After regrinding the flotation concentrate leaching will be carried out in 2 stages. CIL leaching for 24 hours will complete gold extraction, followed by agitated tank leaching to complete silver leaching. A carbon desorption process will recover gold and silver from the CIL loaded carbon, and a Merrill Crowe process will recover gold and silver from pregnant solution from the agitated leach circuit.

Cyanide destruction on leach residue is carried out using the $SO_2$/Air process. Final tailings are thickened and filtered then dry stacked and co-disposed with mine waste rock.

Average process recoveries from mill feed to final product over the life of mine are summarized below for each ore type.

**Average Life of Mine Process Recoveries from Mill Feed**

| | Gold | Silver |
|---|---|---|
| Limestone | 88.5% | 86.8% |
| Volcanic | 64.4% | 76.3% |
| Black Shale | 54.5% | 84.7% |

**Water and Waste Management**

One of Almaden's top priorities at Ixtaca is water quality and a mine plan that provides a permanent and consistent long-term supply of water for residents. The plan outlined in the TRS has evolved through the open dialogue between the Company and residents over the past number of years and as part of the Social Investment Plan consultation (see section below on "Community").

Rainfall in the Ixtaca vicinity falls primarily during a relatively short rainy season. With no local water storage facilities, the flash flows of water are currently lost to the communities. Under the TRS, rainwater will be captured during the rainy season in the water storage reservoir and slowly released during the dry season, for use by both the mining operation and local residents.

Extensive geochemical studies have evaluated the potential for acid rock drainage and metal leaching from the waste rock and tailings using globally accepted standardised methods of laboratory testing and in compliance with Mexican regulations. Most of the waste rock at Ixtaca is limestone, and the studies of both waste rock and tailings have consistently shown that there is more than enough neutralising potential present in the waste rock to neutralise any acid generated. Testing to date also indicates low potential for metal leaching. These results along with the excellent access to potential markets in the growing industrial state of Puebla, indicate the potential for rock waste and tailings from the Ixtaca deposit to be secondary resources such as aggregate and cement feedstock. These opportunities were examined in 2019 as part of the Company's commitment to best sustainable practices.

In consideration of these findings and the hydrologic conditions at Ixtaca, Almaden and its consultants reviewed Best Available Technology and Best Applicable Practice in the design and planning of tailings management at Ixtaca, which resulted in selecting a dry-stack tailings facility which would include co-disposal of waste with filtered tailings, use much less water than traditional slurry facilities, reduce the mine footprint, allow for better dust control, and enable earlier rehabilitation of the tailings and waste disposal areas.

**Community Consultations**

Almaden has a long history of engagement with communities in the region around the Ixtaca Project. Amongst many other initiatives, the Company has trained and employed drillers and driller helpers from the local area, held ten large-scale community meetings totalling over 4,500 people, taken 500 local adults on tours of operating mines in Mexico, and held monthly technical meetings on a diverse range of aspects relating to the mining industry and the Ixtaca Project. At the end of 2021, the Company convened an outdoor end of year gathering in a large open space and is very appreciative of the ongoing support and optimism from local communities regarding the future of the project and the tremendous value that we can collectively deliver to the local area through project development.

In 2017, Almaden engaged a third-party consultant to lead a community consultation and impact assessment at the Ixtaca Project. In Mexico, only the energy industry requires completion of such an assessment (known in Mexico as a Trámite Evaluación de Impacto Social, or "EVIS") as part of the permitting process. The purpose of these studies is to identify the people in the area of influence of a project ("Focus Area"), and assess the potential positive and negative consequences of project development to assist in the development of mitigation measures and the formation of social investment plans. To Almaden's knowledge, this is the first time a formal EVIS has been completed in the minerals industry in Mexico, and as such reflects the Company's commitment to best national and international standards in Ixtaca project development.

The EVIS and subsequent work on the development of a Social Investment Plan were conducted according to Mexican and international standards such as the Guiding Principles on Business and Human Rights, the Equator Principles, and the OECD Guidelines for Multinational Enterprises and Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector.

Fieldwork for the EVIS was conducted by an interdisciplinary group of nine anthropologists, ethnologists and sociologists graduated from various universities, who lived in community homes within the Ixtaca Focus Area during the study to allow for ethnographic immersion and an appreciation for the local customs and way of life. This third-party consultation sought voluntary participation from broad, diverse population groups, with specific attention to approximately one thousand persons in the Focus Area.

This extensive consultation resulted in changes to some elements of the mine design, including the planned construction of a permanent water reservoir to serve the local area long after mine closure, and the shift to dry-stack filtered waste management.

In March 2020, the Company announced that it has partnered with a local community group focused on irrigation development, and together with them coordinated with the Federal Government water authority ("CONAGUA"), to co-fund a new water reservoir in Zacatepec, a community located close to the Ixtaca mine development area. Next steps will involve adding new pipelines, tanks, and other structures to enhance the irrigation potential in support of local agricultural production.

This reservoir is one of the projects identified which could bring immediate benefits to the local area even prior to Ixtaca development. The Company looks forward to advancing further elements of the community Social Investment Plan as mine permitting and construction advance.

The Company has now commenced a Human Rights Impact Assessment ("HRIA") at the Ixtaca project. The HRIA will be conducted in accordance with best international practice and in observance of the latest developments in international human rights legislation and precedents. It will seek to predict, identify, characterize, and assess the impacts the project may have on these matters and will propose strategies which amplify the positive impacts and mitigate or compensate for any negative ones.

**Economic Contributions**

The TRS anticipates that approximately 600 direct jobs will be created during the peak of construction, and 420 jobs will be generated during operations. Assuming base case metal prices, under this TRS Ixtaca is anticipated to generate approximately US$130 million in Federal taxes, US$50 million in State taxes and US$30 million in Municipal taxes.

**Closure and Reclamation**

Mine waste areas will be reclaimed and re-vegetated at the end of mining activity. At closure, all buildings will be removed and remaining facilities, except for the water storage dam (WSD), will be reclaimed and re-vegetated. The WSD and the availability of this water to the local communities will remain after closure.

**Opportunities**

Several opportunities excluded from the base case economics have been identified in the TRS.

- Results from the ore sorting tests identified several opportunities to increase the ore sort efficiency and could result in a further increase in mill feed grades. These opportunities will be investigated with future test work.

- Gold extraction recoveries in the minor black shale unit are currently impeded by the presence of carbonaceous material. Recent test work including carbon pre-flotation and ultra-fine gravity separation has demonstrated that the carbon can be liberated and removed with a significant improvement in gold recovery. This test work is ongoing and is expected to improve the black shale gold recovery.

- Test work carried out on Ixtaca limestone waste rock samples concluded that Ixtaca limestone waste rock is suitable for many types of concrete use and other applications such as shotcrete, subgrade, asphalt aggregate or railroad ballast with little effort and processing. Concrete produced with tests on Ixtaca limestone aggregate performed very well, achieving the 28-day design compressive strength of 30 MPa already at 7 days, and more than 40 MPa at 28 and 56 days.

  Ixtaca is connected by 60 km of paved road to the industrial city Apizaco, 120 km of paved road to the state capital of Puebla, and 170 km of paved road to Mexico City.

  The sale of limestone ore sort rejects (a waste product) as an aggregate presents a very significant potential source of revenue to the Project at no additional capital or operating cost to the Project. There is also potential to sell some of the waste rock as an aggregate.

- Fine aggregate from crushing and grinding operations is also expected to perform in a similar way to the coarse aggregate. Chemical analysis of the fine aggregate indicates that it is also suitable as a raw material for the production of lime cement or Portland cement if properly processed and blended with suitable silica aluminates.

**Next Engineering and Development Steps**

In December 2020, the Company announced that it received notification from the Mexican federal permitting authority, SEMARNAT, that the Company's initial MIA, a required permit in order to proceed to construction and operation of the Ixtaca Project, did not receive approval. The Company originally submitted the MIA in early 2019.

The reasons cited by SEMARNAT for not approving the MIA include insufficient technical information regarding the impacts of the Ixtaca Project on the environment, local and regional area. Although not formally vested with authority on indigenous matters under a specific local body of law, SEMARNAT also expressed its opinion that indigenous persons are present in the area affected by the Ixtaca Project and indicated that this needs to be addressed in the context of obligations assumed by Mexico under ILO Convention 169 regarding the human right to free, prior, informed consultation of indigenous communities.

In December 2020, the Company announced that its initial MIA was not approved by Mexican authorities. The Company is now preparing a revised MIA permit application which incorporates additional data presently available to the Company as well as data gathered in further field studies.

**Qualified Persons, Sample Preparation, Analyses, Quality Control and Assurance**

The independent qualified person responsible for the TRS is Jesse Aarsen, P.Eng., of Moose Mountain Technical Services. A copy of the TRS, and Mr. Aarson's consent, are included as exhibits to this Annual Report.

The analyses used in the preparation of the mineral resource statement were carried out at ALS Chemex Laboratories of North Vancouver ("ALS") using industry standard analytical techniques. All strongly altered or epithermal-mineralized intervals of core have been sampled. Almaden employs a maximum sample length of 2 to 3m in unmineralized lithologies, and a maximum sample length of 1m in mineralized lithologies. During the years 2010 and 2011, Almaden employed a minimum sample length of 20cm. The minimum sample length was increased to 50cm from 2012 onwards to ensure the availability of sufficient material for replicate analysis. Drill core is half-sawn using industry standard diamond core saws. After cutting, half the core is placed in a new plastic sample bag and half is placed back in the core box. Sample numbers are written on the outside of the sample bags and a numbered tag placed inside the bag. Sample bags are sealed using a plastic cable tie. Sample numbers are checked against the numbers on the core box and the sample book.

ALS sends its own trucks to the Ixtaca Project to take custody of the samples at the Santa Maria core facility and transports them to its sample preparation facility in Guadalajara or Zacatecas, Mexico. Prepared sample pulps are then forwarded by ALS personnel to the ALS North Vancouver, British Columbia laboratory, which is ISO/IEC 17025:2017 and ISO 9001: 2015 certified, for analysis.

For gold, samples are first analysed by fire assay and atomic absorption spectroscopy (“AAS”). Samples that return values greater than 10 g/t gold using this technique are then re-analysed by fire assay but with a gravimetric finish. Silver is first analysed by Inductively Coupled Plasma - Atomic Emission Spectroscopy (“ICP-AES”). Samples that return values greater than 100 g/t silver by ICP-AES are then re analysed by HF-HNO3-HCLO4 digestion with HCL leach and ICP-AES finish. Of these samples those that return silver values greater than 1,500 g/t are further analysed by fire assay with a gravimetric finish. Blanks, field duplicates and certified standards were inserted into the sample stream as part of Almaden’s quality assurance and control program. In addition to the in-house QAQC measures employed by Almaden, Kris Raffle, P.Geo. of APEX Geoscience Ltd., completed an independent review of blank, field duplicate and certified standard analyses. All QAQC values falling outside the limits of expected variability were flagged and followed through to ensure completion of appropriate reanalyses. No discrepancies were noted within the drill hole database, and all QAQC failures were dealt with and handled with appropriate reanalyses.

**Current Work**

In December 2020, the Company announced that its initial MIA was not approved by Mexican authorities. The Company is now working towards submitting a revised MIA permit application which incorporates additional data presently available to the Company as well as data gathered in further field studies.

***Upcoming / Outlook***

Almaden has access to sufficient funding to conduct its anticipated work program for the next fiscal year at the Ixtaca Project. The Company intends to proceed with the preparation of a revised MIA application and completion of the Human Rights Impact Assessment during 2022. In the normal course, MIA permits may take up to one year for review by SEMARNAT after submission.

**Item 4A. Unresolved Staff Comments**

Not applicable.

**Item 5. Operating and Financial Review and Prospects**

***Operating Results***

The following discussion and analysis of the results of operations and the Company’s financial position should be read in conjunction with the consolidated financial statements and related notes for the years ended December 31, 2021, 2020, and 2019 appearing under Item 18 – Financial Statements and listed under Item 19 – Exhibits.

The Company’s consolidated financial statements are stated in Canadian Dollars and have been prepared in accordance and compliance with International Financial Reporting Standards as issued by the IFRS.

The Company is in the business of exploring its principal mineral property in Mexico with the aim of developing it to a stage where it can be exploited at a profit or to arrange joint ventures or other business transactions whereby other companies provide, in whole or in part, funding for development and exploitation. At that stage, the Company’s operations would, to some extent, be dependent on the world market prices of any minerals mined. The Company does not have producing properties or operations on its properties.

The Company receives other income from Administrative Services Agreements with Azucar and Almadex. Under those Agreements, the Company is the sole and exclusive manager of Azucar and Almadex. Azucar and Almadex compensate the Company 27% (2020 – 60%) and 39% (2020 – 30%), respectively, of the Company’s actual monthly overhead costs including any shared personnel fees and/or wages. Azucar and Almadex also pay the Company any reasonable fees or costs incurred on their behalf by the Company which were approved by Azucar or Almadex, respectively. The Administrative Services Agreements have an initial 5-year term, with subsequent automatic 1-year renewals unless terminated pursuant to the terms permitted under the respective

Agreements. The Administrative Services Agreements include a Change of Control clause. If either party is subject to a Change of Control during the term of the respective Agreement, that Agreement shall automatically terminate within 48 hours of the Change of Control unless agreed to in writing by both parties. The target of the Change of Control shall then pay the other party $2 million as compensation for the unplanned termination of the Company's engagement and significant disruption to the other party's business. "Change of Control" means the date upon which, without the written concurrence of the target of the Change of Control, any person (as that term is defined in the *Securities Act* (British Columbia)) makes and does not withdraw a take-over bid (as that term is defined in the *Securities Act* (British Columbia)) or acquires, directly or indirectly, that number of common shares of the target which equals or exceeds twenty percent (20%) of the then issued common shares of the target.

**Fiscal 2021 compared to Fiscal 2020**
For the year ended December 31, 2021 ("Fiscal 2021"), the Company recorded a comprehensive loss of $2,668,254, or $0.02 per common share, compared to a comprehensive loss of $3,129,368, or $0.03 per common share, for the year ended December 31, 2020 ("Fiscal 2020"). The decrease of $461,114 was primarily a result of $1,849,558 increase in other income offset by $1,074,303 increase in operating expenses and $314,141 increase in deferred income tax expense.

As the Company is at the development stage, it has no revenue from mining operations. Other income of $3,551,864 (Fiscal 2020 - $1,702,306) during Fiscal 2021 consisted primarily of administrative services fees earned from Azucar of $412,812 (Fiscal 2020 - $935,872) and from Almadex of $969,532 (Fiscal 2020 - $468,227). The Company has an administrative services agreement with these two companies whereby overhead and salaries expenses are proportionally allocated as described above and under the heading "Related Party Transactions" below. Amounts earned from administrative service fees depends on the business activities of each company. The increase of $1,849,558 in other income (loss) is also due to an increase in interest and other income of $450,049 earned from higher cash balance from the Fiscal 2021 financing and a refund from value added taxes in Mexico from prior years. Furthermore in Fiscal 2021, there were no financing fees paid from the gold loan compared to $54,577 in Fiscal 2020.

Operating expenses were $5,905,977 during Fiscal 2021 (Fiscal 2020 - $4,831,674). Certain operating expenses were reported on a gross basis and recovered through other income from the administrative services agreements with Azucar and Almadex. The increase in operating expenses of $1,074,303 are mainly the result of an increase of salary and benefits of $539,901 from year-end bonus paid in 2021 by Almadex and recovered through the Administrative Services fee, an increase in professional fees of $208,742 from operational activities and an increase in share-based payments of $86,300 from stock option grants during 2021.

**Fiscal 2020 compared to Fiscal 2019**
For Fiscal 2020, the Company recorded a comprehensive loss of $3,129,368, or $0.03 per common share, compared to a comprehensive loss of $3,763,075, or $0.03 per common share, for the year ended December 31, 2019 ("Fiscal 2019"). The decrease of $633,707 was primarily a result of $390,645 increase in operating expenses offset by a $1,024,352 increase in other income.

As the Company is at the development stage, it has no revenue from mining operations. Other income of $1,702,306 (Fiscal 2019 - $677,954) during Fiscal 2020 consisted primarily of administrative services fees earned from Azucar of $935,872 (Fiscal 2019 - $639,320) and from Almadex of $468,227 (Fiscal 2019 - $320,093). The Company has an administrative services agreement with these two companies whereby overhead and salaries expenses are proportionally allocated as described above and under the heading "Related Party Transactions" below. The increase of $1,024,352 in other income relates to an increase in administrative service fees of $444,686 and a reduction in impairment of exploration and evaluation assets of $501,620.

Operating expenses were $4,831,674 during Fiscal 2020 (Fiscal 2019 - $4,441,029). Certain operating expenses were reported on a gross basis and recovered through other income from the administrative services agreements with Azucar and Almadex. The increase in operating expenses of $390,645 are mainly the result of a decrease in professional fees of $363,974 and a decrease in travel and promotion of $180,081 which are all related to the work stoppage during the COVID-19 pandemic, offset by an increase in share-based payments of $851,380 from stock option grants.

***Liquidity and Capital Resources***
As at December 31, 2021, the Company's working capital position was $10,651,264. Management estimates that

the current cash position and expected future cash flows from the exercise of outstanding stock options and warrants and equity financing will be sufficient for the Company to carry out its anticipated exploration and operating plans for fiscal 2022 that includes further development of the Ixtaca Project.

Management believes that the Company's cash resources are sufficient to meet its working capital and mineral exploration requirements for its next fiscal year, but the Company may decide to raise additional funds through the sale of equity in fiscal 2022 depending upon favorable market conditions.

During fiscal 2019, the Company filed a preliminary short-form base shelf prospectus in certain jurisdictions of Canada and a corresponding Registration Statement on Form F-10 with the Commission. A final short-form base shelf prospectus relating to the 2019 preliminary prospectus was never filed and therefore the related Registration Statement did not become effective under the U.S. Securities Act of 1933. Subsequent to year end 2020, the Company withdrew its prior Registration Statement on Form F-10 and re-filed a preliminary short-form base shelf prospectus in certain jurisdictions of Canada and a corresponding Registration Statement on Form F-10 with the Commission. Subsequently, the Company filed a final short-form base shelf prospectus in certain jurisdictions of Canada and an amendment to its Registration Statement on Form F-10, which is currently effective under the U.S. Securities Act of 1933.

Under the Registration Statement on Form F-10 and Canadian final short-form base prospectus, the Company may, from time to time, prior to March 25, 2023, that the prospectus remains valid, offer for sale and issue Securities (defined below). The Company may issue and sell up to an aggregate total offering price of US$60,000,000. The Securities to be issued under the prospectus and Registration Statement on Form F-10 may consist of common shares, warrants to purchase common shares, subscription receipts that entitle the holder to receive, upon satisfaction of certain release conditions and for no additional consideration, common shares or warrants, or securities comprised of more than one of common shares, warrants and/or subscription receipts offered together as a unit (collectively, "Securities").

The Company may sell the Securities, separately or together, to or through underwriters or dealers, and also may sell Securities to one or more other purchasers directly or through agents. The Securities may be sold, from time to time in one or more transactions at a fixed price or prices which may be changed or at market prices prevailing at the time of sale, at prices related to such prevailing market prices or at negotiated prices, including in transactions that are deemed to be "at-the-market distributions" as defined in Canadian NI 44-102, including sales made directly on the TSX, the NYSE American or other existing trading markets for the Securities.

**Fiscal 2021**

At the end of Fiscal 2021, the Company had working capital of $10,651,264 including cash and cash equivalents of $10,170,376 compared to working capital of $3,082,986, including cash and cash equivalents of $2,534,698 at the end of Fiscal 2020. The increase in working capital of $7,568,278 is due to the registered direct offering closed on March 2021 offset by the cash balances being used for expenditures in exploration and evaluation assets and corporate affairs.

The Company has long term liabilities of $6,457,408 at the end of Fiscal 2021 compared to $4,688,836 at the end of Fiscal 2020 that relates to deferred income tax liability from the Mexican income tax and Special Mining Duty associated with the Ixtaca Project of $1,749,023 (Fiscal 2020 - $1,434,882). Other components of long term liabilities relate to long-term portion of lease liabilities of $465,930 (Fiscal 2020 - $35,781) for office lease, gold loan payable of $3,227,545 (Fiscal 2020 - $2,842,756) entered with Almadex on May 14, 2019, warrant liability of $623,290 (Fiscal 2020 - $Nil) for the warrants issued pursuant to the registered direct offering on March 18, 2021 and derivative financial liabilities of $391,620 (Fiscal 2020 - $375,417) related to the gold loan.

Net cash used in operating activities during Fiscal 2021, was $1,613,580 (Fiscal 2020 - $1,253,362), after adjusting for non-cash activities.

Net cash used in investing activities during Fiscal 2021, was $2,795,150 (Fiscal 2020 - $1,757,718) related to expenditures in exploration and evaluation assets while waiting for its development permits.

Net cash from financing activities during Fiscal 2021, was $12,044,408 (Fiscal 2020 - $4,633,564) as a result of registered direct offer of $11,610,581 (Fiscal 2020 – non-brokered private placements financing $3,850,209), options exercised of $564,750 (Fiscal 2020 - $158,090), share issue cost on cashless exercise of options of $Nil (Fiscal 2020 - $40,157), deferred share issue cost of $Nil (Fiscal 2020 - $40,990), warrants exercised of $Nil

(Fiscal 2020 - $10,000), net proceeds on gold in trust of $Nil (Fiscal 2020 - $818,360) and repayment of leasing of $130,923 (Fiscal 2020- $121,948).

Management estimates that the current cash position will be sufficient for the Company to carry out its business for the upcoming year. Longer term, should the Company receive the necessary permits and authorizations to proceed to construction of the Ixtaca Project, additional funding will need to be secured.

***Use of Proceeds From March 2021 Financing***

The net proceeds to the Company from the Offering were approximately US$9,630,500 after deducting the Agent's Fee of US$669,500 in aggregate, but before deducting the expenses of the Offering.

The Company intends to use the majority of the net proceeds of the Offering for preparation and submission of applications for permits required to commence construction of the Ixtaca Project, additional engineering work, exploration activities, legal and consulting costs, and for general working capital purposes as follows:

| Items | Expressed in millions of dollars | Budget USD | Budget CAD | Actual Use CAD Mar 18 to Dec 31, 2021 | Variance CAD |
|---|---|---|---|---|---|
| 1. | Permitting and related fees and expenses | 2.24 | 2.88 | (0.77) | 2.11 |
| 2. | Detailed project engineering and related expenses | 2.67 | 3.42 | (0.71) | 2.71 |
| 3. | Exploration drilling | 0.78 | 1.00 | (0.51) | 0.49 |
| 4. | Assay costs | 0.47 | 0.60 | (0.02) | 0.58 |
| 5. | Geology, mapping, geophysics | 0.16 | 0.21 | (0.20) | 0.01 |
| 6. | Mineral leases | 0.12 | 0.15 | (0.08) | 0.07 |
| 7. | Marketing, finance, legal, and administration costs for the next 12 months | 1.48 | 1.90 | (1.49) | 0.41 |
| 8. | Public company costs for the next 12 months | 0.23 | 0.29 | (0.04) | 0.25 |
| 9. | General working capital | 1.48 | 1.90 | (0.41) | 1.49 |
| **Total** | | **$ 9.63** | **$ 12.35** | **(4.23)** | **8.12** |

The above noted allocation represents the Company's intentions with respect to its use of proceeds based on knowledge, planning and expectations of management of the Company as at March 17, 2021, when the Company filed its prospectus supplement to its base shelf prospectus dated February 25, 2021. Actual expenditures from March 18 to December 31, 2021 are reflected and compared to budget. The reason for the large variance reported above is the short time which has passed since the completion of the offering. There can be no assurances the above objectives will be completed as circumstances may change and for business reasons, a reallocation of funds may be necessary in order for the Company to achieve its stated business objectives. See "Risk Factors".

**Fiscal 2020**

At the end of Fiscal 2020, the Company had working capital of $3,082,986 including cash and cash equivalents of $2,534,698 compared to working capital of $1,748,508, including cash and cash equivalents of $912,214 at the end of Fiscal 2019. The increase in working capital of $1,334,478 is due to the non-brokered private placement financings closed in March and August 2020 offset by the cash balances being used for expenditures in exploration and evaluation assets and corporate affairs.

The Company has long term liabilities of $4,688,836 at the end of Fiscal 2020 compared to $4,577,916 at the end of Fiscal 2019 that relates to deferred income tax liability from the Mexican income tax and Special Mining Duty associated with the Ixtaca Project of $1,434,882 (Fiscal 2019 - $1,434,882). Other components of long term liabilities relate to long-term portion of lease liabilities of $35,781 (Fiscal 2019 - $170,731) for office lease, gold loan payable of $2,842,756 (Fiscal 2019 - $2,541,338) entered with Almadex on May 14, 2019 and derivative financial liabilities of $375,417 (Fiscal 2019 - $430,965) related to the gold loan.

On March 27, 2020, and August 6, 2020, the Company closed non-brokered private placements for gross proceeds of $2,038,573 and of $2,015,000, respectively. With this additional cash, Management believes that the Company's cash resources are sufficient to meet its minimum working capital for its next fiscal year as most expenditures in exploration and evaluation assets are discretionary.

Net cash used in operating activities during Fiscal 2020, was $1,253,362 (Fiscal 2019 - $1,892,325), after adjusting for non-cash activities.

Net cash used in investing activities during Fiscal 2020, was $1,757,718 (Fiscal 2019 - $3,751,770). Significant items include expenditures on exploration and evaluation assets of $1,750,935 (Fiscal 2019 - $3,324,173) while waiting for its development permits.

Net cash from financing activities during Fiscal 2020, was $4,633,564 (Fiscal 2019 - $1,475,729) as a result of net proceeds from non-brokered private placements of $3,850,209 (Fiscal 2019 - $Nil) in 2020, options and warrants exercised of $168,090 (Fiscal 2019 - $Nil), and gold in trust in of $818,360 (Fiscal 2019 - $1,577,704). Net cash used in financing activities during the Fiscal 2020 was $203,095 (Fiscal 2019 - $101,975) as a result of lease payments of $121,948 (Fiscal 2019 - $101,975), share issue costs of $40,990 (Fiscal 2019 - $Nil) and share issue costs on cashless exercise of options $40,157 (Fiscal 2019 - $Nil).

Management estimates that the current cash position and potential future cash flows will be sufficient for the Company to carry out its business for the upcoming year.

On February 25, 2021, the Company filed a final short form base shelf prospectus in each of the provinces and territories of Canada, other than Québec (the "Shelf Prospectus"), and a corresponding amendment to its Registration Statement on Form F-10 with the Commission under the U.S./Canada Multijurisdictional Disclosure System.

Under the Registration Statement on Form F-10 and Canadian final short-form base prospectus, the Company may, from time to time, during the 25-month period that the prospectus remains valid, offer for sale and issue Securities (defined below). The Company may issue and sell Securities up to an aggregate total offering price of US$60,000,000.

The Company may sell the Securities, separately or together, to or through underwriters or dealers, and also may sell Securities to one or more other purchasers directly or through agents. The Securities may be sold, from time to time in one or more transactions at a fixed price or prices which may be changed or at market prices prevailing at the time of sale, at prices related to such prevailing market prices or at negotiated prices, including in transactions that are deemed to be "at-the-market distributions" as defined in Canadian NI 44-102, including sales made directly on the TSX, the NYSE American or other existing trading markets for the Securities.

**Fiscal 2019**

At the end of Fiscal 2019, the Company had working capital of $1,748,508 including cash and cash equivalents of $912,214 compared to working capital of $4,356,589 including cash and cash equivalents of $5,080,580 at the end of Fiscal 2018. The decrease in working capital of $2,608,081 is mainly due to the cash balances used for expenditures in exploration and evaluation assets and corporate affairs.

The Company has long term liabilities of $4,577,916 at the end of Fiscal 2019 compared to $1,434,882 at the end of Fiscal 2018 that relates to deferred income tax liability from the Mexican income tax and Special Mining Duty associated with the Ixtaca project. Other components of long-term liabilities relate to long-term portion of lease liabilities of $170,731, gold loan payable of $2,541,338 and derivative financial liabilities of $430,965.

On May 14, 2019, the Company entered into a secured gold loan agreement with Almadex which provides access to approximately $3 million, with only minor dilution to shareholders. With this additional cash, Management believes that the Company's cash resources are sufficient to meet its minimum working capital for its next fiscal year.

Net cash used in operating activities during Fiscal 2019, was $1,892,325 (Fiscal 2018 - $1,919,921), after adjusting for non-cash activities.

Net cash used in investing activities during Fiscal 2019, was $3,751,770 (Fiscal 2018 - $18,171,752). Significant items include expenditures on exploration and evaluation assets of $3,324,173 (Fiscal 2018 - $9,674,048) mainly to complete the feasibility study and start its development activities in Mexico.

Net cash from financing activities during Fiscal 2019, was $1,475,729 (Fiscal 2018 - $8,837,719) as a result of net proceeds of gold in trust.

Management estimates that the current cash position and potential future cash flows will be sufficient for the Company to carry out its business plans for the upcoming year. Management is sourcing project financing options to advance the Ixtaca project during its development stage.

***Research and Development, Patents and Licenses***
The Company conducts no Research and Development activities, nor is it dependent upon any patents or licenses.

***Trend Information***
During 2021, prices of precious metals continued to be quite volatile, with the gold price trading at a low of about US$1685/ounce in March and a high of over US$1,900/ounce by June. The price of silver was characteristically more volatile, trading at a low of about US$21.50/ounce in September after having traded at over US$28/ounce earlier in February.

Volatility is against a background of Central Banks maintain low interest rate policies, and countries around the world accumulating massive debts even during good times and now exacerbated in the presence of the COVID-19 pandemic. Consumers have accumulated a lot of debt because of low interest rates and the likelihood that more consumer spending can bail everything out appears low.

It remains very difficult to predict the trajectory and consequences of the COVID-19 pandemic, but the effects are already drastic. Situations where there is increased risk to the established financial and social structures are the classic reason for owning gold and silver as preservers of savings and value; nevertheless, even the values of precious metals and the securities of companies engaged in their exploration, development and production are not immune to the repercussions that have resulted from the crisis.

Because of difficult financial conditions around the world, mining exploration has suffered and much resource development has been held up by opposition from anti-development activists, in many cases emanating from well outside of the communities local to the development projects. Nevertheless, the demand and need for precious and other metals will continue to grow. The reserves of known deposits are being depleted and the need for replacement will grow. There are fewer advanced projects in the pipeline, and management anticipates that their value will come to be recognized by both investors and the jurisdictions where they occur.

Both the scarcity of funding for new discoveries and the difficulty in developing new resources are likely to limit the supply of metals to a growing and developing global population. The Company believes that in the long term, metal prices will be constructive for both exploration and development activities. The Company plans to continue advancing the Ixtaca project with the aim of developing it into one of the more attractive advanced and modern projects in the world.

***Off-balance Sheet Arrangements***
The Company has no off-balance sheet arrangements other than the lease related to its office premises as disclosed below.

***Contractual Obligations***

The Company is obligated under an operating lease for its office premises with the following aggregate minimum lease payments effective April 1, 2017 through to March 31, 2022 with an extension through to March 31, 2027. The Company has government requirements in work and/or taxes to maintain claims held. The decision to keep or abandon such claims is not contractual but at the discretion of the Company.

The operating lease contains an extension option exercisable only by the Company which was exercised on November 22, 2021. The lease was therefore extended from March 31, 2022 to March 31, 2027. The Company reassessed this significant event as a lease modification and has estimated that the potential future lease payments under the extended lease term would result in an increase in lease liability by $508,799.

**Table No. 4**
**Contractual Obligations of the Company**

| | Payments due by period | | | | |
|---|---|---|---|---|---|
| | **Total** | **Less than 1 year** | **1 – 3 years** | **3 – 5 years** | **More than 5 years** |
| Operating lease | $905,566 | $171,759 | $338,046 | $351,238 | $44,523 |

On January 29, 2013, the Company entered into contracts with its Chairman and President for an annual remuneration of $240,000 and $265,000 respectively effective January 1, 2013, for two years, renewable for two additional successive terms of 24 months each. Effective December 31, 2015, the Chairman's contract was mutually terminated and effective January 1, 2016, the Company and the Chairman entered into a new contract for an annual remuneration of $240,000 for two years, renewable for two additional successive terms of 24 months each. The Chairman's contract and the President's contract were amended April 1, 2016 and further amended on January 1, 2019 to make their term indefinite. Effective May 24, 2011, as amended April 1, 2016, the Company and the Chief Financial Officer ("CFO") entered into an Employment Agreement for an indefinite term and, effective September 22, 2014, as amended April 1, 2016, the Company and the Executive Vice-President (formerly Vice President, Corporate Development) entered into an Employment Agreement for an indefinite term. Effective January 1, 2016, the Chairman's and President's base salaries ("Base Salary") were $240,000 and $265,000, respectively, and the CFO's and EVP's Base Salaries were $185,000 and $175,000, respectively. Effective January 1, 2017, the Chairman's, President's, CFO's and EVP's Base Salaries were $240,000, $305,000, $203,500 and $192,500, respectively. Under the Administrative Services Agreements between the Company and each of Azucar Minerals Ltd. and Almadex Minerals Ltd. the Company provides management services to Azucar and Almadex. Azucar compensates the Company 27% (2020 – 60%) of any shared personnel remuneration and office overhead expenses, while Almadex compensates the Company 39% (2020 – 30%) of any shared personnel remuneration and office overhead expenses. Therefore, Almaden currently recovers 66% (2020 – 90%) of the contractual compensation amounts for the Chairman, Chief Executive Officer, Chief Financial Officer and Executive Vice-President.

Contractual obligations of the Company in the above table exclude future option payments required to maintain the Company's interest in certain mineral properties.

***Significant accounting judgments and estimates***

Significant assumptions about the future and other sources of judgments and estimates that management has made at the statement of financial position dates, that could result in a material adjustment to the carrying amounts of assets and liabilities, in the event that actual results differ from assumptions made, relate to, but are not limited to, the following:

Critical Judgments

- The analysis of the functional currency for each entity of the Company determined by conducting an analysis of the consideration factors identified in IAS 21, "The Effect of Changes in Foreign Exchange Rates". In concluding that the Canadian dollar is the functional currency of the parent and its subsidiary companies, management considered the currency that mainly influences the cost of providing goods and services in each jurisdiction in which the Company operates. As no single currency was clearly dominant, the Company also considered secondary indicators including the currency in which funds from financing activities are denominated and the currency in which funds are retained.

Estimates

- A global pandemic related to COVID-19 was declared in March 2020. The current and expected impacts on global commerce have been, and are anticipated to be, far-reaching. To date, there has been significant volatility in commodity prices and foreign exchange rates, restrictions on the conduct of business in many jurisdictions, including travel restrictions, and supply chain disruptions. There is significant ongoing uncertainty surrounding COVID-19 and the extent and duration of the impact that it may have;

- The estimated useful lives of property, plant and equipment which are included in the consolidated statements of financial position and the related depreciation included in profit or loss;
- The recoverability of the value of the exploration and evaluation assets which is recorded in the consolidated statements of financial position;
- The Company uses the Black-Scholes option pricing model to determine the fair value of options, warrants, and derivative financial liabilities in order to calculate share-based payments expense, warrant liability and the fair value of finders' warrants and stock options. Certain inputs into the model are estimates that involve considerable judgment or could be affected by significant factors that are out of the Company's control;
- The provision for income taxes which is included in profit or loss and the composition of deferred income tax liability included in the consolidated statement of financial position and the evaluation of the recoverability of deferred tax assets based on an assessment of the Company's ability to utilize the underlying future tax deductions against future taxable income prior to expiry of those deductions;
- The assessment of indications of impairment of each exploration and evaluation asset and property plan and equipment and related determination of the net realizable value and write-down of those assets where applicable;
- The estimated incremental borrowing rate used to calculate the lease liabilities;
- The estimated fair value of gold in trust; and
- The estimated initial fair value of gold loan payable.

## Item 6. Directors, Senior Management and Employees

Table No. 5 lists the directors of the Company as of April 28, 2022. The directors have served in their respective capacities since their election and/or appointment and will serve until the next annual general meeting of the Company or until a successor is duly elected, unless the office is vacated in accordance with the Articles of the Company. All directors are residents and citizens of Canada with the exception of Alfredo Phillips, who is a resident and citizen of Mexico.

**Table No. 5**
**Directors of the Company**

| Name and Jurisdiction of Residence | Age | Date First Elected or Appointed |
|---|---|---|
| James Duane Poliquin, B.C. Canada | 81 | February 1, 2002(4) |
| Morgan Poliquin, B.C. Canada | 50 | February 1, 2002(4) |
| Elaine Ellingham(1)(2)(3) ON, Canada | 63 | February 27, 2018 |
| Kevin O'Kane(1)(2)(3) B.C. Canada | 62 | March 31, 2021 |
| Alfredo Phillips(2) CDMX, Mexico | 60 | March 31, 2021 |
| Ria Fitzgerald(1)(3) B.C. Canada | 43 | June 29, 2021 |

(1) Member of Audit Committee
(2) Member of Nominating and Corporate Governance Committee
(3) Member of Compensation Committee
(4) Date of issue of the Certificate of Amalgamation

Duane Poliquin was a director of Almaden Resources Corporation since September 1980 and Morgan Poliquin since June 1999.

Duane Poliquin was a director of Fairfield Minerals Ltd. since June 1996.

Table No. 6 lists the Executive Officers of the Company as of April 28, 2022. The Executive Officers serve at the pleasure of the Board of Directors, subject to the terms of executive compensation agreements hereinafter described. All Executive Officers are residents British Columbia, Canada and citizens of Canada with the exception of Laurence Morris, who is a resident of Nicaragua and citizen of the United Kingdom.

**Table No. 6**
**Executive Officers of the Company**

| Name | Position | Age | Date First Appointed |
|---|---|---|---|
| James Duane Poliquin | Chairman of the Board | 81 | February 1, 2002 (1) |
| Morgan Poliquin | President and Chief Executive Officer | 50 | March 1, 2007 |
| Korm Trieu | Chief Financial Officer & Corp. Secretary | 56 | May 30, 2011 |
| Douglas McDonald | Executive Vice-President | 53 | September 22, 2014 |
| Laurence Morris | Vice-President, Operations & Projects | 68 | April 30, 2018 |
| John A. Thomas | Vice-President, Project Development | 74 | September 9, 2019 |

(1) Date of issue of the Certificate of Amalgamation

Duane Poliquin was appointed an Officer of Almaden Resources Corporation in September 1980 and of Fairfield Minerals Ltd. in June 1996.

**Duane Poliquin** is a registered professional geological engineer with over 50 years of experience in mineral exploration and he is the founding shareholder of Almaden Resources Corporation. He gained international experience working with major mining companies where he participated in the discovery of several important mineral deposits. Mr. Poliquin has held executive positions and directorships with several junior resource companies over his career. He was founder and President of Westley Mines Ltd. when that company discovered the Santa Fe gold deposit in Nevada. Mr. Poliquin spends virtually all of his time on the affairs of the Company, Azucar Minerals Ltd. and Almadex Minerals Ltd., of which he also serves as Chairman of the Board and a director, his principal occupation during the preceding five years.

**Morgan Poliquin** is a registered professional geological engineer with over 20 years' experience in mineral exploration since graduating with a B.A.Sc. degree in geological engineering from the University of British Columbia (1994). In 1996 he earned a M.Sc. in geology from the University of Auckland, New Zealand studying geothermal and epithermal deposits in the South Pacific including the Emperor Gold Deposit, Fiji. In 2010, Dr. Poliquin earned his Ph.D. in Geology from the Camborne School of Mines, University of Exeter. He is President and CEO of the Company and oversees corporate matters as well as directing the Company's exploration program. Dr. Poliquin spends virtually all of his time directing the exploration programs and the affairs of the Company, Azucar Minerals Ltd. and Almadex Minerals Ltd., of which he also serves as President, CEO and a director, his principal occupation during the preceding five years.

**Elaine Ellingham** is a professional geoscientist with over 35 years of experience in the mining industry, her principal occupation during the preceding five years, having held senior positions in several mining companies. Ms. Ellingham serves as President & CEO of Omai Gold Mines Corp. and is principal of Ellingham Consulting, providing corporate advisory services to international mining companies and private equity groups. She spent eight years with the Toronto Stock Exchange serving in various capacities, including four years as the TSX National Leader of Mining & International Business Development. Ms. Ellingham has also served as interim CEO and Director of Richmont Mines Inc. and Senior Vice President, Investor Relations at IAMGOLD, in addition to other corporate development experience with Campbell Resources and Rio Algom Limited. She is also an active director on the Boards of Alamos Gold Inc. and Omai Gold Mines Corp.

**Kevin O'Kane** is a registered professional engineer with nearly 40 years of experience in the global mining industry, his principal occupation during the preceding five years. He has held executive positions with BHP in South America, including Project Director, Vice President of Health, Safety and Environment, and Asset President. Most recently, Mr. O'Kane held the position of Executive Vice-President and Chief Operating Officer for SSR Mining Inc. He holds the ESG Competent Boards Certificate and Global Competent Boards Designation (GCB.D), achieved in 2021. He is fluent in Spanish and brings a wealth of technical, operational and HSCE leadership combined with Latin American knowledge to Almaden's Board. Mr. O'Kane also serves on the Boards of SolGold Plc, IAMGOLD Corporation and NorthIsle Copper and Gold Inc.

**Alfredo Phillips** is a seasoned business executive in Mexican primary industries, his principal occupation during the preceding five years. He is currently the Vice President of Corporate Affairs and National Director for Mexico at Argonaut Gold Inc. Prior to this position, he served as Head of Governmental Affairs in Mexico at Arcelor Mittal, the world's largest steel producer and a similar capacity for Torex Gold for over six years. Mr. Phillips is past President of the Mining Task Force of the Canadian Chamber of Commerce in Mexico, continues to serve on the Board of the Chamber, and is founding Chairman of the Guerrero Mining Cluster since 2016. He also serves on the Board of Directors of the Latin American and Caribbean Council on Renewable Energy (LAC-CORE). Mr. Phillips received a B.Sc. in Actuarial Mathematics from Anahuac University in Mexico City and a Master's in Public Administration from the Kennedy School of Government at Harvard University.

**Ria Fitzgerald** is a business development consultant with twenty years of experience in equity capital markets, mergers and acquisitions, project financing and project development with global and start-up companies in the mining, infrastructure, and renewable power sectors, her principal occupation during the preceding five years. She is currently providing corporate advisory services in the mining and renewable power sectors. Ms. Fitzgerald has ten years of experience as an investment banker focused on the mining industry, where she was involved in over 100 financings raising more than $7 billion in private and public equity for global mining companies. She has also worked for mining companies in providing strategic analysis regarding mergers & acquisitions and financings. Ms. Fitzgerald holds a Bachelor of Commerce degree from the University of Saskatchewan, where she graduated with High Honours and Great Distinction in finance and holds both the Chartered Financial Analyst designation and the Certificate in ESG Investing from the CFA Institute.

**Korm Trieu** is a Chartered Professional Accountant (CPA, CA) and holds a Bachelor of Science degree from the University of British Columbia and has spent over 20 years in corporate finance, administration and tax services, primarily in the natural resource, financial service and real estate sectors. From 2008-2011, he served as Vice President Finance for Sprott Resource Lending Corp. where he oversaw the Finance and Administration departments of a natural resource lending company. Mr. Trieu spends all of his business time on the affairs of the Company along with Azucar Minerals Ltd. and Almadex Minerals Ltd., of which he is also the Chief Financial Officer and Corporate Secretary, his principal occupation during the preceding five years.

**Douglas McDonald, formerly Vice-President, Corporate Development,** holds a Bachelor of Commerce degree and an M.A. Sc. specializing in mineral economics from the University of British Columbia and has over 20 years of experience in the resource, foreign trade and resource policy arenas. Prior to joining Almaden, he worked with an investment dealer where he advised numerous mineral resource companies regarding M&A opportunities and assisted them in accessing capital markets. He also spent 5 years as a Foreign Service officer with the Canadian government, where he focused on international trade issues, primarily concerning their impact on the resources industry. Mr. McDonald spends all of his business time on the affairs of the Company, along with Azucar Minerals Ltd. and Almadex Minerals Ltd., of which he is also a director and the Executive Vice-President, his principal occupation during the preceding five years.

**Laurence Morris** is a mining engineer and geologist with more than 35 years of experience in the metals and mining business, his principal occupation during the preceding five years. Mr. Morris has broad international experience in construction, operating and planning roles ranging from exploration stage to large scale operating mines in a variety of commodities and countries. From 2015 to 2017, Mr. Morris was the Mine Manager for First Quantum Minerals at their US$5.5 billion Cobre Panama project, where he was responsible for transitioning the project from a greenfields site to an operating mine, including mine planning, mining team assembly and training, setting up operating procedures and technical services. Prior to this Mr. Morris held several key positions including Vice President of Operations for Minefinders Corporation Ltd. from 2010 to 2013. In that position, he oversaw all aspects of development, mining operations, exploration activities and resource management at the Dolores mine in Mexico. Prior to joining Minefinders in 2010, Mr. Morris worked in mine management for First Quantum Minerals Ltd. in Zambia and Mauritania. Mr. Morris holds an Honours Bachelor of Science in Geology from the University of Sheffield. He is a Fellow of the Institute of Materials, Minerals and Mining (IOM3), a voluntary director of the IOM3's Minerals Technology Division, and an active writer on mining and environmental matters. He is a registered project manager and a member of the Association of Project Management.

**John A. Thomas** is a professional engineer, who holds a BSc, an MSc and a PhD in chemical engineering from the University of Manchester in the United Kingdom. He also received a diploma in accounting and finance from the U.K. Association of Certified Accountants. He has over 45 years of experience in the mining industry, including both base metal and precious metal projects in several countries including Brazil, Venezuela, Costa Rica, Russia, Kazakhstan, Canada and Zambia, his principal occupation during the preceding five years. His experience covers a wide range of activities in the mining industry from process development, management of feasibility studies, engineering and management of construction, and operation of mines. He served as VP Projects for Atlantic Gold for six years during which time he acted as a Qualified Person for the construction of the Moose River Consolidated Mine.

There are no arrangements or understandings with major shareholders, customers, suppliers or others pursuant to which any such director or executive officer was selected as a director or executive officer. Duane Poliquin, Chairman of the Board and Director, is the father of Morgan Poliquin, President, Chief Executive Officer and Director.

***Compensation***
For the purposes of this document, "executive officer" of the Company means an individual who at any time during the year was the Chief Executive Officer ("CEO"), President, Executive Vice President or Chief Financial Officer ("CFO") of the Company; any Vice-President in charge of a principal business unit, division or function; and any individual who performed a policy-making function in respect of the Company.

Set out below are particulars of compensation paid to the following persons (the "Named Executive Officers" or "NEOs") for the fiscal year ended December 31, 2021:

1. the CEO;
2. the CFO;
3. each of the three most highly compensated executive officers, or the three most highly compensated individuals acting in a similar capacity, other than the CEO and CFO, at the end of the most recently completed financial year whose total compensation was, individually, more than $150,000 for that financial year; and
4. any individual who would be a NEO under paragraph (3) but for the fact that the individual was neither an executive officer of the Company, nor acting in a similar capacity, at the end of that financial year.

The Company has no pension, defined contribution, or deferred compensation plans for its directors, executive officers or employees.

During Fiscal 2021, the Chairman was remunerated at his base salary of $240,000 per annum, of which he has agreed to defer payment of $96,000 (2019-2020 - $160,000), and the Chief Executive Officer was remunerated at his base salary of $345,000 per annum. The Chief Executive Officer's employment contract included terms for two additional successive terms of 24 months each (the "Extended Term") ending January 29, 2019. Effective December 31, 2015, a contract with a company in which the Chairman is a shareholder, Hawk Mountain Resources Ltd., was terminated by mutual consent with the Company and, in lieu thereof, the Chairman entered into a new employment contract directly with the Company. The new employment contract includes a base salary of $240,000 per annum and has an effective date of January 1, 2016. It has an initial two-year term and is renewable for two additional successive terms of 24 months each (the "Extended Term") ending December 31, 2021. On January 1, 2019, both the Chief Executive Officer's and Chairman's employment contracts were amended to remove the Extended Term thereby making their terms indefinite.

During Fiscal 2021, the Chief Financial Officer ("CFO") and the Executive Vice-President ("EVP") were remunerated at their base salary of $241,250 CAD and $233,667 CAD, respectively. Each of the CFO's and EVP's employment agreements have indefinite terms.

Under Administrative Services Agreements between the Company and each of Azucar Minerals Ltd. and Almadex Minerals Ltd., the Company provides management services to Azucar and Almadex. Azucar compensates the Company 27% (2020 – 60%) of any shared personnel remuneration and office overhead expenses, while Almadex compensates the Company 39% (2020 – 30%) of any shared personnel remuneration and office overhead expenses. Therefore, Almaden currently recovers 66% (2020 – 90%) of the contractual compensation amounts for the Chairman, Chief Executive Officer, Chief Financial Officer and Executive Vice-President.

All non-management Directors are compensated $30,000 (2020 - $12,000) yearly. The Chair of the Audit Committee and the Chair of the Compensation Committee are compensated an additional $10,000 (2020 - $5,000) and $5,000 (2020 - $5,000) per year respectively. The Chair of the Nominating and Corporate Governance Committee is compensated $Nil (2020 - $Nil) yearly. The Compensation Committee also recommended that, with respect to Director stock options, up to 550,000 options be granted to each non-management Director. Directors are entitled to reimbursement for reasonable travel and other out-of-pocket expenses incurred in connection with attendance at meetings of the Board of Directors. The Board of Directors may award special remuneration to any director undertaking any special services on behalf of the Company other than services ordinarily required of a director. Other than as indicated in Table No. 7 below, no director received any compensation for their services as a director, including committee participation and/or special assignments, or will receive compensation on termination.

Total compensation paid by the Company directly and/or indirectly to all directors and executive officers during Fiscal 2021 was $613,022 (Fiscal 2020 - $236,200) after recovery by the Company of 66% (2020 - 90%) of executive officer compensation pursuant to the terms of the Administrative Services Agreements between the Company and each of Azucar and Almadex.

**Table No. 7**
**Summary Compensation Table**

| | Annual Compensation | | | | Long-Term Compensation Awards | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| Name, Principle Position and Jurisdiction of Residence | Fiscal Year | Salary | Bonus | Other Annual Compensation* | Restricted Stock Awards | Options/ SARS Granted (#) | LTIP Payouts | All Other Compensation | Total Compensation |
| Duane Poliquin | 2021(1)(2) | $82,000(9) | Nil | $155,450 | Nil | 615,000 | Nil | Nil | $237,450 |
| Chairman of the Board & | 2020(1)(2) | $24,000(9) | Nil | $230,000 | Nil | 800,000 | Nil | Nil | $254,000 |
| Director, B.C, Canada | 2019(1)(2) | $96,000(9) | Nil | $121,850 | Nil | 565,000 | Nil | Nil | $217,850 |
| Morgan Poliquin | 2021(1)(2) | $117,875 | $35,366 | $344,950 | Nil | 1,165,000 | Nil | Nil | $498,191 |
| President, CEO | 2020(1)(2) | $33,500 | Nil | $525,000 | Nil | 2,075,000 | Nil | Nil | $558,500 |
| & Director, B.C, Canada | 2019(1)(2) | $134,000 | Nil | $263,850 | Nil | 1,065,000 | Nil | Nil | $397,850 |
| Elaine Ellingham(6) | 2021 | Nil | Nil | $136,500 | Nil | 450,000 | Nil | $40,000(3)(5) | $176,500 |
| Director, ON, Canada | 2020 | Nil | Nil | $20,000 | Nil | 100,000 | Nil | $12,000(3) | $32,000 |
| | 2019 | Nil | Nil | Nil | Nil | Nil | Nil | $12,000(3) | $12,000 |
| Kevin O'Kane(11) Director, B.C, Canada | 2021 | Nil | Nil | $167,500 | Nil | 550,000 | Nil | $22,500(3) | $190,000 |
| Alfredo Phillips(11) Director, CDMX, Mexico | 2021 | Nil | Nil | $167,500 | Nil | 550,000 | Nil | $22,500(3) | $190,000 |
| Ria Fitzgerald(11) Director, B.C, Canada | 2021 | Nil | Nil | $137,500 | Nil | 550,000 | Nil | $17,500(3)(4) | $155,000 |
| Jack McCleary(10) | 2021 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | $Nil |
| Former Director, AB, | 2020 | Nil | Nil | $101,300 | Nil | 318,000 | Nil | $17,0000(3)(5) | $118,300 |
| Canada | 2019 | Nil | Nil | $39,440 | Nil | 232,000 | Nil | $17,0000(3)(5) | $56,440 |
| Gerald G. Carlson(10) | 2021 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | $Nil |
| Former Director, B.C, | 2020 | Nil | Nil | $90,200 | Nil | 272,000 | Nil | $12,000(3) | $102,200 |
| Canada | 2019 | Nil | Nil | $62,600 | Nil | 240,000 | Nil | $12,000(3) | $74,600 |
| Mark T. Brown(10) | 2021 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | $Nil |
| Former Director, B.C, | 2020 | Nil | Nil | $73,800 | Nil | 268,000 | Nil | $17,000(3)(4) | $90,800 |
| Canada | 2019 | Nil | Nil | $67,580 | Nil | 282,000 | Nil | $17,000(3)(4) | $84,580 |
| William J. Worrall(10) | 2021 | Nil | Nil | $12,500 | Nil | 50,000 | Nil | Nil | $12,500 |
| Former Director, B.C, | 2020 | Nil | Nil | $109,750 | Nil | 385,000 | Nil | $12,000(3) | $121,750 |
| Canada | 2019 | Nil | Nil | $33,350 | Nil | 115,000 | Nil | $12,000(3) | $45,350 |
| Korm Trieu | 2021(1)(2) | $83,042 | $25,628 | $170,200 | Nil | 540,000 | Nil | Nil | $278,870 |
| Chief Financial Officer, | 2020(1)(2) | $22,500 | Nil | $142,000 | Nil | 605,000 | Nil | Nil | $164,500 |
| B.C, Canada | 2019(1)(2) | $90,000 | Nil | $63,100 | Nil | 240,000 | Nil | Nil | $153,100 |
| Douglas McDonald | 2021(1)(2) | $80,983 | $25,628 | $157,750 | Nil | 525,000 | Nil | Nil | $264,361 |
| Executive Vice President | 2020(1)(2) | $21,200 | Nil | $179,250 | Nil | 625,000 | Nil | Nil | $200,450 |
| B.C, Canada | 2019(1)(2) | $84,800 | Nil | $41,750 | Nil | 175,000 | Nil | Nil | $126,550 |
| Laurence Morris(7) | 2021 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | $Nil |
| Vice President, Operations | 2020 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | $Nil |
| & Projects, Nicaragua | 2019 | $236,491 | Nil | Nil | Nil | Nil | Nil | Nil | $236,491 |
| John A. Thomas (8) | 2021 | $60,000 | Nil | $102,000 | Nil | 300,000 | Nil | Nil | $162,000 |
| Vice President, Project | 2020 | $65,000 | Nil | Nil | Nil | Nil | Nil | Nil | $65,000 |
| Development, B.C, Canada | 2019 | $40,000 | Nil | $74,500 | Nil | 300,000 | Nil | Nil | $114,500 |

* Other Annual Compensation is the fair value of options granted calculated using the Black-Scholes option pricing model at grant date.

(1) Azucar has compensated the Company, 40% during Fiscal 2019, 60%, during Fiscal 2020, and 27% during Fiscal 2021 of any shared personnel fees and/or wages. The above table reflects only the compensation for each individual paid by Almaden after recovery of such 40%, 60% or 27% from Azucar.

(2) Almadex has compensated the Company, 20% during Fiscal 2019, 30% during Fisca1 2020, and 39% during Fiscal 2021 of any shared personnel's fees and/or wages. The above table reflects only the compensation for each individual paid by Almaden after recovery of such 20%, 30% or 39% from Almadex.

(3) Director's fees.

(4) Audit Committee Chairman's fees.

(5) Compensation Committee Chairman's fees.

(6) Elaine Ellingham commenced as a Director of the Company effective February 27, 2018.

(7) Laurence Morris, Vice President, Operations & Projects, is compensated at an annual fee of Nil USD during 2021 and 2020, and

$178,330 USD during 2019.

(8) John A. Thomas commenced as Vice President, Project Development effective September 9, 2019 and pursuant to his Independent Contractor Agreement dated July 1, 2019 is compensated at a rate of $5,000 per month.

(9) Duane Poliquin has agreed to defer payment to him of $96,000 of his $240,000 gross salary during Fiscal 2021 and 2020 and $64,000 of his $240,000 gross salary during Fiscal 2019.

(10) Jack McCleary and Gerald G. Carlson ceased to be Directors on March 31, 2021, Mark T. Brown ceased to be a Director on June 29, 2021 and Willian J. Worrall ceased to be a Director on July 24, 2021.

(11) Kevin O'Kane and Alfredo Phillips commenced as a Director of the Company effective March 31, 2021 and Ria Fitzgerald commenced as a Director effective June 29, 2021

***Remuneration on Termination***

The Company has the following termination clauses within its executive employment contracts.

**(1) Chairman**

The Company entered into an Executive Employment Contract dated January 1, 2016, as amended by Amending Agreement dated April 1, 2016 and Second Amending Agreement made January 1, 2019 (the "DP Agreement") between the Company and Duane Poliquin (the "Executive" under the DP Agreement) which replaced an expired Executive Compensation Contract dated January 29, 2013 (the "HMR Agreement") between the Company and Hawk Mountain Resources Ltd. ("Management Company"), a private company of which Duane Poliquin (the "Executive" under the HMR Agreement) is a shareholder, which was terminated by mutual agreement on December 31, 2015. The DP Agreement will terminate or may be terminated for any one of the following reasons:

(a) voluntarily by the Executive, upon at least three (3) months prior written notice of termination by the Executive to the Company; or
(b) without Cause, upon at least three (3) months prior written notice of termination by the Company to the Executive; or
(c) by the Company for Cause; or
(d) upon the death or disability of the Executive; or
(e) upon retirement by the Executive.

**Termination by the Executive Voluntarily or by the Company for Cause**

If the Executive shall voluntarily terminate employment under the DP Agreement or if the employment of the Executive thereunder is terminated by the Company for Cause, then all compensation and benefits as theretofore provided shall terminate immediately upon the effective date of termination and no special severance compensation will be paid.

Cause to terminate the Executive's employment under the DP Agreement shall mean:

(a) the repeated and demonstrated failure by the Executive to perform the Executive's material duties under the DP Agreement, after demand for substantial performance is delivered by the Company to the Executive that specifically identifies the manner in which the Company believes the Executive has not substantially performed by the Executive under the DP Agreement; or
(b) the willful engagement by the Executive in misconduct which is materially injurious to the Company, monetarily or otherwise; or
(c) any other willful violation by the Executive of the provisions of the DP Agreement; or
(d) the Executive is convicted of a criminal offence involving fraud or dishonesty.

**Termination by the Company Without Cause**

If the Company shall terminate the Executive's employment under the DP Agreement for any reason except for Cause or Disability then, upon the effective date of termination, the Company shall pay the Executive in one lump sum an amount equal to two (2) times the Executive's then current Base Salary, less all statutory withholdings and deductions. All the benefits theretofore provided to the Executive shall be continued as if the Executive was still an employee of the Company for a period of twelve (12) months from the date of termination or until equal or better benefits are provided by a new employer, whichever shall first occur.

**Termination by Death or Disability**

If the Executive dies or becomes disabled before the Executive's employment is otherwise terminated, the Company shall pay the Executive or the Executive's estate, an amount of compensation equal to six (6) months of the Executive's then current Base Salary and all the benefits theretofore provided to the Executive shall be continued, for a period of six (6) months from the date of Death or Disability as if the Executive were still an employee of the Company. If such termination is due to the Executive's Death, payment shall be made in one lump sum to the Executive's Designate within 60 days of the Executive's death. If no Executive's Designate survives the Executive, the entire amount shall be paid to the Executive's estate. If such termination is due to the Executive's Disability, payment shall be made in one lump sum to the Executive within sixty (60) days of the Executive's Disability. The compensation provided under this paragraph shall be in addition to that payable from any insurance coverage providing compensation upon Death or Disability.

**Termination Following Change in Control**

For purposes of the DP Agreement, a Change in Control shall be deemed to have occurred if:

(i) any person or any person and such person's associates or affiliates, as such terms are defined in the *Securities Act* (British Columbia) (the "Act"), makes a tender, take-over or exchange offer, circulates a proxy to shareholders or takes other steps to effect a takeover of the control of the Company, whether by way of a reverse take-over, formal bid, causing the election or appointment of a majority of directors of the Company or otherwise in any manner whatsoever; or

(ii) during any period of eighteen (18) consecutive months (not including any period prior to the Effective Date), individuals who at the beginning of such period constituted the Board of Directors and any new directors, whose appointment by the Board of Directors or nomination for election by the Company's shareholders was approved by a vote of at least three quarters (3/4) of the Board of Directors then still in office who either were directors at the beginning of the period or whose appointment or nomination for election was previously so approved, cease for any reason to constitute a majority of the Board of Directors; or

(iii) the acquisition by any person or by any person and such person's affiliates or associates, as such terms are defined in the Act, and whether directly or indirectly, of common shares of the Company at the time held by such person and such person's affiliates and associates, totals for the first time, twenty percent (20%) or more of the outstanding common shares of the Company; or

(iv) the business or businesses of the Company for which the Executive's services are principally performed, are disposed of by the Company pursuant to a partial or complete liquidation, dissolution, consolidation or merger of the Company, or a sale or transfer of all or a significant portion of the Company's assets.

Notwithstanding any other provisions in the DP Agreement regarding termination, if any of the events described above constituting a Change in Control shall have occurred during the Term, upon the termination of the Executive's employment (unless such termination is because of the Executive's Death or Disability, by the Company for Cause or by the Executive other than for "Good Reason", as defined below) the Executive shall be entitled to and will receive no later than the fifteenth ($15^{th}$) day following the date of termination a lump sum payment equal to three (3) times the Executive's then current Base Salary. In addition, all benefits then applicable to the Executive shall be continued for a period of eighteen (18) months after the date of termination.

For purposes of the DP Agreement, "Good Reason" shall mean, without the Executive's express written consent, any of the following:

(i) the assignment to the Executive of any duties inconsistent with the status or authority of the Executive's office, or the Executive's removal from such position, or a substantial alteration in the nature or status of the Executive's authorities or responsibilities from those in effect immediately prior to the Change in Control;

(ii) a reduction by the Company of the Executive's Base Salary as in effect on the date of the DP Agreement or as the same may have been increased from time to time, or a failure by the Company to increase the Executive's Base Salary as provided for in the DP Agreement or at a rate commensurate with that of other key executives of the Company;

(iii) the relocation of the office of the Company where the Executive is employed at the time of the Change in Control (the "CIC Location") to a location more than fifty (50) miles away from the CIC Location, or the Company's requiring the Executive to be based more than fifty (50) miles away from the CIC Location (except for requiring travel on the Company's business to an extent substantially consistent with the Executive's business travel obligations prior to the Change in Control);

(iv) the failure by the Company to continue to provide the Executive with benefits at least as favourable as those enjoyed by the Executive prior to the Change in Control, the taking of any action by the Company which would directly or indirectly materially reduce any of such benefits or deprive the Executive of any material fringe benefit enjoyed by the Executive at the time of the Change in Control, or the failure by the Company to provide the Executive with the number of entitled vacation days to which the Executive has earned on the basis of years of services with the Company; or

(v) the failure of the Company to obtain a satisfactory agreement from any successor to assume and agree to perform the DP Agreement or, if the business of the Company for which the Executive's services are principally performed is sold or transferred, the purchaser or transferee of such business shall fail to agree to provide the Executive with the same or a comparable position, duties, remuneration and benefits for the Executive as provided immediately prior to the Change in Control.

Following a Change in Control during the Term, the Executive shall be entitled to terminate the Executive's employment for Good Reason.

In the event the Executive is entitled to a severance payment under the DP Agreement, then in addition to such severance payment, the Executive shall be entitled to employment search assistance to secure other comparable employment for the Executive for a period not to exceed one (1) year or until such comparable employment is found, whichever is the sooner, with fees for such assistance to be paid by the Company.

The Executive's right to receive the aforementioned payment and benefits is expressly contingent upon the signing of a waiver and release satisfactory to the Company which releases the Company and its affiliates from all claims and liabilities arising out of the Executive's employment and termination thereof and including confidentiality provisions, which waiver and release is satisfactory to the Company with respect to form, substance and timeliness.

**(2) President & CEO**

The Executive Employment Contract dated January 29, 2013, as amended by Amending Agreement dated April 1, 2016 and Second Amending Agreement made January 1, 2019 (the "MP Agreement") between the Company and Morgan Poliquin (the "Executive" under the MP Agreement) will terminate or may be terminated for any one of the following reasons:

(a) voluntarily by the Executive, upon at least three (3) months prior written notice of termination by the Executive to the Company; or
(b) without Cause, upon at least three (3) months prior written notice of termination by the Company to the Executive; or
(c) by the Company for Cause; or
(d) upon the death or disability of the Executive; or
(e) upon retirement by the Executive.

**Termination by the Executive Voluntarily or by the Company for Cause**

If the Executive shall voluntarily terminate employment under the MP Agreement or if the employment of the Executive is terminated by the Company for Cause, then all compensation and benefits as theretofore provided shall terminate immediately upon the effective date of termination and no special severance compensation will be paid.

Cause to terminate the Executive's employment shall mean:

(a) the repeated and demonstrated failure by the Executive to perform the Executive's material duties under the MP Agreement, after demand for substantial performance is delivered by the Company to the Executive that specifically identifies the manner in which the Company believes the Executive has not substantially performed the Executive's duties under the MP Agreement; or
(b) the willful engagement by the Executive in misconduct which is materially injurious to the Company, monetarily or otherwise; or
(c) any other willful violation by the Executive of the provisions of the MP Agreement; or
(d) the Executive is convicted of a criminal offence involving fraud or dishonesty.

**Termination by the Company Without Cause**

If the Company shall terminate the Executive's employment under the MP Agreement for any reason except for Cause then, upon the effective date of termination, the Company shall pay the Executive in one lump sum an amount equal to two (2) times the Executive's then current Base Salary, less all statutory withholdings and deductions. All the benefits theretofore provided to the Executive shall be continued as if the Executive was still an employee of the Company for a period of twelve (12) months from the date of termination or until equal or better benefits are provided by a new employer, whichever shall first occur.

**Termination by Death or Disability**

If the Executive dies or becomes disabled before the Executive's employment is otherwise terminated, the Company shall pay the Executive or the Executive's estate, an amount of compensation equal to six (6) months of the Executive's then current Base Salary and all the benefits theretofore provided to the Executive shall be continued, for a period of six (6) months from the date of Death or Disability as if the Executive were still an employee of the Company. If such termination is due to the Executive's Death, payment shall be made in one lump sum to the Executive's Designate within sixty (60) days of the Executive's death. If no Executive's Designate survives the Executive, the entire amount shall be paid to the Executive's estate. If such termination is due to the Executive's Disability, payment shall be made in one lump sum to the Executive within sixty (60) days of the Executive's Disability. The compensation provided under this paragraph shall be in addition to that payable from any insurance coverage providing compensation upon Death or Disability.

**Termination Following Change in Control**

For purposes of the MP Agreement, a Change in Control shall be deemed to have occurred if:

(i) any person or any person and such person's associates or affiliates, as such terms are defined in the *Securities Act* (British Columbia) (the "Act"), makes a tender, take-over or exchange offer, circulates a proxy to shareholders or takes other steps to effect a takeover of the control of the Company, whether by way of a reverse take-over, formal bid, causing the election or appointment of a majority of directors of the Company or otherwise in any manner whatsoever; or

(ii) during any period of eighteen (18) consecutive months (not including any period prior to the Effective Date), individuals who at the beginning of such period constituted the Board of Directors and any new directors, whose appointment by the Board of Directors or nomination for election by the Company's shareholders was approved by a vote of at least three quarters (3/4) of the Board of Directors then still in office who either were directors at the beginning of the period or whose appointment or nomination for election was previously so approved, cease for any reason to constitute a majority of the Board of Directors; or

(iii) the acquisition by any person or by any person and such person's affiliates or associates, as such terms are defined in the Act, and whether directly or indirectly, of common shares of the Company at the time held by such person and such person's affiliates and associates, totals for the first time, twenty percent (20%) or more of the outstanding common shares of the Company; or

(iv) the business or businesses of the Company for which the Executive's services are principally performed, are disposed of by the Company pursuant to a partial or complete liquidation, dissolution, consolidation or merger of the Company, or a sale or transfer of all or a significant portion of the Company's assets.

Notwithstanding any other provisions in the MP Agreement regarding termination, if any of the events described above constituting a Change in Control shall have occurred during the Term, upon the termination of the Executive's employment (unless such termination is because of the Executive's Death or Disability, by the Company for Cause or by the Executive other than for "Good Reason", as defined below) the Executive shall be entitled to and will receive no later than the fifteenth ($15^{th}$) day following the date of termination a lump sum severance payment equal to three (3) times the Executive's then current Base Salary. In addition, all benefits then applicable to the Executive shall be continued for a period of eighteen (18) months after the date of termination.

For purposes of the MP Agreement, "Good Reason" shall mean, without the Executive's express written consent, any of the following:

(i) the assignment to the Executive of any duties inconsistent with the status or authority of the Executive's office, or the Executive's removal from such position, or a substantial alteration in the nature or status of the Executive's authorities or responsibilities from those in effect immediately prior to the Change in Control;

(ii) a reduction by the Company in the Executive's Base Salary as in effect on the date of the MP Agreement or as the same may have been increased from time to time, or a failure by the Company to increase the Executive's Base Salary as provided for in the MP Agreement or at a rate commensurate with that of other key executives of the Company;

(iii) the relocation of the office of the Company where the Executive is employed at the time of the Change in Control (the "CIC Location") to a location more than fifty (50) miles away from the CIC Location, or the Company's requiring the Executive to be based more than fifty (50) miles away from the CIC Location (except for requiring travel on the Company's business to an extent substantially consistent with the Executive's business travel obligations prior to the Change in Control);

(iv) the failure by the Company to continue to provide the Executive with benefits at least as favourable as those enjoyed by the Executive prior to the Change in Control, the taking of any action by the Company which would directly or indirectly materially reduce any of such benefits or deprive the Executive of any material fringe benefit enjoyed by the Executive at the time of the Change in Control, or the failure by the Company to provide the Executive with the number of entitled vacation days to which the Executive has earned on the basis of years of service with the Company; or

(v) the failure of the Company to obtain a satisfactory agreement from any successor to assume and agree to perform the MP Agreement or, if the business of the Company for which the Executive's services are principally performed is sold or transferred, the purchaser or transferee of such business shall fail to agree to provide the Executive with the same or a comparable position, duties, salary and benefits as provided to the Executive by the Company immediately prior to the Change in Control.

Following a Change in Control during the Term, the Executive shall be entitled to terminate the Executive's employment for Good Reason.

In the event the Executive is entitled to a severance payment under the MP Agreement, then in addition to such severance payment, the Executive shall be entitled to employment search assistance to secure other comparable employment for a period not to exceed one (1) year or until such comparable employment is found, whichever is the sooner, with fees for such assistance to be paid by the Company.

The Executive's right to receive the aforementioned payment and benefits is expressly contingent upon the signing of a waiver and release satisfactory to the Company which releases the Company and its affiliates from all claims and liabilities arising out of the Executive's employment and termination thereof and including confidentiality provisions, which waiver and release is satisfactory to the Company with respect to form, substance and timeliness.

**(3) CFO**

The Employment Agreement dated May 24, 2011 as amended April 1, 2016 (the "KT Agreement") between the Company and Korm Trieu (the "Employee" under the KT Agreement) may be terminated for any one of the following reasons:

(a) voluntarily by the Employee, upon at least sixty (60) days prior written notice of termination by the Employee to the Company; or
(b) by the Company for cause; or
(c) without cause, upon payment of twelve (12) months of the Employee's then current Base Salary to the Employee; or
(d) upon the physical and/or mental impairment of the Employee.

**Termination by the Employee Voluntarily or by the Company for Cause**

If the Employee shall voluntarily terminate employment under the KT Agreement or if the employment of the Employee is terminated by the Company for cause, then all compensation and benefits as theretofore provided shall terminate immediately upon the effective date of termination and no special severance compensation will be paid.

Cause to terminate the Employee's employment shall mean:

(a) the repeated and demonstrated failure by the Executive to perform the Employee's material duties under the KT Agreement, after demand for substantial performance is delivered by the Company to the Employee that specifically identifies the manner in which the Company believes the Employee has not substantially performed the Employee's duties under the KT Agreement; or
(b) the willful engagement by the Employee in misconduct which is materially injurious to the Company, monetarily or otherwise; or
(c) any other willful violation by the Employee of the provisions of the KT Agreement; or
(d) the Employee is convicted of a criminal offence involving fraud or dishonesty.

**Termination by the Company Without Cause**

If the Company elects to terminate the Employee's employment for reasons other than cause, the Company shall pay the Employee, in one lump sum or in installments at the Company's discretion, a severance payment equal to twelve (12) months of the Employee's then current Base Salary.

**Termination upon the physical and/or mental impairment of the Employee**

If the Company terminates the Employee's employment for physical and/or mental impairment, the Company's financial obligation to the Employee is limited to that which the Employee would otherwise receive if the Company terminated the Employee's employment for no reason.

**Termination Following Change in Control**

For purposes of the KT Agreement, a change in control shall be deemed to have occurred if:

(i) any person or any person and such person's associates or affiliates, as such terms are defined in the *Securities Act* (British Columbia) (the "Act"), makes a tender, take-over or exchange offer, circulates a proxy to shareholders or takes other steps to effect a takeover of the control of the Company, whether by way of a reverse take-over, formal bid, causing the election or appointment of a majority of directors of the Company or otherwise in any manner whatsoever; or

(ii) during any period of eighteen (18) consecutive months (not including any period prior to the Effective Date), individuals who at the beginning of such period constituted the Board of Directors and any new directors, whose appointment by the Board of Directors or nomination for election by the Company's shareholders was approved by a vote of at least three quarters (3/4) of the Board of Directors then still in office who either were directors at the beginning of the period or whose appointment or nomination for election was previously so approved, cease for any reason to constitute a majority of the Board of Directors; or

(iii) the acquisition by any person or by any person and such person's affiliates or associates, as such terms are defined in the Act, and whether directly or indirectly, of common shares of the Company at the time held by such person and such person's affiliates and associates, totals for the first time, twenty percent (20%) or more of the outstanding common shares of the Company; or

(iv) the business or businesses of the Company for which the Employee's services are principally performed, are disposed of by the Company pursuant to a partial or complete liquidation, dissolution, consolidation or merger of the Company, or a sale or transfer of all or a significant portion of the Company's assets.

Notwithstanding any other provisions in the KT Agreement regarding termination, if any of the events described above constituting a Change in Control shall have occurred during the course of the KT Agreement, upon the termination of the Employee's employment (unless such termination is because of the Employee's Death or Disability, by the Company for cause or by the Employee other than for "Good Reason", as defined below) the Employee shall be entitled to and will receive no later than the fifteenth (15th) day following the date of termination a lump sum severance payment equal to two (2) times the Employee's then current Base Salary.

For purposes of the KT Agreement, "Good Reason" shall mean, without the Employee's express written consent, any of the following:

(i) the assignment to the Employee of any duties inconsistent with the status or authority of the Employee's office, or the Employee's removal from such position, or a substantial alteration in the nature or status of the Employee's authorities or responsibilities from those in effect immediately prior to the Change in Control;

(ii) a reduction by the Company in the Employee's Base Salary as in effect on the date of the KT Agreement or as the same may have been increased from time to time, or a failure by the Company to increase the Employee's Base Salary as provided for in the KT Agreement or at a rate commensurate with that of other key employees of the Company;

(iii) the relocation of the office of the Company where the Employee is employed at the time of the Change in Control (the "CIC Location") to a location more than fifty (50) miles away from the CIC Location, or the Company's requiring the Employee to be based more than fifty (50) miles away from the CIC Location (except for requiring travel on the Company's business to an extent substantially consistent with the Employee's business travel obligations prior to the Change in Control);

(iv) the failure by the Company to continue to provide the Employee with benefits at least as favourable as those enjoyed by the Employee prior to the Change in Control, the taking of any action by the Company which would directly or indirectly materially reduce any of such benefits or deprive the Employee of any material fringe benefit enjoyed by the Employee at the time of the Change in Control, or the failure by the Company to provide the Employee with the number of entitled vacation days to which the Employee has earned on the basis of years of service with the Company; or

(v) the failure of the Company to obtain a satisfactory agreement from any successor to assume and agree to perform the KT Agreement or, if the business of the Company for which the Employee's services are principally performed is sold or transferred, the purchaser or transferee of such business shall fail to agree to provide the Employee with the same or a comparable position, duties, salary and benefits as provided to the Employee by the Company immediately prior to the Change in Control.

Following a Change in Control during the course of the KT Agreement, the Employee shall be entitled to terminate the Employee's employment for Good Reason.

The Employee's right to receive the aforementioned payment and benefits is expressly contingent upon the signing of a waiver and release satisfactory to the Company which releases the Company and its affiliates from all claims and liabilities arising out of the Employee's employment and termination thereof and including confidentiality provisions, which waiver and release is satisfactory to the Company with respect to form, substance and timeliness.

**(4) Executive Vice President**

The Employment Agreement dated September 22, 2014 as amended April 1, 2016 (the "DM Agreement") between the Company and Douglas McDonald (the "Employee" under the DM Agreement) may be terminated for any one of the following reasons:

(a) voluntarily by the Employee, upon at least sixty (60) days prior written notice of termination by the Employee to the Company; or
(b) by the Company for cause; or
(c) without cause, upon payment of twelve (12) months of the Employee's then current Base Salary to the Employee; or
(d) upon the physical and/or mental impairment of the Employee.

**Termination by the Employee Voluntarily or by the Company for Cause**

If the Employee shall voluntarily terminate employment under the DM Agreement or if the employment of the Employee is terminated by the Company for cause, then all compensation and benefits as theretofore provided shall terminate immediately upon the effective date of termination and no special severance compensation will be paid.

Cause to terminate the Employee's employment shall mean:

(a) the repeated and demonstrated failure by the Employee to perform the Employee's material duties under the DM Agreement, after demand for substantial performance is delivered by the Company to the Employee that specifically identifies the manner in which the Company believes the Employee has not substantially performed the Employee's duties under the DM Agreement; or
(b) the willful engagement by the Employee in misconduct which is materially injurious to the Company, monetarily or otherwise; or
(c) any other willful violation by the Employee of the provisions of the DM Agreement; or
(d) the Employee is convicted of a criminal offence involving fraud or dishonesty.

**Termination by the Company Without Cause**

If the Company elects to terminate the Employee's employment for reasons other than cause, the Company shall pay the Employee, in one lump sum or in installments at the Company's discretion, a severance payment equal to twelve (12) months of the Employee's then current Base Salary.

**Termination upon the physical and/or mental impairment of the Employee**

If the Company terminates the Employee's employment for physical and/or mental impairment, the Company's financial obligation to the Employee is limited to that which the Employee would otherwise receive if the Company terminated the Employee's employment for no reason.

**Termination Following Change in Control**

For purposes of the DM Agreement, a change in control shall be deemed to have occurred if:

(i) any person or any person and such person's associates or affiliates, as such terms are defined in the *Securities Act* (British Columbia) (the "Act"), makes a tender, take-over or exchange offer, circulates a proxy to shareholders or takes other steps to effect a takeover of the control of the Company, whether by way of a reverse take-over, formal bid, causing the election or appointment of a majority of directors of the Company or otherwise in any manner whatsoever; or

(ii) during any period of eighteen (18) consecutive months (not including any period prior to the Effective Date), individuals who at the beginning of such period constituted the Board of Directors and any new directors, whose appointment by the Board of Directors or nomination for election by the Company's shareholders was approved by a vote of at least three quarters (3/4) of the Board of Directors then still in office who either were directors at the beginning of the period or whose appointment or nomination for election was previously so approved, cease for any reason to constitute a majority of the Board of Directors; or

(iii) the acquisition by any person or by any person and such person's affiliates or associates, as such terms are defined in the Act, and whether directly or indirectly, of common shares of the Company at the time held by such person and such person's affiliates and associates, totals for the first time, twenty percent (20%) or more of the outstanding common shares of the Company; or

(iv) the business or businesses of the Company for which the Employee's services are principally performed, are disposed of by the Company pursuant to a partial or complete liquidation, dissolution, consolidation or merger of the Company, or a sale or transfer of all or a significant portion of the Company's assets.

Notwithstanding any other provisions in the DM Agreement regarding termination, if any of the events described above constituting a Change in Control shall have occurred during the course of the DM Agreement, upon the termination of the Employee's employment (unless such termination is because of the Employee's Death or Disability, by the Company for cause or by the Employee other than for "Good Reason", as defined below) the Employee shall be entitled to and will receive no later than the fifteenth ($15^{th}$) day following the date of termination a lump sum severance payment equal to two (2) times the Employee's then current Base Salary.

For purposes of the DM Agreement, "Good Reason" shall mean, without the Employee's express written consent, any of the following:

(i) the assignment to the Employee of any duties inconsistent with the status or authority of the Employee's office, or the Employee's removal from such position, or a substantial alteration in the nature or status of the Employee's authorities or responsibilities from those in effect immediately prior to the Change in Control;

(ii) a reduction by the Company in the Employee's Base Salary as in effect on the date of the DM Agreement or as the same may have been increased from time to time, or a failure by the Company to increase the Employee's Base Salary as provided for in the DM Agreement or at a rate commensurate with that of other key employees of the Company;

(iii) the relocation of the office of the Company where the Employee is employed at the time of the Change in Control (the "CIC Location") to a location more than fifty (50) miles away from the CIC Location, or the Company's requiring the Employee to be based more than fifty (50) miles away from the CIC Location (except for requiring travel on the Company's business to an extent substantially consistent with the Employee's business travel obligations prior to the Change in Control);

(iv) the failure by the Company to continue to provide the Employee with benefits at least as favourable as those enjoyed by the Employee prior to the Change in Control, the taking of any action by the Company which would directly or indirectly materially reduce any of such benefits or deprive the Employee of any material fringe benefit enjoyed by the Employee at the time of the Change in Control, or the failure by the Company to provide the Employee with the number of entitled vacation days to which the Employee has earned on the basis of years of service with the Company; or

(v) the failure of the Company to obtain a satisfactory agreement from any successor to assume and agree to perform the DM Agreement or, if the business of the Company for which the Employee's services are principally performed is sold or transferred, the purchaser or transferee of such business shall fail to agree to provide the Employee with the same or a comparable position, duties, salary and benefits as provided to the Employee by the Company immediately prior to the Change in Control.

Following a Change in Control during the course of the DM Agreement, the Employee shall be entitled to terminate the Employee's employment for Good Reason.

The Employee's right to receive the aforementioned payment and benefits is expressly contingent upon the signing of a waiver and release satisfactory to the Company which releases the Company and its affiliates from all claims and liabilities arising out of the Employee's employment and termination thereof and including confidentiality provisions, which waiver and release is satisfactory to the Company with respect to form, substance and timeliness.

**(5) Vice President, Operations & Projects**

The Independent Contractor Agreement dated January 15, 2018 (the "LM Agreement") between the Company and Laurence Morris (the "Contractor" under the LM Agreement) may be terminated for any one of the following reasons:

a. by Contractor, at any time, without cause or reason, upon 90 days written notice to the Company;
b. by the Company, for cause, at any time in the event of a failure by Contractor to comply with any of the provisions of the LM Agreement, including, without limitation, a persistent failure on the part of Contractor to follow the directions of the Board or CEO or any act of gross negligence or willful misconduct on the part of Contractor, where the Company has communicated such failure to Contractor and a reasonable opportunity to cure the failure has been provided, or by the Company immediately upon the death or incapacity of Contractor or upon Contractor no longer being qualified, under applicable corporate or securities laws or stock exchange requirements, to be the Vice-President Operations & Projects of the Company;
c. by Contractor, for cause, at any time in the event of a failure by the Company to comply with any of the provisions of the LM Agreement, where such failure has been communicated to the Company and a reasonable opportunity to cure the failure has been provided; or
d. by the Company, at any time, without cause or reason, upon 90 days written notice to Contractor;

and upon any such termination, the Board shall be at liberty to remove Contractor from any office held by Contractor in the Company or any of its subsidiaries and to make or cause to be made whatever regulatory or stock exchange filings are required in the circumstances.

**Termination Following Change in Control**

A Change of Control means the occurrence of any of the following events:

a. any Person acquiring fifty percent (50%) or more of the issued and outstanding shares of the Company; or
b. any Person acquiring all or substantially all of the assets of the Company, provided that for the purposes of the applicable section of the LM Agreement, "Person" means a third party that is operating at arm's length from Contractor. For greater certainty, "Person" shall not include any person, partnership, corporation or other entity with which Contractor is involved directly or indirectly as principal, agent, shareholder of more than 2% of such entity's voting securities, officer, employee or in any other manner whatsoever.

If a Change of Control occurs and (i) thereafter the Company terminates Contractor's engagement under the LM Agreement otherwise than for cause or (ii) Contractor elects to terminate his engagement under the LM

Agreement by notifying the Company of such election in writing within ten (10) calendar days after the occurrence of a Change of Control, Contractor's engagement shall immediately terminate and the Company shall provide Contractor with a payment equivalent to two (2x) times the Contractor's Annual Fee, payable, at the Company's discretion, either in one lump sum within five (5) business days from the effective date of termination of Contractor's engagement under the LM Agreement or in two or more equal instalments over the three (3) months period commencing on the effective date of termination of Contractor's engagement under the LM Agreement, with the first such instalment payable within five (5) business days from the effective date of termination of Contractor's engagement under the LM Agreement, and upon Contractor's receipt of such lump sum payment or the last instalment payment, the LM Agreement shall terminate.

**(6) Vice President, Project Development**

The Independent Contractor Agreement dated July 1, 2019 (the "JT Agreement") between the Company and John A. Thomas (the "Contractor" under the JT Agreement) may be terminated for any one of the following reasons:

a. by Contractor, at any time, without cause or reason, upon 30 days written notice to the Company;
b. by the Company, for cause, at any time in the event of a failure by Contractor to comply with any of the provisions of the JT Agreement, including, without limitation, a persistent failure on the part of Contractor to follow the directions of the Board or CEO or any act of gross negligence or willful misconduct on the part of Contractor, where the Company has communicated such failure to Contractor and a reasonable opportunity to cure the failure has been provided, or by the Company immediately upon the death or incapacity of Contractor or upon Contractor no longer being qualified, under applicable corporate or securities laws or stock exchange requirements, to be the Vice-President, Project Development of the Company;
c. by Contractor, for cause, at any time in the event of a failure by the Company to comply with any of the provisions of the JT Agreement, where such failure has been communicated to the Company and a reasonable opportunity to cure the failure has been provided; or
d. by the Company, at any time, without cause or reason, upon 30 days written notice to Contractor;

and upon any such termination, the Board shall be at liberty to remove Contractor from any office held by Contractor in the Company or any of its subsidiaries and to make or cause to be made whatever regulatory or stock exchange filings are required in the circumstances.

***Stock options***
Incentive stock options to purchase securities from the Company are granted to directors, executive officers, employees and consultants of the Company on terms and conditions acceptable to the regulatory authorities in Canada, notably the Toronto Stock Exchange, and in accordance with the requirements of the applicable Canadian securities commissions' requirements and regulations.

The Company has a formal written stock option plan ("Plan") which permits the issuance of up to 10% of the Company's issued share capital from time to time during the term of the Plan and provides that stock options may be granted from time to time provided that incentive stock options in favor of any consultant or person providing investor relations services cannot exceed 2% in any 12 month period. No incentive stock option granted under the Plan is transferable by the optionee other than by will or the laws of descent and distribution, and each incentive stock option is exercisable during the lifetime of the optionee only by such optionee and by the optionee's personal representatives in the event of death for a period ending on the earlier of the expiry date of the option and twelve months after the date of death.

The exercise price of all incentive stock options granted under the Plan is determined in accordance with Toronto Stock Exchange guidelines and cannot be less than the Market Price on the date of the grant. Market Price is the volume weighted average trading price of the Company's shares on the Toronto Stock Exchange for the five trading days immediately preceding the date of the grant. The maximum term of each incentive stock option is five years. Options granted to consultants or persons providing Investor Relations Activities (as defined in the Plan) shall vest in stages with no more than ¼ of such options being exercisable in any three-month period. All options granted during Fiscal 2021, Fiscal 2020 and Fiscal 2019 vested on the date granted. Under the requirements of the Toronto Stock Exchange, all unallocated options under the Plan must be approved by the Board of Directors, including a majority of the unrelated directors, and by the shareholders every three years after the institution of the Plan. Insiders and affiliates of insiders entitled to receive a benefit under the Plan are not entitled to vote for such approval. The Plan received its triennial approval in Fiscal 2020.

The names and titles of the directors and executive officers of the Company to whom outstanding stock options have been granted and the number of common shares subject to such options as of April 28, 2022 are set forth in Table No. 8, as well as the number of options granted to directors, executive officers, employees and consultants as a group.

**Table No. 8**
**Stock Options Outstanding**

| Name | # Options Outstanding &Exercisable | Exercise Price CDN$ | Expiry Date |
|---|---|---|---|
| Duane Poliquin | 500,000 | 0.64 | 06/09/2022 |
| Chairman of the Board & Director | 200,000 | 1.13 | 10/03/2022 |
| | 100,000 | 0.89 | 12/15/2022 |
| | 100,000 | 0.69 | 05/08/2023 |
| | 350,000 | 0.62 | 07/08/2023 |
| | 165,000 | 0.51 | 09/18/2023 |
| Morgan Poliquin | 500,000 | 0.62 | 05/31/2022 |
| President, Director & | 700,000 | 0.64 | 06/09/2022 |
| Chief Executive Officer | 200,000 | 1.13 | 10/03/2022 |
| | 300,000 | 0.89 | 12/15/2022 |
| | 250,000 | 0.97 | 02/09/2023 |
| | 600,000 | 0.62 | 07/08/2023 |
| | 315,000 | 0.51 | 09/18/2023 |
| | 375,000 | 0.38 | 03/07/2027 |
| Alfredo Phillips | 500,000 | 0.68 | 03/31/2023 |
| Director | 50,000 | 0.62 | 07/08/2023 |
| Kevin O'Kane | 500,000 | 0.68 | 03/31/2023 |
| Director | 50,000 | 0.62 | 07/08/2023 |
| Ria Fitzgerald | 550,000 | 0.62 | 07/08/2023 |
| Director | | | |
| Elaine Ellingham | 400,000 | 0.68 | 03/31/2023 |
| Director | 50,000 | 0.62 | 07/08/2023 |
| | 100,000 | 0.38 | 03/07/2027 |
| Korm Trieu | 75,000 | 0.41 | 04/30/2022 |
| Chief Financial Officer & | 150,000 | 0.64 | 06/09/2022 |
| Corporate Secretary | 100,000 | 1.13 | 10/03/2022 |
| | 30,000 | 0.89 | 12/15/2022 |
| | 50,000 | 0.97 | 02/09/2023 |
| | 75,000 | 0.96 | 03/03/2023 |
| | 200,000 | 0.68 | 03/31/2023 |
| | 100,000 | 0.62 | 07/08/2023 |
| | 115,000 | 0.51 | 09/18/2023 |
| | 250,000 | 0.38 | 03/07/2027 |
| Douglas McDonald | 20,000 | 0.64 | 06/09/2022 |
| Executive Vice President | 100,000 | 1.13 | 10/03/2022 |
| | 255,000 | 0.89 | 12/15/2022 |
| | 75,000 | 0.96 | 03/03/2023 |
| | 250,000 | 0.68 | 03/31/2023 |
| | 100,000 | 0.62 | 07/08/2023 |
| | 100,000 | 0.51 | 09/18/2023 |
| | 250,000 | 0.38 | 03/07/2027 |
| John A. Thomas | 50,000 | 0.97 | 02/09/2023 |
| Vice President, Project Development | 100,000 | 0.96 | 03/03/2023 |
| | 150,000 | 0.51 | 09/18/2023 |
| Total Directors/Officers (9 persons) | 9,450,000 | | |
| Total Employees/Consultants (12 persons) | 2,540,000 | | |
| **Total Directors/Officers/Employees/Consultants** | 11,990,000 | | |

No funds were set aside or accrued by the Company during Fiscal 2021 to provide pension, retirement or similar benefits for directors or executive officers.

## General

The TSX and the applicable Canadian securities law and regulation require that the Company comply with National Instrument 58-101 (*Disclosure of Corporate Governance Practices)* or any replacement of that instrument. The

Company is also, under applicable Canadian securities law and regulation, required to comply with National Policy 58-201 (*Corporate Governance Guidelines).* National Instrument 58-101 and National Policy 58-201 (for convenience referred to in the aggregate as the "guidelines") deal with matters such as the constitution and independence of corporate boards, their functions, the effectiveness and education of the board members and other matters. The Company's statement as to compliance with the guidelines and its approach to corporate governance is set forth below.

**Corporate Governance**

The Company's Board and management are committed to the highest standards of corporate governance. The Company's corporate governance practices are in accordance with the guidelines. The Company is also cognizant of and compliant with various corporate governance requirements in Canada and is in compliance with applicable U.S. requirements.

The Company's prime objective in directing and managing its business and affairs is to enhance shareholder value. The Company views effective corporate governance as a means of improving corporate performance and accordingly of benefit to the Company and all shareholders.

The Company also believes that director and management honesty and integrity are essential factors in ensuring good and effective corporate governance. To that end the Company's directors have adopted various codes and policies for the Company, its directors, officers, employees and consultants. The codes and policies adopted to date are as follows: Audit Committee Charter, Nominating and Corporate Governance Committee-Responsibilities and Duties, Compensation Committee-Responsibilities and Duties, Code of Business Ethics, Code of Business Conduct and Ethics for Directors, Communications Policy, Securities Trading Policy, Whistleblowers Policy and Privacy Policy (the "Codes"). The Codes may be viewed on the Company's website at www.almadenminerals.com. The Codes may also be viewed as filed on EDGAR as an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006. Any amendments to the Codes or waivers of the provision of any Codes will be posted on the Company's website within 5 business days of such amendment or waiver.

**Executive Officer Position Descriptions**

***Chairman of the Board ('Chairman')***

***Responsibilities:***

- Leads the Board of Directors of the Company and also takes a hands-on role in the Company's day-to-day management.
- Helps the CEO to oversee all the operational aspects involved in running the Company, including project selection and planning.
- Takes overall responsibility for the Company's direction and growth, seeking to generate significant financial gains for the shareholders.
- Oversees relationships with the communities and stakeholders in the areas where the Company operates, with the intent of ensuring the Company's activities are of benefit to all.

***Chief Executive Officer ('CEO')***

**Reports to:**

The Board of Directors of the Company (the "Board")

**Function:**

Provides overall leadership and vision in developing, in concert with the Board, the strategic direction of the Company and in developing the tactics and business plans necessary to increase shareholder value.

Manages the overall business to ensure strategic and business plans are effectively implemented, the results are monitored and reported to the Board and financial and operational objectives are attained.

**Authorities, Duties and Responsibilities:**

**(a) General Functions:**

1. Provides effective leadership to the management and the employees of the Company and establishes an effective means of control and co-ordination for all operations and activities.
2. Fosters a corporate culture that promotes ethical practices, integrity and a positive work climate enabling the Company to attract, retain and motivate a diverse group of quality employees.
3. Keeps the Board fully informed on the Company`s operational and financial affairs.
4. Develops and maintains a sound, effective organization structure and plans for capable management succession, progressive employee training and development programs and reports to the Board on these matters.
5. Ensures that effective communications and appropriate relationships are maintained with the shareholders of the Company and other stakeholders.
6. Develops capital expenditure plans for approval by the Board.
7. Turns any strategic plan as may be developed by the Board into a detailed operating plan.

**(b) Strategy and Risks**

1. Develops and recommends to the Board strategic plans to ensure the Company`s profitable growth and overall success. This includes updating and making changes as required and involving the Board in the early stages of developing strategy.
2. Identifies in conjunction with the other senior officers and appropriate directors of the Company the key risks with respect to the Company and its businesses and reviews such risks and strategies for managing them with the Board.
3. Ensures that the assets of the Company are adequately safeguarded and maintained.

**(c) Exploration and Development**

Responsible for managing the day to day activities and operating management of the Company and as such shall be responsible for the design, operation and improvement of the systems that create the Company`s exploration and development opportunities. The CEO accordingly shall have the primary responsibility:

- To direct and oversee all operational activities of the Company including exploration, development, mining and other such functions.
- To initiate solutions to the key business challenges of the Company.
- To participate in sourcing and negotiating financial arrangements for the further expansion and development of the Company including joint ventures, mergers, acquisitions, debt and equity financing.
- Represent and speak for the Company with shareholders, potential investors and other members of the industry.

**(d) Financial Reporting**

Oversees the quality and timeliness of financial reporting. Reports to the Board in conjunction with the CFO on the fairness and adequacy of the financial reporting of the Company to its shareholders.

***Chief Financial Officer ('CFO')***

**Reports to:**
The CEO of the Company

**Responsibilities:**

- Developing, analyzing and reviewing financial data.
- Reporting on financial performance.
- Monitoring expenditures and costs.
- Assisting the CEO in preparing budgets and in the communicating to the analyst and shareholder, community and securities regulators, the financial performance of the Company.

- Fulfilling the reporting requirements of the securities regulators, stock exchanges and shareholders.
- Monitoring filing of tax returns and payment of taxes.

The CFO shall assist the CEO in establishing effective means of control and co-ordination of the operations and activities of the Company and identifying, in conjunction with the CEO, the key risks with respect to the Company and its business and reviewing with the CEO the strategies for managing such risks and ensuring that the assets of the Company are adequately safeguarded and maintained.

The CFO, in conjunction with the CEO, shall design or supervise the design of and implement, maintain and periodically evaluate the effectiveness of internal controls to provide reasonable assurances that the financial statements of the Company are fairly presented in accordance with generally accepted financial standards and principles and that disclosure controls are in place to provide reasonable assurance that material information relating to the financial performance of the Company and any deficiencies are made known to the Audit Committee.

***Executive Vice President (formerly Vice President, Corporate Development)***

**Reports to:**
The CEO of the Company

**Responsibilities:**
The Executive Vice President is responsible for:
- Developing and managing relationships with current and prospective business partners, investment bankers, institutional investors, financial analysts and the media;
- Preparing and presenting comprehensive reviews and analysis regarding the business to senior management and to the Board;
- Coordinating execution of key strategic initiatives such as activities relating to business and project financing, permitting and litigation;
- Ensuring appropriate corporate disclosure of non technical matters, aside from matters which would normally fall under the purview of the CFO;
- Working with the CEO in preparing and presenting to investors, the executive team and the Board;
- Conducting technical and financial analysis to determine the impact of growth opportunities on various metrics and to establish an execution plan as needed.

The Executive Vice President shall work with the CEO in establishing and managing relationships with key stakeholders, identifying and analysing key strategic business opportunities, as well as the development, communication and implementation of corporate strategies related to executing the business plan of the Company.

***Vice President, Operations & Projects***

**Reports to:**
The CEO of the Company

**Responsibilities:**
The Vice President, Operations & Projects is responsible for:
- Planning and managing the operations of the Ixtaca Project;
- Developing and overseeing the implementation of all required project execution systems and procedures including project controls, procurement of contracts, engineering construction, quality assurance and quality control;
- Ensuring the project objectives, scope and plan are well defined and understood by the project team and stakeholders;
- Ensuring the compliance with health, safety, environmental and community regulations and corporate standards;
- Developing and recommending production strategies, together with capital budget and operating budget requirements to optimize short and long-range production capabilities while minimizing exposure to economic and environmental risk;
- Overseeing all site activities, site services, construction, pre-commissioning and commissioning;

- Assisting the CEO in preparing and presenting to investors, the executive team and the Board;

The Vice President, Operations & Projects shall assist the CEO in establishing and managing relationships with key stakeholders. The Vice President, Operations & Projects shall also conduct technical and financial analysis to determine the impact of growth opportunities on various metrics and to establish an execution plan as needed.

***Vice President, Project Development***

**Reports to:**
The CEO of the Company

**Responsibilities:**
The Vice President, Project Development is responsible for:
- Planning and managing the construction of the Ixtaca Project;
- Developing and overseeing the implementation of all required Project execution systems and procedures including Project controls, procurement of contracts, engineering construction, quality assurance and quality control;
- Ensuring the Project objectives, scope and plan are well defined and understood by the Project team and stakeholders;
- Ensuring the compliance with health, safety, environmental and community regulations and corporate standards;
- Developing and recommending production strategies, together with capital budget and operating budget requirements to optimize short and long-range production capabilities while minimizing exposure to economic and environmental risk;
- Overseeing all site activities, site services, construction, pre-commissioning and commissioning;
- Assisting the CEO in preparing and presenting to investors, the executive team and the Board;

The Vice President, Project Development shall assist the CEO in establishing and managing relationships with key stakeholders. The Vice President, Project Development shall also conduct technical and financial analysis to determine the impact of growth opportunities on various metrics and to establish an execution plan as needed.

**Mandate of the Board**
The mandate of the Board is to supervise the management of the business and affairs of the Company and to act with a view to the best interests of the Company. In fulfilling its mandate, the Board, among other matters, is responsible for:

(a) adopting a strategic planning process and approving, on at least an annual basis, a strategic plan, taking into account the risk and opportunities of the Company's business;
(b) identifying the principal risks of the Company's business and implementing appropriate systems to manage such risks;
(c) satisfying itself, to the extent reasonably feasible, of the integrity of the CEO and other executive officers (if any) and ensuring that all such officers create a culture of integrity throughout the Company and developing programs of succession planning (including appointing, training and monitoring senior management);
(d) creating the Company's internal control and management information systems and creating appropriate policies for matters including communications, securities trading, privacy, audit, whistleblowing and codes of ethical conduct;
(e) managing its affairs including selecting its Chair, nomination of candidates for election to the Board, constituting committees of the Board and determining director compensation; and
(f) engaging any necessary internal and/or external advisors.

In the Fiscal year ended December 31, 2021 there were five (5) meetings of the Board. The frequency of meetings as well as the nature of agenda items change, depending upon the state of the Company's affairs and in light of opportunities or risks which the Company is subject to. Table No. 9 indicates the number of meetings attended by each director.

**Table No. 9**
**Meetings Attended**

| Director | Attended | Meetings |
|---|---|---|
| Duane Poliquin | 5 | 5 |
| Morgan Poliquin | 5 | 5 |
| Elaine Ellingham | 5 | 5 |
| Alfredo Phillips | 3 | 3 |
| Kevin O'Kane | 3 | 3 |
| Ria Fitzgerald | 2 | 2 |

All Directors attended all board meetings held after they were appointed to the Board

The Chairman is the chair of meetings of the Board of directors and is not an independent director. Meetings of the independent members of the Board may be held periodically as convened by the independent Board members. In Fiscal 2021, five (5) meetings of the independent Board members were convened.

In carrying out its mandate, the Board and each committee of the Board, relies primarily on management and its employees to provide it with regular detailed reports on the operations of the Company and its financial position. Certain members of management are also on the Board and provide the Board with direct access to information concerning their areas of responsibility. Management personnel are also regularly asked to attend Board meetings to provide information, answer questions and receive the direction of the Board. The reports and information provided to the Board enable them to monitor and manage the risks associated with the Company's operations and its compliance with legal and safety requirements, environmental issues and the financial position and liquidity of the Company.

The Board discharges its responsibilities directly and through committees. At regularly scheduled meetings, members of the Board and management discuss the broad range of matters and issues relevant to the Company's business interests and the Board is responsible for the approval of the Company's Strategic Plan. In addition, the Board receives reports from management on the Company's operational and financial performance. Between scheduled meetings, matters requiring Board authorization are effected by means of signed Consent Resolutions.

**Board Assessment**
The Nomination and Corporate Governance Committee reports to the Board periodically on the evaluation of the Board's performance and that of the individual directors. The Performance of the Chief Executive Officer is evaluated by the Compensation Committee.

**Composition of the Board**
The guidelines recommend that a board of directors be constituted with a majority of individuals who qualify as "independent" directors.

In deciding whether a particular director is independent, the Board examined the factual circumstances of each director and considered them in the context of many factors, including the definitions in the guidelines and the requirements and policies of NYSE American Company Guide Rules. The current Board is composed of six members. The Board has determined that a majority of directors, namely 4 directors, are independent - Elaine Ellingham, Kevin O'Kane, Alfredo Phillips and Ria Fitzgerald. Two directors – Duane Poliquin and Morgan Poliquin – are not independent because, in addition to their being the Chairman and Chief Executive Officer/President of the Company, respectively, they each have Executive Employment Contracts with the Company and, therefore, they each have a material relationship with the Company. The basis for determination of independence is under Canadian Securities Administrators' National Instrument NI 52-110 - *Audit Committees* ("NI 52-110") and NYSE American Exchange Company Guide Rules.

The Company does not have a controlling or significant shareholder. The Board believes that the membership of the Board fairly reflects the investment in the Company by minority shareholders.

The Board considers its size and composition to be appropriate and effective for carrying out its responsibilities. However, the Board may consider adding an additional director if a suitable candidate can be found who may bring additional experience or knowledge to the Board.

**Board Committees**
The Board currently has three committees - the Audit Committee, the Nomination and Corporate Governance Committee and the Compensation Committee. Each member of each committee is an independent director. Each committee is responsible for determining its own rules of procedure and may, from time to time, develop written descriptions for the responsibilities of the chair of such committee. No written position descriptions have yet been developed.

Mandates of each of the committees and the Codes undergo review periodically (in some cases mandated as annually) to bring them into line with changing Canadian and U.S. securities and corporate governance requirements and to reflect amendments that may be considered appropriate to make them more effective. Any revisions to the mandates and Codes will be available on the Company's website at www.almadenminerals.com.

**Audit Committee**
The full text of the initial Audit Committee Charter is an exhibit to the 2003 Annual Report on Form 20-F filed with the Commission on May 11, 2004. After review, the Charter was altered to more properly define the functions of the Audit Committee. The revised Audit Committee Charter is an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006.

The members of the Audit Committee are Elaine Ellingham, Kevin O'Kane and Ria Fitzgerald, all of whom are independent (on the basis determined as set forth above) and "financially literate" within the meaning of NI 52-110, in that each of them has the ability to read and understand a set of financial statements that present a breadth and level of complexity of accounting issues that are generally comparable to the breadth and complexity of the issues that can reasonably be expected to be raised by the Company's financial statements. The members of the Audit Committee have the respective education and experience set out below that is relevant to the performance of such member's responsibilities as an Audit Committee member:

> **Elaine Ellingham** has an MBA and has over 25 years of financial and management experience for public companies and for private equity groups. She held responsibilities for financial due diligence on issuers and applicants during her tenure at the TSX. She has served on audit committees for TSX and TSXV companies for over 12 years.
>
> **Kevin O'Kane** is a registered professional engineer with nearly 40 years of experience in the global mining industry. He has held executive positions with BHP in South America, including Project Director, Vice President of Health, Safety and Environment, and Asset President. Most recently, Mr. O'Kane held the position of Executive Vice-President and Chief Operating Officer for SSR Mining Inc. He holds the ESG Competent Boards Certificate and Global Competent Boards Designation (GCB.D), achieved in 2021. He is fluent in Spanish and brings a wealth of technical, operational and HSCE leadership combined with Latin American knowledge to Almaden's Board. Mr. O'Kane also serves on the Boards of SolGold Plc IAMGOLD Corporation and NorthIsle Copper and Gold Inc.
>
> **Ria Fitzgerald** holds a Bachelor of Commerce degree and the Chartered Financial Analyst designation. She has over 20 years of financial, investment and capital markets experience, primarily in the mining sector.

The Audit Committee met four (4) times during Fiscal 2021.

**Nominating and Corporate Governance Committee**
The members of the Nominating and Corporate Governance Committee are Elaine Ellingham, Kevin O'Kane, and Alfredo Phillips. The Nominating and Corporate Governance Committee met four (4) times during Fiscal 2021. The full text of the initial Corporate Governance Charter is an exhibit to the 2003 Annual Report on Form 20-F filed with the Commission on May 11, 2004. After review, the Responsibilities and Duties of the Nominating and Corporate Governance Committee were altered to more properly define the functions of the Nominating and Corporate Committee. The revised Responsibilities and Duties is an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006.

**Compensation Committee**
The members of the Compensation Committee are Elaine Ellingham, Kevin O'Kane, and Ria Fitzgerald. The Compensation Committee met four (4) times during Fiscal 2021 with Elaine Ellingham attending all four (4) meetings.

Kevin O'Kane and Ria Fitzgerald attended two (2) of two (2) available meetings while they were on the Compensation Committee. The Responsibilities and Duties of the Compensation Committee is an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006.

**Orientation and Continuing Education**
The Nomination and Corporate Governance Committee is responsible for recommending to the Board an orientation and education program for new directors.

**Director Term Limits and other Mechanisms of Board Renewal**
The Company has not adopted term limits or other mechanisms for Board renewal. The Company does not consider it is yet appropriate to force any term limits or other mechanisms of Board renewal at this time.

**Policies Regarding the Representation of Women on the Board**
There are currently two women on the Company's Board representing 33.3% of the Board. The Company plans to adopt a written policy with respect to the identification and nomination of women directors (the "Diversity Policy"). The Diversity Policy will require that the Board consider diversity on the Board from a number of aspects, including but not limited to gender, age, ethnicity and cultural diversity. In addition, when assessing and identifying potential new members to join the Board or the Company's executive team, the Board will consider the current level of diversity on the Board and the executive team. As the Diversity Policy has not yet been adopted, the Company is not yet able to measure its effectiveness.

**Consideration of the Representation of Women in the Director Identification and Selection Process**
Pursuant to the Diversity Policy, the Board will consider and evaluate the representation of women on the Board when identifying and nominating candidates for election and re-election to the Board. The Company will focus its search for new directors purely based on the qualification of potential candidates, regardless of their gender, age, ethnicity or culture.

**Consideration Given to the Representation of Women in Executive Officer Appointments**
Pursuant to the Diversity Policy, the Board will consider and evaluate the representation of women in the Company's executive officer positions when identifying and nominating candidates for appointment as executive officers. The Company will focus its search for new executive officers purely based on the qualification of potential candidates, regardless of their gender, age, ethnicity or culture.

**The Company's Targets Regarding the Representation of Women on the Board and in Executive Officer Positions**
The Company has not established a target for the representation of women on the Board or in executive officer positions of the Company by a specific date. The Company does not think it is appropriate to set targets because the Company focuses its search for new directors and executive officers purely based on the qualification of potential candidates, regardless of their gender, age, ethnicity or culture.

**Number of Women on the Board and in Executive Officer Positions**
As at the date of this Form Annual Report on Form 20-F, two of the Company's directors (representing 33.3% of the Company's six directors) are and none of the Company's executive officers are women.

**Decisions Requiring Board Approval**
In addition to those matters which must by law be approved by the Board, management is also required to seek Board approval for any major acquisition, disposition or expenditure. Management is also required to consult with the Board before entering into any venture which is outside of the Company's existing line of business.

Changes in officers are to be approved by the Board including changes in officers of the Company's principal operating subsidiaries.

In certain circumstances it may be appropriate for an individual director to engage an outside advisor at the expense of the Company. The engagement of the outside advisor would be subject to the approval of the Nomination and Corporate Governance Committee.

**Communications and Investor Relations**
The Company has adopted a Communications Policy, the purpose and aim of which is as follows:

(a) Controls the communications between the Company and its external stakeholders;
(b) Complies with its continuous and timely disclosure obligations;
(c) Avoids selective disclosure of Company information;
(d) Protects and prevents the improper use or disclosure of material information and confidential information;
(e) Educates the Company's personnel on the appropriate use and disclosure of material information and confidential information;
(f) Fosters and facilitates compliance with applicable laws; and
(g) Creates formal Disclosure Officers to help achieve the above objectives.

In accordance with the Communications Policy of the Company, designated Disclosure Officers receive and respond to shareholder enquiries. Shareholder enquiries and concerns are dealt with promptly by Disclosure Officers of the Company.

**Ethical Business Conduct**
The Company has adopted a Code of Business Conduct and Ethics for Directors ("Code"), a Code of Business Ethics ("COBE"), a Securities Trading Policy and a Privacy Policy. Employees and consultants are required as a term of employment or engagement to undertake to abide by the COBE. Directors are bound to observe the Code adopted by the Board.

All Directors, Officers and Employees ("Individuals") sign a Certification ("Certification") stating they have read the Code of Business Ethics policy ("Policy") of the Company and have complied with such Policy in all respects. The Certification further acknowledges that all members of the Individual's family, all other persons who live with the Individual and all holding companies and other related entities of the Individual and all such persons or companies acting on behalf of or at the request of any of the foregoing also complied with such Policy. The Certification also states that any violation of such Policy may constitute grounds for immediate suspension or dismissal.

Each director is expected and required by statute to act honestly and in good faith with a view to the best interests of the Company and to exercise the care, diligence and skill that a reasonably prudent individual would exercise in comparable circumstances and in accordance with the *Business Corporations Act* (British Columbia) and the Company's Articles.

***Employees***
As of December 31, 2021 and continued through to April 28, 2022, the Company operated with eight people in Canada, of which five are administrative personnel and three are exploration personnel. There are no full-time employees in the U.S. or Mexico. None of the Company's employees are covered by a collective bargaining agreement.

***Share Ownership***
Table No. 10 lists, as of April 28, 2022, directors and executive officers who beneficially own the Company's voting securities (Common Shares) and the amount of the Company's voting securities owned by the directors and executive officers as a group.

**Table No. 10**
**Shareholdings of Directors and Executive Officers**

| Title of Class | Name of Beneficial Owner | Amounts and Nature of Beneficial Ownership | Percent of Class* |
|---|---|---:|---:|
| Common | Duane Poliquin | 5,163,636[1][10] | 3.71% |
| Common | Morgan Poliquin | 5,001,893[2][10] | 3.56% |
| Common | Elaine Ellingham | 676,300[3] | 0.49% |
| Common | Kevin O'Kane | 550,000[4] | 0.40% |
| Common | Alfredo Phillips | 550,000[5] | 0.40% |
| Common | Ria Fitzgerald | 550,000[6] | 0.40% |
| Common | Korm Trieu | 1,253,144[7] | 0.91% |
| Common | Doug McDonald | 1,274,401[8] | 0.92% |
| Common | John A. Thomas | 300,000[9] | 0.22% |
| | **Total Directors/Officers as group** | **15,319,374** | **11.00%** |

(1) Of these shares 1,415,000 represent currently exercisable stock options. 540,500 represent currently exercisable warrants.

(2) Of these shares 3,240,000 represent currently exercisable stock options. 83,600 of these shares are held indirectly through Kohima Pacific Gold Corp., a company owned by Mr. Poliquin.

(3) Of these shares 550,000 represent currently exercisable stock options, 12,500 represent currently exercisable warrants. 44,400 of these shares are held indirectly through Edward Kammermayer, the husband of Mrs. Ellingham.

(4) Of these shares 550,000 represent currently exercisable stock options.

(5) Of these shares 550,000 represent currently exercisable stock options.

(6) Of these shares 550,000 represent currently exercisable stock options.

(7) Of these shares 1,145,000 represent currently exercisable stock options. 7,500 of these shares are held indirectly by Mr. Trieu's wife. 28,000 of these shares represent currently exercisable warrants.

(8) Of these shares, 1,150,000 represent currently exercisable stock options. 7,500 of these shares are held indirectly by Shari Investments, an entity controlled by Mr. McDonald.

(9) Of these shares 300,000 represent currently exercisable stock options.

(10) Pursuant to a Voting Trust Agreement (Exhibit 3 to this Annual Report on Form 20-F), Duane Poliquin and Morgan Poliquin (the "Trustees") jointly hold voting power over any of the Company's common shares legally and beneficially owned by Mr. Ernesto Echavarria, a resident of Mexico. On August 10, 2015, Mr. Echavarria, who is not an executive officer or director of the Company, made a filing with the System for Electronic Disclosure by Insiders ("SEDI"), Canada's on-line, browser-based service for the filing and viewing of insider reports as required by various provincial securities rules and regulations, disclosing that his ownership of Almaden common shares had fallen below the 10% threshold for such reporting. Based on such filing, Mr. Echavarria holds less than 10% of the Company's common shares.

*Based on 137,221,408 shares outstanding as of April 28, 2022 and stock options and warrants exercisable within 60 days held by each beneficial owner.

## Item 7. Major Shareholders and Related Party Transactions

The Company is a publicly owned Canadian company, the shares of which are owned by residents of the U.S., residents of Canada and other foreign residents. To the extent known by the directors and executive officers of the Company, the Company is not directly or indirectly owned or controlled by another company. Table No. 11 lists, as of April 28, 2022, the only persons or companies beneficially owning more than 5% of the Company's voting securities (Common Shares).

**Table No. 11**
**Shareholdings of Beneficial Owners**

| Title of Class | Name of Beneficial Owner | Amounts and Nature of Beneficial Ownership | Percent of Class* |
|---|---|---|---|
| Common | Duane Poliquin | 5,163,636(1)(3) | 3.71% |
| Common | Morgan Poliquin | 5,001,893(2)(3) | 3.56% |

(1) Of these shares 1,415,000 represent currently exercisable stock options. 540,500 represent currently exercisable warrants.

(2) Of these shares 3,240,000 represent currently exercisable stock options. 83,600 of these shares are held indirectly through Kohima Pacific Gold Corp., a company owned by Mr. Poliquin.

(3) Pursuant to a Voting Trust Agreement (Exhibit 3 to this Annual Report on Form 20-F), Duane Poliquin and Morgan Poliquin (the "Trustees") jointly hold voting power over any of the Company's common shares legally and beneficially owned by Mr. Ernesto Echavarria, a resident of Mexico. On August 10, 2015, Mr. Echavarria, who is not an executive officer or director of the Company, made a filing with SEDI, Canada's on-line, browser-based service for the filing and viewing of insider reports as required by various provincial securities rules and regulations, disclosing that his ownership of Almaden common shares had fallen below the 10% threshold for such reporting. Based on such filing, Mr. Echavarria hold less than 10% of the Company's common shares.

*Based on 137,221,408 shares outstanding as of April 28, 2022 and stock options and warrants exercisable within 60 days held by each beneficial owner.

***Related party transactions***

Certain officers and directors of the Company are also officers or directors of companies with which the Company has agreements and may not be considered at arm's-length to such agreements. However, any agreement or any agreement to be negotiated between the Company and such other companies has been or will be approved by directors of the Company, in accordance with the common law and the provisions of the *Business Corporations Act* (British Columbia).

***(a) Compensation of key management personnel***

Key management includes members of the Board, the Chairman, the President and Chief Executive Officer, the

Chief Financial Officer, the Executive Vice President, the Vice President, Operations & Projects, and the Vice President, Project Development. The aggregate compensation paid or payable to key management for services is as follows, after recovery of 27% (2020 – 60%, 2019 – 40%) of executive officer compensation from Azucar and 39% (2020 – 30%, 2019 – 20%) of executive officer compensation from Almadex:

| | March 31, 2022 | December 31, 2021 | December 31, 2020 | December 31, 2019 |
|---|---|---|---|---|
| Professional fees | $ 15,000 | $ 60,000 | $ 65,000 | $ 276,491 |
| Salaries and benefits | 108,863 | 450,522 | 101,200 | 404,800 |
| Share-based payments | 302,250 | 1,551,850 | 1,471,300 | 768,020 |
| Directors' fees | 36,250 | 102,500 | 70,000 | 70,000 |
| | $ 462,363 | 2,164,872 | $1,707,500 | $1,519,311 |

***(b) Administrative Services Agreements***

The Company recovers a portion of expenses from Azucar pursuant to an Administrative Services Agreement dated May 15, 2015 and First Amending Agreement dated December 16, 2015 between the Company and Azucar.

The Company also recovers a portion of expenses from Almadex pursuant to an Administrative Services Agreement dated March 29, 2018 between the Company and Almadex.

During the year ended December 31, 2021, the Company received $412,812 (2020 - $935,872; 2019 - $639,320) from Azucar for administrative services fees included in other income and received $969,532 (2020 - $468,227; 2019 - $320,093) from Almadex for administrative services fees included in other income.

At December 31, 2021, included in accounts receivable is $15,063 (2020 - $81,623) due from Azucar and $69,298 (2020 - $40,678) due from Almadex in relation to expenses recoveries.

At December 31, 2021, the Company accrued $72,130 (2020 - $37,689) payable to Almadex for exploration and drilling services in Mexico.

***(c) Other related party transactions***

During the year ended December 31, 2021, the Company employed the Chairman's daughter for a salary of $41,300 less statutory deductions (2020 - $41,300; 2019 - $41,300) for marketing and administrative services provided to the Company.

Other than as disclosed above, there have been no transactions or proposed transactions, which have materially affected or will materially affect the Company in which any director, executive officer, or beneficial holder of more than 10% of the outstanding common shares, or any of their respective relatives, spouses, associates or affiliates has had or will have any direct or material indirect interest. As stated above, management believes the transactions referenced above were on terms at least as favorable to the Company as the Company could have obtained from unaffiliated parties.

## Item 8. Financial Information

The financial statements as required under Item 8 are attached hereto and found immediately following the text of this Annual Report.

***Legal Proceedings***

The Company's Ixtaca Project Original Concessions (see definition below) have been the subject of legal proceedings (the "Amparo"). On April 7, 2015, the Ejido Tecoltemi filed the Amparo against Mexican mining authorities claiming that Mexico's mineral title system is unconstitutional because indigenous consultation is not required before the granting of mineral title. Almaden's two original mining concessions covering the Ixtaca Project (the "Original Concessions") (Figure 1 below) are the subject matter of the Amparo. The Original Concessions cover Almaden's Ixtaca Project and certain endowed lands of the Ejido (the "Ejido Lands"). The Ejido Lands overlap approximately 330 Ha of the far southeastern corner of the Original Concessions and are not considered material to Almaden.

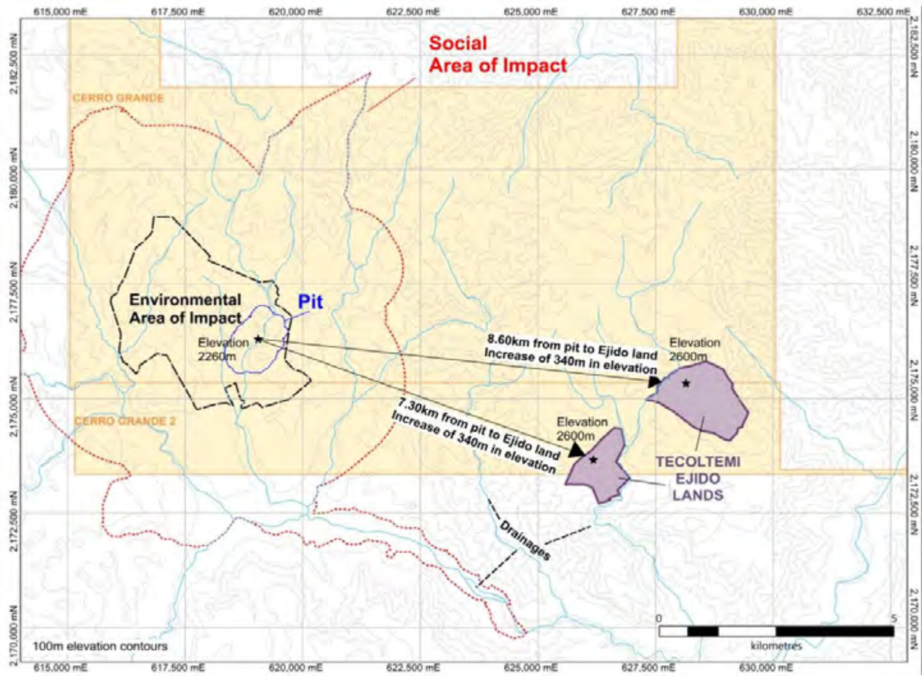



Figure 1: Original Concessions. Ixtaca environmental and social impact areas, and Ejido Lands

Shortly after the Amparo was filed in April 2015, the lower court in Puebla State ordered the suspension of Almaden from conducting exploration and exploitation work over those portions of the Original Concessions which overlap with the Ejido Lands.

Mineral tenure over the Ejido Lands is not material to Almaden. The Ejido Lands do not overlap the Ixtaca Project or its environmental or social area of impact. Almaden has never tried to negotiate access to the Ejido Lands, never conducted exploration work on the Ejido Lands, and has no interest in conducting any future exploration or development work over the Ejido Lands. The Ejido Lands are in a different drainage basin than the Ixtaca Project and the Company does not need to travel though the Ejido Lands to access the Ixtaca Project.

On February 17, 2022, the Company announced that the SCJN reached a decision on February 16, 2022 in respect of the Mineral Title Lawsuit involving the Company's mineral claims. On April 27, 2022, the Company announced that the SCJN had published its final decision on this matter.

Almaden has reviewed the final decision of the SCJN. The decision determines that the Mexican mineral title law is constitutional, but that before issuing Almaden's mineral titles, the Ministry of the Economy should have provided for a consultation procedure with relevant indigenous communities. The decision orders the Ministry of the Economy to declare Almaden's mineral titles ineffective and to issue them to Almaden following the Ministry's compliance with its obligation to carry out the necessary procedures to consult with indigenous communities. The decision discusses the application of international law and jurisprudence to the implementation of consultation by Mexican authorities with relevant indigenous communities. It also provides some detail to Mexican authorities regarding the procedures required to be followed by those authorities in the performance of indigenous consultation prior to the grant of mineral claims. Furthermore, the decision clarifies that the Company's original claim applications were submitted pursuant to the legal framework in force at the time and as such Almaden's mineral rights at the Ixtaca project are safeguarded while the mining authorities comply with conditions and requirements prior to issuing the mineral titles. As previously disclosed, the Company has no interest in holding mineral claims over the indigenous community's land. The decision will take effect at the time of its official notification to the Company which is expected shortly.

Almaden intends to interact with Mexican government officials and local community officials in order to facilitate to the extent possible the government's execution of its responsibilities in the issuance of the mineral titles. At present there is no timeline for the consultation process.

The standards for local implementation of the obligations assumed by Mexico under ILO Convention 169 regarding the human right to free, prior, informed consultation of indigenous communities are currently evolving. The Amparo ruling may halt or result in a significant delay in project development notwithstanding the extensive local engagement already conducted by the Company.

*Claim Reduction Efforts*

In 2015, after learning about the Amparo, Almaden commenced a process to voluntarily cancel approximately 7,000 Ha of its Original Concessions, including the area covering the Ejido Lands, to assure the Ejido that Almaden would not interfere with the Ejido Lands, and to reduce Almaden's land holding costs.

Almaden divided the Original Concessions into nine smaller concessions, which included two smaller mining concessions which overlapped the Ejido Lands (the "Overlapping Concessions") (see Figure 2 below) and then voluntarily cancelled the Overlapping Concessions (see Figure 3 below – which shows only the "New Concessions"). The applicable Mexican mining authorities issued the New Concessions and accepted the abandonment of the Overlapping Concessions in May and June of 2017 after the issuance of a Court Order.

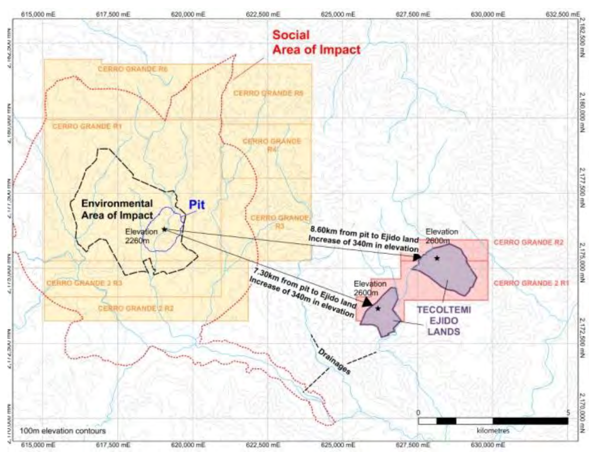


Figure 2: New and overlapping concessions

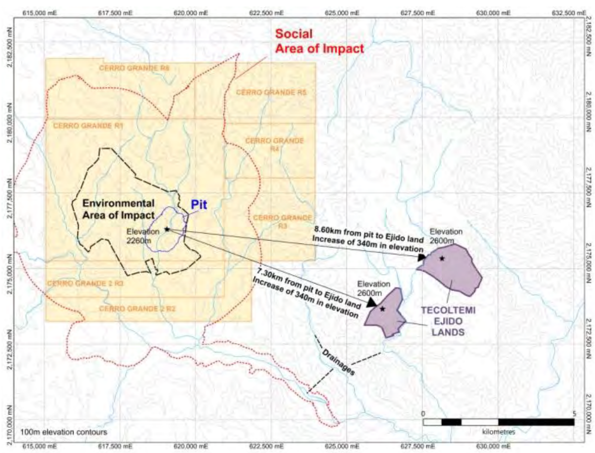


Figure 3: New Concessions.

In June 2017, the Ejido Tecoltemi, the complainant in the Amparo, filed a legal complaint about the Court Order leading to the New Concessions, and on February 1, 2018, the court reviewing the complaint ruled the Ejido's complaint was founded, and sent the ruling to the court hearing the Amparo.

On December 21, 2018, the General Directorate of Mines issued a resolution that the New Concessions are left without effect, and the Original Concessions are in full force and effect (the "December Communication").

On February 13, 2019, the General Directorate of Mines delivered, to the court hearing the Amparo, mining certificates stating that the Original Concessions are valid, and the New Concessions are cancelled.

On June 10, 2019, Almaden's subsidiary appealed the December Communication, and subsequent cancellation of the New Concessions. On September 26, 2019, the lower court refused to hear the appeal, but on October 14, 2019, a higher court agreed to hear the appeal.

On December 1, 2020, the higher court denied the Company's October 14, 2019 appeal, which objected to the reinstatement by the Mexican mining authorities of the Company's Original Concessions. This court decision upheld the action of Mexican mining authorities that reinstated the Original Concessions as the Company's sole mineral claims over the Ixtaca Project, and left the New Concessions the Company was awarded in 2017 as held without effect. However, the decision also stated that the Company had the right to defend the New Concessions through the applicable legal procedures (such as the Administrative Challenge referred to below).

In communications with the lower court and mineral title certificates issued by the General Directorate of Mines directly to Almaden on December 16, 2019 (the "December 2019 Certificates"), the applicable Mexican records reflected the position that the Original Concessions (the subject matter of the Amparo) are active and owned by

Almaden (through its Mexican subsidiary) and the New Concessions are left without effect. It should be noted that the Mexican mining authorities also have indicated in the December 2019 Certificates that their position is subject to the final resolution of the Amparo.

On January 21, 2020, the Company filed an administrative challenge against the Mexican mining authorities' issuance of the December 2019 Certificates, which represented the first time that Almaden had been directly notified of any changes in its mineral tenure.

Almaden believes that the December Communication from the Mexican mining authorities is the basis for the recorded change in its mineral tenure. The Company's Mexican counsel has advised that the December Communication should have no legal effect as it was only provided to the lower court, was never officially served on the Company and was not issued by an official possessing the necessary legal authority. While the December Communication is dated December 21, 2018, the Company first became aware of it in May 2019 through a review of court documents.

Currently, applicable Mexican mining authority records show the Original Concessions as Almaden's sole mineral claims to the Ixtaca Project. As noted above those claims are subject to the Amparo and the decision of the SCJN announced by the Company on April 27, 2022.

Almaden continues to file taxes and assessment reports on the basis of the reduced area defined by the New Concessions. These taxes have been accepted by the Mexican mining authorities, and Almaden has not received any notifications from the Mexican mining authorities regarding taxes on the Original Concessions.

***Dividends***
The Company has not declared any dividends since inception and does not anticipate that it will do so in the foreseeable future. The present policy of the Company is to retain future earnings for use in its operations and the expansion of its business.

***Significant Changes***
There have been no significant changes of financial condition since the most recent audited financial statements included within this Annual Report on Form 20-F.

## Item 9. Offer and Listing of Securities

The Company's common shares trade on TSX in Toronto, Ontario, Canada having the symbol "AMM," and on the NYSE American (formerly the NYSE MKT) in New York, New York, U.S.A. having the symbol "AAU" and CUSIP #020283107.

The Company's common shares commenced trading on February 11, 2002 on TSX and December 19, 2005 on the American Stock Exchange, now the NYSE American.

Table No. 12 lists the high and low prices for the shares of Almaden Minerals Ltd. common shares on NYSE American for the preceding five years. Table No. 13 lists the high and low prices for shares of Almaden Minerals Ltd. common shares on TSX for the preceding five years.

**Table No. 12**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**NYSE American**
**(expressed in US$)**

| Year Ended | High | Low |
|---|---|---|
| 12/31/2021 | $1.20 | $0.27 |
| 12/31/2020 | 1.24 | 0.21 |
| 12/31/2019 | 0.90 | 0.43 |
| 12/31/2018 | 1.05 | 0.48 |
| 12/31/2017 | 1.75 | 0.71 |

**Table No. 13**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**The Toronto Stock Exchange**
**(expressed in C$)**

| Year Ended | High | Low |
|---|---|---|
| 12/31/2021 | $1.52 | $0.36 |
| 12/31/2020 | 1.60 | 0.31 |
| 12/31/2019 | 1.19 | 0.57 |
| 12/31/2018 | 1.35 | 0.63 |
| 12/31/2017 | 2.33 | 0.92 |

Table No. 14 lists the quarterly high and low prices for shares of Almaden Minerals Ltd. common shares on NYSE American for the two most recent full financial years. Table No. 15 lists the quarterly high and low prices for shares of Almaden Minerals Ltd. common shares on TSX for the two most recent full financial years.

**Table No. 14**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**NYSE American**
**(expressed in US$)**

| Quarter Ended | High | Low |
|---|---|---|
| 03/31/2022 | $0.49 | $0.27 |
| 12/31/2021 | 0.44 | 0.27 |
| 09/30/2021 | 0.51 | 0.36 |
| 06/30/2021 | 0.60 | 0.46 |
| 03/31/2021 | 1.20 | 0.48 |
| 12/31/2020 | 1.24 | 0.45 |
| 09/30/2020 | 1.09 | 0.47 |
| 06/30/2020 | 0.59 | 0.26 |

**Table No. 15**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**The Toronto Stock Exchange**
**(expressed in C$)**

| Quarter Ended | High | Low |
|---|---|---|
| 03/31/2022 | $0.62 | $0.34 |
| 12/31/2021 | 0.55 | 0.36 |
| 09/30/2021 | 0.67 | 0.47 |
| 06/30/2021 | 0.74 | 0.58 |
| 03/31/2021 | 1.52 | 0.61 |
| 12/31/2020 | 1.60 | 0.59 |
| 09/30/2020 | 1.43 | 0.64 |
| 06/30/2020 | 0.77 | 0.38 |

Table No.16 lists the high and low prices for shares of Almaden Minerals Ltd. common shares on NYSE American for the most recent six months. Table No. 17 lists the high and low prices for shares of Almaden Minerals Ltd. common shares on TSX for the most recent six months.

**Table No. 16**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**NYSE American**
**(expressed in US$)**

| Month Ended | High | Low |
|---|---|---|
| 03/31/2022 | $0.49 | $0.28 |
| 02/28/2022 | 0.39 | 0.27 |
| 01/31/2022 | 0.32 | 0.27 |
| 12/31/2021 | 0.35 | 0.27 |
| 11/30/2021 | 0.44 | 0.32 |
| 10/31/2021 | 0.41 | 0.37 |

**Table No. 17**
**Almaden Minerals Ltd.**
**Stock Trading Activity**
**The Toronto Stock Exchange**
**(expressed in C$)**

| Month Ended | High | Low |
|---|---|---|
| 03/31/2022 | $0.62 | $0.38 |
| 02/28/2022 | 0.49 | 0.34 |
| 01/31/2022 | 0.40 | 0.34 |
| 12/31/2021 | 0.44 | 0.36 |
| 11/30/2021 | 0.55 | 0.40 |
| 10/31/2021 | 0.51 | 0.45 |

The closing price of the Company's common shares was $0.36 (US$) on the NYSE American and $0.45 (C$) on TSX on March 31, 2022.

In recent years, securities markets in Canada and the U.S. have experienced a high level of price and volume volatility, and the market price of many resource companies, particularly those considered speculative exploration companies, have experienced wide fluctuations in price which have not necessarily been related to operating performance or underlying asset values on prospects of such companies. Exploration for gold and other minerals is considered high risk and highly speculative in the resource industry and the trading market for precious and base metal exploration companies is characteristically volatile, with wide fluctuations of price and volume only in part related to progress of exploration. There can be no assurance that continual fluctuations in the Company's share price and volume will not occur.

The Company's common shares are issued in registered form and the following information is from the Company's registrar and transfer agent, Computershare Investor Services Inc. located in Vancouver, British Columbia and Toronto, Ontario, Canada.

On February 28, 2022, the shareholders' list for the Company's common shares showed 213 registered shareholders, including depositories, and 137,221,408 shares outstanding. 178 of these registered shareholders are U.S. residents, owning 38,497,549 shares representing 28% of the issued and outstanding common shares. 24 of these registered shareholders are Canadian residents, owning 93,878,480 shares representing 68% of the issued and outstanding common shares. 11 of these registered shareholders are of other countries, owning 4,845,379 shares representing 4% of the issued and outstanding common shares.

Table No. 18 lists changes, if any, in issued shares to April 28, 2022:

**Table No. 18**
**Shares Issued to April 28, 2022**

| | Number |
|---|---|
| Balance, December 31, 2021 | 137,221,408 |
| Balance, April 28, 2022 | 137,221,408 |

## Item 10. Additional Information

***Flow-Through Common Shares***

Flow-through common shares differ from other common shares in one aspect only, namely the tax benefits connected with qualified mineral exploration expenditures in Canada associated with the funds raised through the sale of flow through shares flow-through to the shareholder rather than the Company; all other rights of the shareholder remain unchanged. Companies must specifically identify the expenditures associated with the funds raised through the sale of flow-through shares. These tax benefits are available only to shareholders residing in Canada who are subject to Canadian Federal Income Tax for the taxation year in which the credit is being claimed. Shareholders residing in the U.S. and other non-Canadian shareholders receive no tax benefits through the purchase of flow-through shares.

The Company's common shares are not normally flow-through shares but the Company has issued flow-through shares pursuant to private placements of the Company's common shares. There were no flow-through shares issued in Fiscal 2021, Fiscal 2020 or Fiscal 2019. In Fiscal 2011, the Company issued 100,000 flow-through shares.

***Memorandum and Articles***

At the Annual and Special General meeting of the Company held on May 18, 2005, shareholders passed appropriate resolutions to complete the transition procedures in accordance with the *Business Corporations Act* (British Columbia), (the "BCBCA"), to increase the number of common shares which the Company is authorized to issue to an unlimited number of common shares and to cancel the Company's Articles and adopt new Articles to take advantage of provisions of the BCBCA. The BCBCA was adopted in British Columbia on March 29, 2004 replacing the *Company Act* (the "Former Act"). The BCBCA requires the provisions formerly required in the Memorandum to be in the Articles. The BCBCA eliminates the requirement for a Memorandum.

The revised Articles are an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006, and replaced the Memorandum and Articles as filed with the Commission on May 17, 2002.

***Articles***

The Company was formed through the amalgamation of Fairfield Minerals Ltd. and Almaden Resources Corporation effective December 31, 2001 under the *Company Act* of British Columbia (the "Company Act"). On March 29, 2004, British Columbia adopted the BCBCA to replace the Company Act. Companies registered under the Company Act are required to transition to the BCBCA. At the Annual and Special General meeting of the Company held on May 18, 2005, shareholders passed appropriate resolutions to complete the transition procedures to cancel the Company's Articles and adopt new Articles, which includes an increase of the number of common shares which the Company is authorized to issue to an unlimited number of common shares. The Company's new Articles became effective in June 2005 (the "Articles").

The Articles contain no restrictions on the business the Company may carry on.

Under the Articles, if a director has a disclosable interest in a contract or transaction, such director is liable to account to the Company for any profits that accrue to the director as a result of the contract or transaction unless disclosure is made thereof and the contract or transaction is approved in accordance with the provisions of the BCBCA and a director is not entitled to vote on any director's resolution to approve that contract or transaction unless all of the directors have a disclosable interest in that contract or transaction, in which case all of those directors may vote on such resolution.

A director may hold any office or place of profit with the Company in conjunction with the office of director, and no director shall be disqualified by their office from contracting with the Company. A director or such director's firm may act in a professional capacity for the Company and a director or such director's firm shall be entitled to remuneration for professional services. A director may become a director or other officer or employee of, or otherwise interested in, any company or firm in which the Company may be interested as a shareholder or otherwise. The director shall not be accountable to the Company for any remuneration or other benefits received by the director from such other company or firm unless the Company in general meeting directs otherwise.

Under the Articles the directors must manage or supervise the management of the business and affairs of the Company and have the authority to exercise all such powers which are not required to be exercised by the shareholders, or as governed by the BCBCA. Under the Articles the directors may, by resolution, create and appoint one or more committees consisting of such member or members of their body as they think fit and may delegate to any such committee such powers of the Board as the Board may designate or prescribe.

The Articles provide that the quorum necessary for the transaction of the business of the directors may be fixed by the directors and if not so fixed shall be a majority of the directors. The continuing directors may, notwithstanding any vacancy in their body, but if and so long as their number is reduced below the number fixed pursuant to the Articles as the necessary quorum of directors, act only for the purpose of increasing the number of directors to that number, or of summoning a general meeting of the Company, but for no other purpose.

The Articles provide that the directors may, on behalf of the Company:

- Borrow money in a manner and amount, on any security, from any source and upon any terms and conditions;
- Issue bonds, debentures, and other debt obligations either outright or as security for any liability or obligation of the Company or any other person;
- Guarantee the repayment of money by any other person or the performance of any obligation of any other person; and
- Mortgage, charge, or give other security, on the whole or any part of the property or assets of the Company, both present and future.

There are no age limit requirements pertaining to the retirement or non-retirement of directors.

A director need not be a shareholder of the Company.

The Articles provide for the mandatory indemnification of Directors, Officers, former officers and directors, alternate directors, as well as their respective heirs and personal or other legal representatives, or any other person, to the greatest extent permitted by the BCBCA. The indemnification includes the mandatory payment of expenses and, in furtherance thereof, the Company is party to indemnification agreements with such individuals. The directors may cause the Company to purchase and maintain insurance for the benefit of eligible parties.

The rights, preferences and restrictions attaching to each class of the Company's shares are as follows:

***Common Shares***
The authorized share structure of the Company consists of an unlimited number of common shares without par value. All the common shares of the Company are of the same class and, once issued, rank equally as to dividends, voting powers, and participation in assets. Holders of common shares are entitled to one vote for each share held of record on all matters to be acted upon by the shareholders. Holders of common shares are entitled to receive such dividends as may be declared from time to time by the Board of Directors, in its discretion, out of funds legally available therefor.

Upon liquidation, dissolution or winding up of the Company, holders of common shares are entitled to receive pro rata the assets of the Company, if any, remaining after payments of all debts and liabilities. No shares have been issued subject to call or assessment. There are no pre-emptive or conversion rights and no provisions for redemption or purchase for cancellation, surrender, or sinking or purchase funds.

The Directors may by resolution make any changes in the authorized share structure as may be permitted under Section 54 of the BCBCA, and may by resolution make or authorize the making of any alterations to the Articles and the Notice of Articles as may be required by such changes.

The Company may by ordinary resolution, create or vary special rights and restrictions as provided in Section 58 of the BCBCA. No alteration will be valid as to any part of the issued shares of any class unless the holders of all the issued shares of that class consent to the alteration in writing or consent by special separate resolution.

An annual general meeting shall be held once every calendar year at such time (not being more than 15 months after holding the last preceding annual meeting under the BCBCA nor more than 6 months from its preceding fiscal year end under the policies of the Toronto Stock Exchange) and place as may be determined by the Directors. The Directors may, as they see fit, convene an extraordinary general meeting. An extraordinary general meeting, if requisitioned in accordance with the BCBCA, shall be convened by the Directors or, if not convened by the Directors, may be convened by the requisitionists as provided in the BCBCA.

There are no limitations upon the rights to own securities.

There are no provisions in the Articles that would have the effect of delaying, deferring, or preventing a change in control of the Company.

There is no special ownership threshold above which an ownership position must be disclosed. However, any ownership level above 10% must be disclosed by news release and notices filed in accordance with Canadian Securities Laws and by notices to the Toronto Stock Exchange.

A copy of the Company's new Articles is an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006.

***Shareholder Rights Plan***
On April 13, 2011, the Company's Board of Directors adopted a Shareholder Rights Plan Agreement (the "Rights Plan") between the Company and Computershare Investor Services Inc. ("Computershare") as Rights Agent. The Rights Plan was subsequently approved by the shareholders of the Company at the Annual General and Special Meeting held June 28, 2011, reconfirmed by the shareholders of the Company at the 2014 Annual General Meeting, amended and reconfirmed at the 2017 Annual General Meeting and reconfirmed at the 2020 Annual General Meeting. The primary objective of the Rights Plan is to ensure, to the extent possible, that all shareholders of the Company are treated fairly in connection with any take-over bid for the Company by (a) providing shareholders with adequate time to properly assess a take-over bid without undue pressure and (b) providing the Board with more time to fully consider an unsolicited take-over bid, and, if applicable, to explore other alternatives to maximize shareholder value.

The full text of the Rights Plan was filed under cover of Form 6-K with the Commission on April 15, 2011 and is also available on SEDAR and the Company's website.

***Advance Notice Policy***
On January 28, 2013 the Company's Board of Directors approved and adopted an Advance Notice Policy, as amended on May 1, 2015 (the "Policy") which, among other things, includes a provision that requires advance notice to the Company in circumstances where nominations of persons for election to the Board of Directors are made by shareholders of the Company other than pursuant to: (i) a requisition of a meeting made pursuant to the provisions of the BCBCA: or (ii) a shareholder proposal made pursuant to the provisions of the BCBCA.

The Policy, among other things, fixes a deadline by which holders of record of common shares of the Company must submit director nominations to the Company prior to any annual or special meeting of shareholders and set forth the information that a shareholder must include in the notice to the Company for the notice to be in proper written form.

In the case of an annual meeting of shareholders, notice to the Company must be made not less than 30 nor more than 65 days prior to the date of the annual meeting; provided, however, that in the event the annual meeting is to be held on a date that is less than 50 days after the date on which the first public announcement of the date of the annual meeting was made, notice may be made not later than the close of business on the 10$^{th}$ day following such public announcement.

In the case of a special meeting of shareholders (which is not also an annual meeting), notice to the Company must be made not later than the close of business on the 15$^{th}$ day following the day on which the first public announcement of the date of the special meeting was made.

The full text of the Amended Advance Notice Policy is an exhibit to the 2017 Annual Report on Form 20-F filed with the Commission on March 29, 2018.

***Multiple Voting Policy for Uncontested Elections of Directors***
The Board believes that each of its members should carry the confidence and support of the Company's shareholders and, accordingly, has adopted, effective May 15, 2017, an Amended Majority Voting Policy for the election of directors for non-contested meetings. The Amended Majority Voting Policy provides that, in a non-contested election of directors, voting will be by ballot and, if the number of shares "withheld" for any nominee exceeds the number of shares voted "for" the nominee, then, notwithstanding that such director is duly elected as a matter of corporate law, he or she shall, immediately following the date of the final scrutineer's report on the ballot, tender his or her written resignation to the Chairman of the Board. A "non-contested election" means an election where the number of nominees for director is not greater than the number of directors to be elected. Under the Amended Majority Voting Policy, the Board will consider such offer of resignation and shall make a determination whether or not to accept or reject the resignation no later than 90 days following the date of the applicable shareholders' meeting and shall accept the resignation absent exceptional circumstances. The Board will promptly announce its decision via press release. If the Board determines not to accept the resignation, the press release must fully state the reasons for its decision. No director who is required to tender his or her resignation shall participate in any meeting of the Board at which the resignation is considered. If a resignation is accepted by the Board, and subject to any corporate law restrictions, the Board may leave any resulting vacancy unfilled until the Company's next annual general meeting, or may appoint a new director to fill the vacancy who the Board considers to merit the confidence of the shareholders, or may call a special meeting of shareholders at which there will be presented a management nominee or nominees to fill the vacant position or positions.

The full text of the Amended Multiple Voting Policy is an exhibit to 2017 Annual Report on Form 20-F filed with the Commission on March 29, 2018.

***Material Contracts***
The following is a summary of each material contract, other than contracts entered into in the ordinary course of business, to which we or any member of the group is a party, for the two years preceding the date of this Annual Report on Form 20-F.

1. Gold Loan Agreement dated as of May 14, 2019 between the Company (the "Borrower") and Almadex Minerals Ltd. (the "Lender"). Almaden may borrow from Almadex up to 1,597 ounces of 99.99% purity gold bullion. Upon receiving a drawdown notice, the Lender will sell the requested gold and send the proceeds in US dollars to the Borrower. Interest will be at 10% per year, calculated monthly, either paid quarterly or accrued to the loan value. The loan, plus any accrued but unpaid interest, is due March 31, 2024, but may be extended to March 31, 2026 upon written notice from Borrower to Lender. Repayment may be in the form of gold or common shares of Almaden, and may include voluntary prepayment, with the form of repayment selected at the sole discretion of the Lender. A maximum of 11,172,671 common shares of Almaden are issuable for repayment of principal and interest, with any additional amounts due payable in gold. Mandatory Prepayment of 100 ounces of gold is required on the last business day of each month following the date when Almaden's Ixtaca Project begins commercial production. The full text of the Gold Loan Agreement is filed as an exhibit to the 2020 Annual Report on Form 20- F filed with the Commission on March 26, 2021.

***Exchange controls***
Except as discussed above, the Company is not aware of any Canadian federal or provincial laws, decrees or regulations that restrict the export or import of capital, including foreign exchange controls, or that affect the remittance of interest, dividends or other payments to non-Canadian holders of the Company's common shares. There are no limitations under the laws of Canada or in the organizing documents of the Company on the right of non-Canadians to hold or vote securities of the Company, except that the *Investment Canada Act* (Canada) may require that, if specified thresholds are exceeded, a "non-Canadian" not acquire "control" of the Company without prior review and approval by the Minister of Innovation, Science and Economic Development. The acquisition of one third or more of the voting shares of the Company would give rise to a rebuttable presumption of the acquisition of control, and the acquisition of more than fifty percent of the voting shares of the Company would be deemed to be an acquisition of control. In addition, the *Investment Canada Act* (Canada) provides the Canadian government with broad discretionary powers in relation to national security to review and potentially prohibit,

condition or require the divestiture of, any investment in the Company by a non-Canadian, including non-control level investments. "Non-Canadian" generally means an individual who is neither a Canadian citizen nor a permanent resident of Canada within the meaning of the *Immigration and Refugee Protection Act* (Canada) who has been ordinarily resident in Canada for not more than one year after the time at which he or she first became eligible to apply for Canadian citizenship, or any entity that is not controlled or beneficially owned by Canadians.

***Taxation***

The following summary of the material Canadian federal income tax consequences generally applicable in respect of the common shares reflects the Company's opinion. The tax consequences to any particular holder of common shares will vary according to the status of that holder as an individual, trust, company or member of a partnership, the jurisdiction in which that holder is subject to taxation, the place where that holder is resident and, generally, according to that holder's particular circumstances. This summary is applicable only to holders who are resident in the U.S., have never been resident in Canada, deal at arm's length with the Company, hold their common shares as capital property and who will not use or hold the common shares in carrying on business in Canada. Special rules, which are not discussed in this summary, may apply to a U.S. holder that is an issuer that carries on business in Canada and elsewhere.

This summary is based upon the provisions of the Income Tax Act of Canada and the regulations thereunder (collectively, the "Canadian Tax Act" or "ITA") and the Canada-United States Tax Convention (the "Convention") as at the date of the Registration Statement and the current administrative practices of Canada Revenue Agency. This summary does not take into account Provincial income tax consequences.

Each holder should consult his own tax advisor with respect to the income tax consequences applicable to him in his own particular circumstances.

**Certain Canadian Federal Income Tax Consequences**

The discussion under this heading summarizes the principal Canadian federal income tax consequences of acquiring, holding and disposing of common shares of the Company for a shareholder of the Company who is not a resident of Canada but is a resident of the U.S. and who will acquire and hold common shares of the Company as capital property for the purposes of the Canadian Tax Act. This summary does not apply to a shareholder who carries on business in Canada through a "permanent establishment" situated in Canada or performs independent personal services in Canada through a fixed base in Canada if the shareholder's holding in the Company is effectively connected with such permanent establishment or fixed base. This summary is based on the provisions of the Canadian Tax Act and the regulations thereunder and on an understanding of the administrative practices of Canada Revenue Agency, and takes into account all specific proposals to amend the Canadian Tax Act or regulations made by the Minister of Finance of Canada as of the date hereof. It has been assumed that there will be no other relevant amendment of any governing law although no assurance can be given in this respect. This discussion is general only and is not a substitute for independent advice from a shareholder's own Canadian and U.S. tax advisors.

The provisions of the Canadian Tax Act are subject to income tax treaties to which Canada is a party, including the Convention.

**Dividends on Common Shares and Other Income**

Under the Canadian Tax Act, a non-resident of Canada is generally subject to Canadian withholding tax at the rate of 25 percent on dividends paid or deemed to have been paid to him or her by a company resident in Canada. The Company is responsible for withholding of tax at the source. The Convention limits the rate to 15 percent if the shareholder is a resident of the U.S. and the dividends are beneficially owned by and paid to such shareholder, and to 5 percent if the shareholder is also a company that beneficially owns at least 10 percent of the voting stock of the payor company.

The amount of a stock dividend (for tax purposes) would generally be equal to the amount by which the paid up or stated capital of the Company had increased by reason of the payment of such dividend. The Company will furnish additional tax information to shareholders in the event of such a dividend. Interest paid or deemed to be paid on the Company's debt securities held by non-Canadian residents may also be subject to Canadian withholding tax, depending upon the terms and provisions of such securities and any applicable tax treaty. The Convention generally eliminates Canadian tax on interest paid or deemed to be paid by the Company to U.S. residents. The Convention generally exempts from Canadian income tax dividends paid to a religious, scientific, literary, educational or charitable organization or to an organization constituted and operated exclusively to administer a pension, retirement or employee benefit fund or plan, if the organization is a resident of the U.S. and is exempt from income tax under the laws of the U.S.

**Dispositions of Common Shares**

Under the Canadian Tax Act, a taxpayer's capital gain or capital loss from a disposition of a common shares of the Company is the amount, if any, by which his or her proceeds of disposition exceed (or are exceeded by, respectively) the aggregate of his or her adjusted cost base of the share and reasonable expenses of disposition. The capital gain or loss must be computed in Canadian currency using a weighted average adjusted cost base for identical properties. There are special transitional rules to apply capital losses against capital gains that arose in different periods. The amount by which a shareholder's capital loss exceeds the capital gain in a year may be deducted from a capital gain realized by the shareholder in the three previous years or any subsequent year, subject to certain restrictions in the case of a corporate shareholder.

Under the Canadian Tax Act, a non-resident of Canada is subject to Canadian tax on taxable capital gains, and may deduct allowable capital losses, realized on a disposition of "taxable Canadian property." Common shares of the Company will constitute taxable Canadian property of a shareholder at a particular time if the shareholder used the shares in carrying on business in Canada, or if at any time in the five years immediately preceding the disposition 25% or more of the issued shares of any class or series in the capital stock of the Company belonged to one or more persons in a group comprising the shareholder and persons with whom the shareholder and persons with whom the shareholder did not deal at arm's length and in certain other circumstances.

The Convention relieves U.S. residents from liability for Canadian tax on capital gains derived on a disposition of shares unless

(a) the value of the shares is derived principally from "real property" in Canada, including the right to explore for or exploit natural resources and rights to amounts computed by reference to production,

(b) the shareholder was resident in Canada for 120 months during any period of 20 consecutive years preceding, and at any time during the 10 years immediately preceding, the disposition and the shares were owned by him when he or she ceased to be resident in Canada, or

(c) the shares formed part of the business property of a "permanent establishment" that the holder has or had in Canada within the 12 months preceding the disposition.

**Certain U.S. Federal Income Tax Consequences**

The following is a discussion of material U.S. federal income tax consequences generally applicable to a U.S. Holder (as defined below) of shares of the Company. This discussion does not cover any state, local or foreign tax consequences.

The following discussion is based upon the sections of the Internal Revenue Code of 1986, as amended ("the Code"), Treasury Regulations, published Internal Revenue Service ("IRS") rulings, published administrative positions of the IRS and court decisions that are currently applicable, any or all of which could be materially and adversely changed, possibly on a retroactive basis, at any time. In addition, the discussion does not consider the potential effects, both adverse and beneficial, or recently proposed legislation which, if enacted, could be applied, possibly on a retroactive basis, at any time. The following discussion is for general information only. It is not intended to be, nor should it be construed to be, legal or tax advice to any U.S. Holder or prospective holder and not an opinion or representation with respect to the U.S. Federal income tax consequences to any U.S. Holder or prospective holder is made. The following summary was not written and is not intended to be used, and cannot be used, by any person for the avoidance of any penalties with respect to taxes that may be imposed on such person. U.S. Holders and prospective holders of shares of the Company are urged to consult their own tax advisors about the federal, state, local, and foreign tax consequences of purchasing, owning and disposing of common shares of the Company.

**U.S. Holders**

As used herein, a U.S. Holder includes a holder of shares of the Company who is a citizen or resident of the U.S. (as defined under Treasury Regulation Section 301.7701(b) or any applicable income tax convention), a company (or an entity which has elected to be treated as a corporation under Treasury Regulation Sections 301.7701-3) created or organized in or under the laws of the U.S. or of any political subdivision thereof, any estate other than a foreign estate (as defined in Section 7701(a)(31)(A) of the Code or, a trust subject to the primary supervision of a court within the U.S. and control of a U.S. fiduciary as described in Section 7701(a)(30)(E) of the Code). This summary does not address the tax consequences to, and U.S. Holder does not include, persons subject to special provisions of Federal income tax law, such as tax-exempt organizations, qualified retirement plans, financial institutions, insurance companies, real estate investment trusts, regulated investment companies, broker-dealers, non-resident alien individuals, persons or entities that have a "functional currency" other than the U.S. dollar, shareholders who hold common shares as part of a straddle, hedging or conversion transaction, and shareholders who acquired their shares through the exercise of employee stock options or otherwise as compensation for services. This summary is limited to U.S. Holders who own shares as capital assets. This summary does not address the consequences to a person or entity holding an interest in a shareholder of the Company or the consequences to a person of the ownership, exercise or disposition of any options, warrants or other rights to acquire shares of the Company.

**Distributions on Shares of the Company**

U.S. Holders receiving dividend distributions (including constructive dividends) with respect to shares of the Company are required to include in gross income for U.S. federal income tax purposes the gross amount of such distributions equal to the U.S. dollar value of such distributions on the date of receipt (based on the exchange rate on such date), to the extent that the Company has current or accumulated earnings and profits, without reduction for any Canadian income tax withheld from such distributions. Such Canadian tax withheld may be credited, subject to certain limitations, against the U.S. Holder's U.S. federal income tax liability or, alternatively, may be deducted in computing the U.S. Holder's U.S. federal taxable income. (See more detailed discussion at "Foreign Tax Credit" below). To the extent that distributions exceed current or accumulated earnings and profits of the Company, they will be treated first as a return of capital up to the U.S. Holder's adjusted tax basis in the common shares and thereafter as gain from the sale or exchange of the common shares. Unless the distribution constitutes "qualified dividend income" as defined in Section 1(h)(11), dividend income will be taxed at marginal tax rates applicable to ordinary income.

In the case of foreign currency received as a dividend that is not converted by the recipient into U.S. dollars on the date of receipt, a U.S. Holder will have a tax basis in the foreign currency equal to its U.S. dollar value on the date of receipt. Gain or loss may be recognized upon a subsequent sale or other disposition of the foreign currency, including an exchange for U.S. dollars.

Dividends paid on the shares of the Company will not generally be eligible for the dividends received deduction provided to companies receiving dividends from certain U.S. corporations. A U.S. Holder which is a corporation may, under certain circumstances, be entitled to a 70% deduction of the U.S. source portion of dividends received from the Company (unless the Company qualifies as a "passive foreign investment company", as defined below) if such U.S. Holder owns shares representing at least 10% of the voting power and value of the Company. The availability of this deduction is subject to several complex limitations which are beyond the scope of this discussion. In addition, as discussed under the Controlled Foreign Corporation section below, distributions from controlled foreign corporations to certain U.S. corporate shareholders may be entitled to a dividend received deduction for the foreign source portion of the dividend.

The so-called Tax Cuts and Jobs Act (the "Tax Act") was enacted on December 22, 2017 by the U.S. government. The Tax Act broadly changes the taxation of foreign earnings attributable to certain U.S. Holders from a worldwide tax regime to a territorial regime. The Tax Act created a transition tax that creates a deemed repatriation of previously untaxed foreign earnings and profits. Certain U.S. Holders may be subject to this transition tax and recognize taxable income due to undistributed earnings and profits of the Company.

**Foreign Tax Credit**

A U.S. Holder who pays (or has withheld from distributions) Canadian income tax with respect to the ownership of shares of the Company may be entitled, at the option of the U.S. Holder, to either a deduction or a tax credit for such foreign tax paid or withheld. This election is made on a year-by-year basis and applies to all foreign income taxes (or taxes in lieu of income tax) paid by (or withheld from) the U.S. Holder during the year. There are significant and complex limitations which apply to a U.S. Holder's ability to claim the foreign tax credit. Furthermore, a foreign tax credit may not be claimed when a U.S. Holder is entitled to a dividend received deduction. The availability of the foreign tax credit and the application of the limitations on the credit are fact specific and holders and prospective holders of shares of the Company should consult their own tax advisors regarding their individual circumstances.

**Disposition of Shares of the Company**
For U.S. tax purposes, a U.S. Holder will generally recognize gain or loss upon the sale of shares of the Company equal to the difference, if any, between (I) the amount of cash plus the fair market value of any property received, and (ii) the shareholder's tax basis in his, her or its shares of the Company. This gain or loss will be capital gain or loss if the common shares are capital assets in the hands of the U.S. Holder. Capital gain will then be classified as a short-term or long-term capital gain or loss depending upon the holding period of the U.S. Holder. Preferential tax rates apply to long-term capital gains of U.S. Holders which are individuals, estates or trusts. Gains and losses are netted and combined according to special rules in arriving at the overall capital gain or loss for a particular tax year. Deductions for net capital losses are subject to significant limitations. For U.S. Holders which are not companies, any unused portion of such net capital loss may be carried over to be used in later tax years until such net capital loss is thereby exhausted, but individuals may not carry back capital losses. For U.S. Holders which are taxable corporations (other than companies subject to Subchapter S of the Code), an unused net capital loss may be carried back three years from the loss year and carried forward five years from the loss year to be offset against capital gains until such net capital loss is thereby exhausted.

**Net Investment Tax**
U.S. Holders may also be subject to the Net Investment Income Tax, which is imposed on certain U.S. taxpayers' income from investments, such as dividends, interest and capital gains. Individual taxpayers are liable for a 3.8 percent Net Investment Income Tax on the lesser of their net investment income, or the amount by which their modified adjusted gross income exceeds certain statutory thresholds based on their filing status. U.S. Holders or prospective U.S. Holders should consult their tax advisors to determine if the Net Investment Income Tax will apply in their individual circumstances.

**Other Considerations**
In the following circumstances, the above sections of the discussion may not describe the U.S. federal income tax consequences resulting from the holding and disposition of shares of the Company.

**Passive Foreign Investment Company**
As a foreign company with U.S. Holders, the Company could potentially be treated as a PFIC, as defined in Section 1297 of the Code. Section 1297 of the Code defines a PFIC as a company that is not formed in the U.S. and, for any taxable year, either (i) 75% or more of its gross income is "passive income", which includes among other types of income, interest, dividends and certain rents and royalties or (ii) the average percentage, by fair market value (or, if the company is a controlled foreign company or makes an election, by adjusted tax basis), of its assets that produce or are held for the production of "passive income" is 50% or more.

The rules governing PFICs can have significant tax effects on U.S. shareholders of foreign companies. U.S. shareholder's income or gain, with respect to a disposition or deemed disposition of PFIC shares or a distribution payable on such shares will generally be subject to tax at the highest marginal rates applicable to ordinary income and certain interest charges as discussed below, unless the U.S. shareholder has timely made a "qualified electing fund" election or a "mark-to-market" election for those shares. The elections available to U.S. shareholders of a PFIC are made on a shareholder-by-shareholder basis, and U.S. shareholders should consult with tax advisors as soon as possible to determine the what election, if any, such U.S. shareholder should make. The timing for making such election can have consequences on the U.S. shareholders tax position with respect to its ownership in a PFIC.

Under one method, a U.S. shareholder who elects in a timely manner to treat the PFIC as a QEF, as defined in the Code, (an "Electing U.S. Holder") will be required to currently include in his income for any taxable year in which the company qualifies as a PFIC his pro-rata share of the company's (i) "net capital gain" (the excess of net long-term capital gain over net short-term capital loss), which will be taxed as long-term capital gain to the Electing U.S. Holder, and (ii) "ordinary earnings" (the excess of earnings and profits over net capital gain), which will be taxed as ordinary income to the Electing U.S. Holder, in each case, for the U.S. Holder's taxable year in which (or with which) the Company's taxable year ends, regardless of whether such amounts are actually distributed. A QEF election also allows the Electing U.S. Holder to (i) generally treat any gain realized on the disposition of his common shares (or deemed to be realized on the pledge of his common shares) as capital gain; (ii) treat his share of the company's net capital gain, if any, as long-term capital gain instead of ordinary income, and (iii) either avoid interest charges resulting from PFIC status altogether (see discussion of interest charge below), or make an annual election, subject to certain limitations, to defer payment of current taxes on his share of the company's annual realized net capital gain and ordinary earnings which will then be subject, however, to an interest charge.

The procedure a U.S. Holder must comply with in making a timely QEF election will depend on whether the year of the election is the first year in the U.S. Holder's holding period in which the Company is a PFIC. If the U.S. shareholder makes a QEF election in such first year, (sometimes referred to as a "Pedigreed QEF Election"), then the U.S. shareholder may make the QEF election by simply filing the appropriate documents at the time the U.S. Holder files its tax return for such first year. If, however, the company qualified as a PFIC in a prior year during the U.S. shareholder's holding period, then the U.S. shareholder may make a retroactive QEF election, provided he has preserved his right to do so under the protective statement regime or he obtains IRS permission.

If a U.S. shareholder has not made a QEF Election at any time (a "Non-electing U.S. Holder"), then special taxation rules under Section 1291 of the Code will apply to (i) gains realized on the disposition (or deemed to be realized by reason of a pledge) of his common shares and (ii) certain "excess distributions" by the company. An excess distribution is a current year distribution received by the U.S. shareholder on PFIC stock to the extent that the distribution exceeds its ratable portion of 125% of the average amount received by the U.S. shareholder during the preceding three years.

A Non-electing U.S. shareholder generally would be required to pro-rate all gains realized on the disposition of his common shares and all excess distributions over the entire holding period for the common shares. All gains or excess distributions allocated to prior years of the U.S. shareholder (other than years prior to the first taxable year of the Company during such U.S. Holder's holding period and beginning after January 1, 1987 for which it was a PFIC) would be taxed at the highest marginal tax rate for each such prior year applicable to ordinary income. The Non-electing U.S. shareholder also would be liable for interest on the foregoing tax liability for each such prior year calculated as if such liability had been due with respect to each such prior year. A Non-electing non-corporate U.S. shareholder must treat this interest charge as "personal interest" which is wholly non-deductible. The balance of the gain or the excess distribution will be treated as ordinary income in the year of the disposition or distribution, and no interest charge will be incurred with respect to such balance.

If a company is a PFIC for any taxable year during which a Non-electing U.S. shareholder holds shares, then the company will continue to be treated as a PFIC with respect to such shares, even if it is no longer by definition a PFIC. A Non-electing U.S. shareholder may terminate this deemed PFIC status by electing to recognize gain (which will be taxed under the rules discussed above for Non-Electing U.S. Holders) as if such shares had been sold on the last day of the last taxable year for which it was a PFIC. If the company no longer qualifies as a PFIC in a subsequent year, then normal Code rules and not the PFIC rules will apply with respect to a U.S. shareholder who has made a Pedigreed QEF election.

If a U.S. shareholder makes a QEF Election that is not a Pedigreed Election (i.e., it is made after the first year during which the company is a PFIC and the U.S. shareholder holds shares of the company) (a "Non-Pedigreed Election"), the QEF rules apply prospectively but do not apply to years prior to the year in which the QEF first becomes effective. U.S. Holders are encouraged to consult their tax advisors regarding the specific consequences of making or not making a QEF Election.

Under an alternative method, U.S. Holders who hold (actually or constructively) marketable stock of a PFIC may elect to mark such stock to the market annually (a "mark-to-market election"). If such an election is made, such U.S. Holder will generally not be subject to the special taxation rules of Section 1291 discussed above. However, if the mark-to-market election is made by a Non-Electing U.S. Holder after the beginning of the holding period for the PFIC stock, then the Section 1291 rules will apply to certain dispositions of, distributions on and other amounts taxable with respect to the Company shares. A U.S. Holder who makes the mark-to-market election will include in income for each taxable year for which the election is in effect an amount equal to the excess, if any, of the fair market value of the shares of the Company as of the close of such tax year over such U.S. Holder's adjusted basis in such common shares. In addition, the U.S. Holder is allowed a deduction for the lesser of (i) the excess, if any, of such U.S. Holder's adjusted tax basis in the shares over the fair market value of such shares as of the close of the tax year, or (ii) the excess, if any, of (a) the mark-to-market gains for the shares in the Company included by such U.S. Holder for prior tax years, including any amount which would have been treated as a mark-to-market gain for any prior tax year but for the Section 1291 rules discussed above with respect to Non-Electing U.S. Holders, over (b) the mark-to-market losses for shares that were allowed as deductions for prior tax years. A U.S. Holder's adjusted tax basis in the shares of the Company will be adjusted to reflect the amount included in or deducted from income as a result of a mark-to-market election. A mark-to-market election applies to the taxable year in which the election is made and to each subsequent taxable year, unless the Company's shares cease to be marketable, as specifically defined, or the IRS consents to revocation of the election. U.S. Holders should consult their tax advisors regarding the manner of making such an election.

**Controlled Foreign Corporation**
If more than 50% of the total combined voting power of all classes of stock entitled to vote or more than 50% of the total value of the stock of the Company is owned, directly, indirectly or constructively, by U.S. Holders, each of whom own actually or constructively 10% or more of the total combined voting power of all classes of stock or 10% or more of the total value of all classes of stock of the Company ("10% U.S. Holders"), the Company would be treated as a "controlled foreign corporation" or "CFC" under Subpart F of the Code. This classification would effect many complex results, one of which requires such 10% U.S. Holders to include in their current income their pro rata share of (i) Subpart F income of the CFC, (ii) the CFC's earnings from certain investments in U.S. property, (iii) global intangible low-taxed income ("GILTI), and (iv) base erosion minimum tax amounts for certain 10% U.S. Holders with sufficient gross receipts that make deductible payments to related foreign parties in tax years after December 31. 2018. The foreign tax credit described above may reduce the U.S. tax on these amounts. In addition, under Section 1248 of the Code, gain from the sale or exchange of shares by a U.S. Holder of common shares of the Company which is or was a 10% U.S. Holder at any time during the five-year period ending with the sale or exchange will be treated as dividend income to the extent of earnings and profits of the Company (accumulated only while the shares were held by the 10% U.S. Holder and while the Company was a CFC attributable to the shares sold or exchanged. Certain U.S. corporations that are 10% U.S. Holders may be entitled to a dividend received deduction for the foreign source portion of dividends received from the Company as discussed above.

If a foreign corporation is both a PFIC and a CFC, the foreign corporation generally will not be treated as a PFIC with respect to certain 10% U.S. Holders of the CFC. This rule generally will be effective for taxable years of 10% U.S. Holders beginning after 1997 and for taxable years of foreign company's ending with or within such taxable years of 10% U.S. Holders. The PFIC provisions continue to apply in the case of a PFIC that is also a CFC with respect to the U.S. Holders that are less than 10% shareholders. Because of the complexity of Subpart F, a more detailed review of these rules is beyond the scope of this discussion.

**Information Reporting and Backup Withholding**
In general, unless a U.S. Holder belongs to a category of certain exempt recipients (such as corporations), information reporting requirements will apply to distributions as well as proceeds of sales from the sale of shares of the Company that are effected through the U.S. office of a broker or the non-U.S. office of a broker that has certain connections with the United States. Backup withholding may apply to these payments if a U.S. Holder fails to provide a correct taxpayer identification number or certification of exempt status, fails to report in full dividend and interest income or, in certain circumstances, fails to comply with applicable certification requirements. Any amounts withheld under the backup withholding rules will be allowed as a refund or credit against a U.S. Holder's U.S. federal income tax, provided the U.S. Holder furnishes the required information to the IRS in a timely manner. Other filing requirements may also apply. U.S. Holders should consult with their own tax advisors concerning their particular reporting requirements.

U.S. Holder's should consult with their tax advisors to determine if holding common shares in the Company will create any other disclosure or reporting requirements for U.S. tax purposes.

***Documents on Display / Additional Information***
Any of the documents referred to above can be viewed at the head office of the Company located at 1333 Johnston Street, Suite 210, Vancouver, British Columbia, Canada, V6H 3R9.

This Annual Report and the Company's recent Form 6-K filings can be viewed on the EDGAR web-site at www.sec.gov./edgar/searchedgar/companysearch.html. Additional information relating to the Company may be found on Sedar at www.sedar.com. As well, additional information is contained in the Company's Information Circular for its most recent annual meeting of security holders that involved the election of directors held on June 29, 2021 and additional financial information is provided in the Company's financial statements and MD&A for its most recently completed financial year.

## Item 11. Quantitative and Qualitative Disclosures about Market Risk

***Exchange Rate Risk***

The Company's primary mineral exploration properties are located in Mexico. As a Canadian company, Almaden's cash balances are kept primarily in Canadian funds, while many exploration and property expenses are denominated in U.S. dollars or the Mexican peso. Therefore, the Company is exposed to some exchange rate risk. The Company considers the amount of risk to be manageable and does not currently, nor is likely in the foreseeable future to, conduct hedging to reduce its exchange rate risk. A 10% change in the U.S. dollar exchange rate relative to the Canadian dollar would change the Company's net loss by $310,000. A 10% change in the Mexican peso exchange rate relative to the Canadian dollar would change the Company's net loss by $24,000.

***Interest Rate Risk***

The Company has no derivative financial instruments or other debt bearing variable interest rate instruments. The Company is exposed to varying interest rates on its cash and cash equivalents. A 1% change in the interest rate would change the Company's net loss by $102,000.

## Item 12. Description of Securities Other than Equity Securities

Not Applicable

# PART II

## Item 13. Defaults, Dividend Arrearages and Delinquencies

Not Applicable

## Item 14. Material Modifications to the Rights of Securities Holders and Use of Proceeds

Not Applicable

## Item 15. Controls and Procedures

***Disclosure Controls and Procedures***

The Company conducted an evaluation of the effectiveness of the design and operation of its disclosure controls and procedures (as defined in Rules 13a-15(e) under the Exchange Act) as of December 31, 2021. This evaluation was conducted under the supervision and with the participation of management, including the Company's Chief Executive Officer and Chief Financial Officer. Based upon this evaluation, the Company's Chief Executive Officer and Chief Financial Officer have concluded that, as of December 31, 2021, the Company's disclosure controls and procedures were effective to provide reasonable assurance that information required to be disclosed by the Company in reports filed or submitted under the Exchange Act is recorded, processed, summarized and reported within the time periods specified by the rules and forms. The Company also concluded that its disclosure controls and procedures are effective to provide reasonable assurance that information required to be disclosed in the reports filed or submitted under the Exchange Act is accumulated and communicated to its management, including the Company's Chief Executive Officer and Chief Financial Officer, to allow timely decisions regarding required disclosure.

***Management's Annual Report on Internal Control Over Financial Reporting***

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is a process designed by, or under the supervision of, the Company's principal executive and principal financial officers and effected by the Company's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with IFRS as issued by IASB.

Because of the inherent limitations of internal control over financial reporting, including the possibility of collusion or improper management override of controls, material misstatements due to error or fraud may not be prevented or detected on a timely basis. Also, projections of any evaluation of the effectiveness of the internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The Company's management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2021. In making this assessment, the Company's management used criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in *Internal Control-Integrated Framework (2013)* published by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on its assessment, management concluded that, as of December 31, 2021, the Company's internal control over financial reporting was effective.

There were no changes in the Company's internal control over financial reporting that occurred during the year ended December 31, 2021 that has materially affected, or that is reasonably likely to materially affect, the Company's internal control over financial reporting.

**Attestation Report of the Registered Accounting Firm.**

This Annual Report on Form 20-F does not include an attestation report of the Company's registered public accounting firm regarding internal control over financial reporting. Management's report was not subject to attestation by the Company's registered public accounting firm pursuant to the rules of the Commission that permit the Company to provide only management's report in this Annual Report on Form 20-F.

## Item 16. [Reserved]

## Item 16A. Audit Committee Financial Expert

The Company's Board of Directors has determined that Ms. Elaine Ellingham is the Company's audit committee financial expert. Ms. Ellingham has extensive business and financial experience. She has served as a director of several other publicly traded companies over the past 15 years, and currently serves as a director of two other publicly traded mining companies. Ms. Ellingham is independent as defined by Section 803(A) of the NYSE American Listing Standards.

## Item 16B. Code of Ethics

The Company adopted several codes of conduct, including a Code of Business Ethics, a Code of Business Conduct Ethics for Directors, a Communications Policy and an Audit Committee Charter. These initial codes were filed with the Annual Report on Form 20-F for the fiscal year ended December 31, 2003 as filed with the Commission on May 11, 2004. After review, the Company has adopted revised and new codes as follow: Audit Committee Charter, Nominating and Corporate Governance Committee-Responsibilities and Duties, Compensation Committee-Responsibilities and Duties, Code of Business Ethics, Code of Business Conduct and Ethics for Directors, Communications Policy, Securities Trading Policy, Whistleblowers Policy and a Privacy Policy (the "Codes"). The Codes may be viewed on the Company's website at www.almadenminerals.com. The Codes may also be viewed as filed on EDGAR as an exhibit to the 2005 Annual Report on Form 20-F filed with the Commission on March 30, 2006. Any amendments to the Codes or waivers of the provision of any Codes will be posted on the Company's website within 5 business days of such amendment or waiver.

The Company has adopted a Code of Business Conduct and Ethics for Directors ("Code"), a Code of Business Ethics ("COBE"), a Securities Trading Policy and a Privacy Policy. Employees and consultants are required as a term of employment or engagement to undertake to abide by the COBE. Directors are bound to observe the Code adopted by the Board.

All Directors, Officers and Employees ("Individuals") sign a Certification ("Certification") stating they have read the Code of Business Ethics policy ("Policy") of the Company and have complied with such Policy in all respects. The Certification further acknowledges that all members of the Individual's family, all other persons who live with the Individual and all holding companies and other related entities of the Individual and all such persons or companies acting on behalf of or at the request of any of the foregoing also complied with such Policy. The Certification also states that any violation of such Policy may constitute grounds for immediate suspension or dismissal.

Each director is expected and required by statute to act honestly and in good faith with a view to the best interests of the Company and to exercise the care, diligence and skill that a reasonably prudent individual would exercise in comparable circumstances and in accordance with the *Business Corporations Act* (British Columbia) and the

Company’s Articles.

## Item 16C. Principal Accountant Fees and Services

**Audit Committee's pre-approval policies and procedures**
The Audit Committee nominates and engages the independent auditors to audit the financial statements, and approves all audit services, audit-related services, tax services and other services provided by Davidson & Company LLP. Any services provided by Davidson & Company LLP that are not specifically included within the scope of the audit must be preapproved by the Audit Committee prior to any engagement. The Audit Committee is permitted to approve certain fees for audit-related services, tax services and other services before the completion of the engagement.

As of the hereof, the aforementioned Named Expert or, as applicable, Designated Professionals, to the best of the Company's knowledge, after reasonable inquiry, beneficially owns, directly or indirectly, less than 1% of the Common Shares of the Company or any of the Company’s associates or affiliates, and none of them have any registered or beneficial ownership, direct or indirect, of property of the Company or any of the Company’s associates or affiliates.

Table No. 19 lists the aggregate fees billed for each of the last two fiscal years for professional services rendered by the principal accountant for the audit of the Company’s annual financial statements or services that are normally provided by the accountant in connection with statutory and regulatory filings or engagements for those fiscal years.

**Table No. 19**
**Principal Accountant Fees**

| | December 31, 2021 | December 31, 2020 |
|---|---|---|
| Audit fees | $42,000 | $42,000 |
| Audit-related fees | 14,137 | 15,088 |
| Tax fees | - | - |
| All other fees | - | - |

Fiscal 2021 and Fiscal 2020 audit fees relate to the annual audit of the Company’s consolidated financial statements, effectiveness of the Company’s internal control over financial reporting and review of the Form 20-F. Audit-related fees relate to accounting advisory services. Tax fees relate to the completion of income tax returns and tax consulting services. Other fees relate to services other than audit fees, audit-related fees, and tax fees described above.

## Item 16D. Exemptions from the Listing Standards for Audit Committees
Not applicable.

## Item 16E. Purchases of Equity Securities by the Issuer and Affiliated Purchasers
Not applicable.

## Item 16F. Change in Registrant’s Certifying Accountant
Not applicable.

## Item 16G. Corporate Governance
The Company’s class of common shares is listed on the NYSE American and the Toronto Stock Exchange. Under the rules of the NYSE American, listed companies are generally required to have a majority of their Board of Directors be “independent” as defined by the NYSE American Company Guide Rules. Currently, as permitted under applicable Canadian regulations, the Company’s Board consists of 6 directors, of which 4 are considered to be “independent.” In the opinion of management, the Company’s corporate governance practices do not differ in any significant way from those required of U.S. domestic companies listed on the NYSE American.

**Item 16H. Mine Safety Disclosure**
Not applicable.

**Item 16I. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections**
Not applicable.

Our external auditor is Davidson & Company LLP, Vancouver, British Columbia, Canada (PCAOB Number 731).

## PART III

**Item 17. Financial Statements**

The Company has provided financial statements pursuant to Item 18 of this Form 20-F.

**Item 18. Financial Statements**

The Company's consolidated financial statements and notes thereto are expressed in Canadian Dollars (CDN$) and are prepared in accordance and compliance with IFRS as issued by the International Accounting Standards Board ("IASB").

**Item 19. Exhibits**

A. The financial statements and notes thereto as required under Item 18 are attached hereto and found immediately following the text of this Annual Report.

Audited Financial Statements
Independent registered Public Accounting Firm reports on the consolidated financial statements, dated March 25, 2022
Consolidated statements of financial position at December 31, 2021 and 2020
Consolidated statements of comprehensive loss for the years ended December 31, 2021, 2020 and 2019
Consolidated statements of changes in equity for the years ended December 31, 2021, 2020 and 2019
Consolidated statements of cash flows for the years ended December 31, 2021, 2020 and 2019
Summary of significant accounting policies and other explanatory information

B. Index to Exhibits

1. Certificate of Amalgamation
Amalgamation Agreement
- Incorporated by reference to the Company's Form Annual Report on Form 20-F for the year ended December 31, 2001, as filed with the Commission on May 17, 2002.

1.1 Articles
- Incorporated by reference to the Company's Form Annual Report on Form 20-F for the year ended December 31, 2005, as filed with the Commission on March 30, 2006.

2. Instruments defining the rights of holders of equity or debt securities being registered
- Refer to Exhibit No. 1.

3. Voting trust agreements. The Voting Trust Agreement dated December 17, 2009 between Ernesto Echavarria, as grantor, and Messrs Duane and Morgan Poliquin, as voting trustees.
- Incorporated by reference to the Company's Form 20-F for the year ended December 31, 2013 and filed with the Commission on March 31, 2014.

4. Executive Compensation Contract dated January 29, 2013 with Hawk Mountain Resources Ltd.
- Incorporated by reference to the Company's Form 20-F for the year ended December 31, 2012 and filed with the Commission on March 28, 2013.

4.1 Executive Compensation Contract dated January 29, 2013 with Morgan Poliquin
- Incorporated by reference to the Company's Form 20-F for the year ended December 31, 2012 and filed with the Commission on March 28, 2013.

| | | |
|---|---|
| 4.2 | Assignment of Rights Agreement dated March 11, 2013 with Don David Gold Mexico, S.A. de C.V. - Incorporated by reference to the Company's Form 20-F for the year ended December 31, 2013 and filed with the Commission on March 31, 2014. |
| 4.3 | Sale and Purchase Agreement dated June 20, 2013 with Tarsis Resources Ltd. - Incorporated by reference to the Form 6-K and filed with the Commission on June 20, 2013. |
| 4.4 | Amendment Agreement dated November 26, 2013 with Candymin, S.A. de C.V. and Mr. Charlie Warren - Incorporated by reference to the Company's Form 20-F for the year ended December 31, 2013 and filed with the Commission on March 31, 2014. |
| 4.5 | Arrangement Agreement dated May 11, 2015 in connection with the Company's statutory Plan of Arrangement with Almadex and filed with the Commission on March 31, 2016. |
| 4.6 | Administrative Services Agreement between the Company and Almadex Minerals Limited dated May 15, 2015 and filed with the Commission on March 31, 2016. |
| 4.7 | First Amending Agreement to the May 15, 2015 Administrative Services Agreement between the Company and Almadex Minerals Limited dated December 16, 2015 and filed with the Commission on March 31, 2016. |
| 4.8 | Termination Agreement effective December 31, 2015 between the Company and Hawk Mountain Resources Ltd. and filed with the Commission on March 31, 2016. |
| 4.9 | Executive Employment Contract between the Company and Duane Poliquin dated effective January 1, 2016 and filed with the Commission on March 31, 2016. |
| 4.10 | Deloitte Letter to the Securities and Exchange Commission dated March 29, 2016 and filed with the Commission on March 31, 2016. |
| 4.11 | Amending Agreement dated April 1, 2016 to the Executive Compensation Contract with Morgan Poliquin dated January 29, 2013 and filed with the Commission on March 30, 2017. |
| 4.12 | Amending Agreement dated April 1, 2016 to the Executive Employment Contract with Duane Poliquin dated January 1, 2016 and filed with the Commission on March 30, 2017. |
| 4.13 | Amending agreement to the Executive Compensation Contract with Morgan Poliquin dated January 1, 2019 and filed with the Commission on March 15, 2019. |
| 4.14 | Amending agreement to the Executive Compensation Contract with Duane Poliquin dated January 1, 2019 and filed with the Commission on March 15, 2019. |
| 4.15 | Administrative Services Agreement between the Company and Almadex Minerals Ltd. (formerly 1154229 B.C. Ltd.) dated March 29, 2018 and filed with the Commission on March 15, 2019. |
| 4.16 | Gold Loan Agreement between the Company and Almadex Minerals Ltd. dated effective May 14th, 2019 and filed with the commission on March 27, 2020. |
| 4.17 | Short Form Base Shelf Prospectus and filed with the commission on February 25, 2021 |
| 4.18 | Form of Placement Agency Agreement dated March 16, 2021 - Incorporated by reference to the Form 6-K and filed with the Commission on March 16, 2021 |
| 4.19 | Form of Securities Purchase Agreement - Incorporated by reference to the Form 6-K and filed with the Commission on March 16, 2021 |
| 5. | List of foreign patents – N/A |
| 6. | Calculation of earnings per share – N/A |
| 7. | Explanation of calculation of ratios – N/A |
| 8. | List of subsidiaries |
| 9. | Statement pursuant to the instruction to Item 8.A.4, regarding the financial statement filed in registration Statements for initial public offerings of securities – N/A |
| 10. | Any notice required by Rule 104 of Regulation BTR – N/A |
| 11 | Audit Committee Charter |
| 11.1 | Nominating and Corporate Governance Committee-Duties and Responsibility |
| 11.2 | Compensation Committee-Responsibilities and Duties |
| 11.3 | Code of Business Ethics |
| 11.4 | Code of Business Conduct and Ethics for Directors |
| 11.5 | Communications Policy |

11.6 Securities Trading Policy
11.7 Whistleblower Policy
11.8 Privacy Policy
- Incorporated by reference to the Company's Form Annual Report on Form 20-F for the year ended December 31, 2005, as filed with the Commission on March 30, 2006.
11.9 Shareholder Rights Plan dated April 13, 2011, as amended and reconfirmed at the 2017 Annual General Meeting and as reconfirmed at the 2020 Annual General Meeting.
- Incorporated by reference to the Form 6-K filed with the Commission on April 15, 2011.
11.10 Amended Advance Notice Policy dated January 28, 2013, as amended May 1, 2015 as filed with the Commission on March 29, 2018.
11.11 Amended Majority Voting Policy – adopted by the Board of Directors on May 7, 2013, as amended effective May 15, 2017 as filed with the Commission on March 29, 2018.

12.1 Certification of CEO Pursuant to Securities Exchange Act, Rules 13a-14 and 15d-14 as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
12.2 Certification of CFO Pursuant to Securities Exchange Act, Rules 13a-14 and 15d-14 as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

13.1 Certification of CEO Pursuant to the Sarbanes-Oxley Act, 18 U.S.C. Section 1350, As Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
13.2 Certification of CFO Pursuant to the Sarbanes-Oxley Act, 18 U.S.C. Section 1350, As Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

14.1 Consent of Jesse Aarsen
14.2 S-K 1300 Technical Report Summary of the Ixtaca Gold-Silver Project
101.INS Inline XBRL Instance Document
101.SCH Inline XBRL Taxonomy Extension Schema Documents
101.CAL Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE Inline XBRL Taxonomy Extension Presentation Linkbase Document
104 Cover Page Interactive Data File (embedded within Inline XBRL document)

Consolidated Financial Statements of

# Almaden Minerals Ltd.

For the years ended December 31, 2021, 2020 and 2019

# Almaden Minerals Ltd.
December 31, 2021, 2020 and 2019

## Table of contents

# REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and Directors of
Almaden Minerals Ltd.

***Opinion on the Consolidated Financial Statements***

We have audited the accompanying consolidated statements of financial position of Almaden Minerals Ltd. (the "Company"), as of December 31, 2021 and 2020, and the related consolidated statements comprehensive loss, changes in equity, and cash flows for the years ended December 31, 2021, 2020 and 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for the years ended December 31, 2021, 2020 and 2019 in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board.

***Basis for Opinion***

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatements of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

We have served as the Company's auditor since 2015.

**/s/ DAVIDSON & COMPANY LLP**

Vancouver, Canada — Chartered Professional Accountants

March 25, 2022

# Almaden Minerals Ltd.

## Consolidated statements of financial position

(Expressed in Canadian dollars)

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| | **$** | $ |
| **ASSETS** | | |
| **Current assets** | | |
| Cash and cash equivalents (Note 13) | **10,170,376** | 2,534,698 |
| Gold in trust (Note 8) | **915,995** | 955,781 |
| Accounts receivable and prepaid expenses (Note 4) | **155,638** | 175,008 |
| | **11,242,009** | 3,665,487 |
| **Non-current assets** | | |
| Right-of-use assets (Note 5) | **539,110** | 151,790 |
| Property, plant and equipment (Note 6) | **14,019,532** | 14,025,665 |
| Exploration and evaluation assets (Note 7) | **61,431,639** | 58,605,829 |
| | **75,990,281** | 72,783,284 |
| **TOTAL ASSETS** | **87,232,290** | 76,448,771 |
| **LIABILITIES** | | |
| **Current liabilities** | | |
| Trade and other payables (Note 11 (a)(c)) | **508,068** | 447,551 |
| Current portion of lease liabilities (Note 5) | **82,677** | 134,950 |
| | **590,745** | 582,501 |
| **Non-current liabilities** | | |
| Long-term portion of lease liabilities (Note 5) | **465,930** | 35,781 |
| Gold loan payable (Note 8) | **3,227,545** | 2,842,756 |
| Warrant liability (Note 9) | **623,290** | - |
| Derivative financial liabilities (Note 8) | **391,620** | 375,417 |
| Deferred income tax liability (Note 14) | **1,749,023** | 1,434,882 |
| | **6,457,408** | 4,688,836 |
| **Total liabilities** | **7,048,153** | 5,271,337 |
| **EQUITY** | | |
| Share capital (Note 10) | **141,040,654** | 131,189,978 |
| Reserves (Note 10) | **21,068,273** | 19,243,992 |
| Deficit | **(81,924,790)** | (79,256,536) |
| **Total equity** | **80,184,137** | 71,177,434 |
| **TOTAL EQUITY AND LIABILITIES** | **87,232,290** | 76,448,771 |

Subsequent events (Note 18)

The accompanying notes are an integral part of these consolidated financial statements.

These consolidated financial statements are authorized for issue by the Board of Directors on March 25, 2022.
They are signed on the Company's behalf by:

/s/Duane Poliquin
Director

/s/ Elaine Ellingham
Director

**Almaden Minerals Ltd.**

Consolidated statements of comprehensive loss

(Expressed in Canadian dollars)

| | | Year ended December 31, | |
|---|---|---|---|
| | **2021** | 2020 | 2019 |
| **Expenses** | **$** | $ | $ |
| Professional fees (Note 11(a)) | **772,887** | 564,145 | 928,119 |
| Salaries and benefits (Note 11(a)) | **1,876,911** | 1,337,010 | 1,378,501 |
| Travel and promotion | **200,995** | 82,013 | 262,094 |
| Depreciation (Note 6) | **16,638** | 19,564 | 24,199 |
| Office and license (Note 11(b)) | **218,879** | 140,137 | 93,252 |
| Amortization of right-of-use assets (Note 5) | **121,479** | 121,432 | 121,432 |
| Occupancy expenses (Note 5) | **40,542** | 45,248 | 39,561 |
| Interest expense on lease liabilities (Note 5) | **13,330** | 21,480 | 32,305 |
| Arrangement fee on gold loan payable (Note 8) | **-** | - | 50,000 |
| Interest, accretion and standby fees on gold loan payable (Note 8) | **394,371** | 371,250 | 216,918 |
| Listing and filing fees | **187,169** | 199,327 | 225,432 |
| Insurance | **89,476** | 75,568 | 66,096 |
| Directors' fees (Note 11(a)) | **102,500** | 70,000 | 70,000 |
| Share-based payments (Note 10(d) and 11(a)) | **1,870,800** | 1,784,500 | 933,120 |
| | **5,905,977** | 4,831,674 | 4,441,029 |
| **Other income (loss)** | | | |
| Administrative services fees (Note 11(b)) | **1,382,344** | 1,404,099 | 959,413 |
| Interest income | **490,245** | 40,196 | 41,650 |
| Finance fees | **-** | (54,577) | (204,231) |
| Impairment of exploration and evaluation assets (Note 7) | **-** | - | (501,620) |
| Unrealized gain (loss) on derivative financial liabilities (Note 8) | **(18,156)** | 44,049 | (66,631) |
| Unrealized gain (loss) on gold in trust (Note 8) | **(35,775)** | 199,379 | 236,217 |
| Unrealized foreign exchange gain on gold loan payable (Note 8) | **11,535** | 81,331 | 102,104 |
| Unrealized foreign exchange loss on gold in trust (Note 8) | **(4,011)** | (21,017) | (73,937) |
| Unrealized gain on warrant liability (Note 9) | **1,747,884** | - | - |
| Realized gain on sale of gold in trust (Note 8) | **-** | 19,413 | 200,932 |
| Foreign exchange loss | **(22,202)** | (10,567) | (15,943) |
| | **3,551,864** | 1,702,306 | 677,954 |
| Loss before income taxes | **(2,354,113)** | (3,129,368) | (3,763,075) |
| Deferred income tax expense (Note 14) | **(314,141)** | - | - |
| **Net loss for the year** | **(2,668,254)** | (3,129,368) | (3,763,075) |
| **Total comprehensive loss for the year** | **(2,668,254)** | (3,129,368) | (3,763,075) |
| **Basic and diluted net loss per share (Note 12)** | **(0.02)** | (0.03) | (0.03) |

The accompanying notes are an integral part of these consolidated financial statements.

# Almaden Minerals Ltd.

Consolidated statements of cash flows

(Expressed in Canadian dollars)

| | Year ended December 31, | | |
|---|---|---|---|
| | **2021** | 2020 | 2019 |
| | **$** | $ | $ |
| **Operating activities** | | | |
| Net loss for the year | **(2,668,254)** | (3,129,368) | (3,763,075) |
| Items not affecting cash | | | |
| Deferred income tax expense | **314,141** | - | - |
| Depreciation | **16,638** | 19,564 | 24,199 |
| Impairment of exploration and evaluation assets | **-** | - | 501,620 |
| Amortization of right-of-use assets | **121,479** | 121,432 | 121,432 |
| Arrangement fee on gold loan payable | **-** | - | 50,000 |
| Interest, accretion and standby fees on gold loan payable | **394,371** | 371,250 | 216,918 |
| Unrealized (gain) loss on derivative financial liabilities | **18,156** | (44,049) | 66,631 |
| Unrealized (gain) loss on gold in trust | **35,775** | (199,379) | (236,217) |
| Realized gain on sale of gold in trust | **-** | (19,413) | (200,932) |
| Unrealized foreign exchange gain on gold loan payable | **(11,535)** | (81,331) | (102,104) |
| Unrealized gain on warrant liability | **(1,747,884)** | - | - |
| Unrealized foreign exchange loss on gold in trust | **4,011** | 21,017 | 73,937 |
| Share-based payments | **1,870,800** | 1,784,500 | 933,120 |
| Changes in non-cash working capital components | | | |
| Accounts receivable and prepaid expenses | **19,370** | (14,291) | 243,699 |
| Trade and other payables | **19,352** | (83,294) | 178,447 |
| Net cash used in operating activities | **(1,613,580)** | (1,253,362) | (1,892,325) |
| **Investing activities** | | | |
| Property, plant and equipment – purchase | **(10,505)** | (6,783) | (427,597) |
| Exploration and evaluation assets – costs | **(2,784,645)** | (1,750,935) | (3,324,173) |
| Net cash used in investing activities | **(2,795,150)** | (1,757,718) | (3,751,770) |
| **Financing activities** | | | |
| Issuance of shares, net of share issue costs | **11,610,581** | 3,850,209 | - |
| Options exercised | **564,750** | 158,090 | - |
| Share issue costs on cashless exercise of options (Note 9(d)) | **-** | (40,157) | - |
| Share issue costs (Note 9(b)) | **-** | (40,990) | - |
| Warrants exercised | **-** | 10,000 | - |
| Net proceeds on gold in trust | **-** | 818,360 | 1,577,704 |
| Repayment of lease liabilities | **(130,923)** | (121,948) | (101,975) |
| Net cash from financing activities | **12,044,408** | 4,633,564 | 1,475,729 |
| | | | |
| Change in cash and cash equivalents | **7,635,678** | 1,622,484 | (4,168,366) |
| Cash and cash equivalents, beginning of year | **2,534,698** | 912,214 | 5,080,580 |
| Cash and cash equivalents, end of year | **10,170,376** | 2,534,698 | 912,214 |

Supplemental cash flow information (Note 13)

The accompanying notes are an integral part of these consolidated financial statements.

**Almaden Minerals Ltd.**

Consolidated statements of changes in equity

(Expressed in Canadian dollars)

| | Share capital | | Reserves | | | | |
|---|---|---|---|---|---|---|---|
| | Number of shares | Amount | Share-based payments | Warrants | Total reserves | **Deficit** | **Total** |
| | | $ | $ | $ | $ | $ | $ |
| **Balance, January 1, 2019** | **111,726,719** | **127,022,366** | **15,990,864** | **715,968** | **16,706,832** | **(72,364,093)** | **71,365,105** |
| Share-based payments | - | - | 933,120 | - | 933,120 | - | 933,120 |
| Fair value of warrants issued for arrangement fee on gold loan payable | - | - | 50,000 | - | 50,000 | - | 50,000 |
| Total comprehensive loss for the year | - | - | - | - | - | (3,763,075) | (3,763,075) |
| **Balance, December 31, 2019** | **111,726,719** | **127,022,366** | **16,973,984** | **715,968** | **17,689,952** | **(76,127,168)** | **68,585,150** |
| Share-based payments | - | - | 1,784,500 | - | 1,784,500 | - | 1,784,500 |
| Private placements, net of share issue costs | 8,609,658 | 3,850,209 | - | - | - | - | 3,850,209 |
| Shares issued for cash on exercise of stock options | 188,000 | 158,090 | - | - | - | - | 158,090 |
| Fair value of cash stock options transferred to share capital | - | 51,980 | (51,980) | - | (51,980) | - | - |
| Shares issued on cashless exercise of stock options | 105,877 | - | - | - | - | - | - |
| Share issue costs on cashless exercise of options | - | (40,157) | - | - | - | - | (40,157) |
| Share issue costs | - | (40,990) | - | - | - | - | (40,990) |
| Fair value of cashless stock options transferred to share capital | - | 178,480 | (178,480) | - | (178,480) | - | - |
| Warrants exercised | 20,000 | 10,000 | - | - | - | - | 10,000 |
| Total comprehensive loss for the year | - | - | - | - | - | (3,129,368) | (3,129,368) |
| **Balance, December 31, 2020** | **120,650,254** | **131,189,978** | **18,528,024** | **715,968** | **19,243,992** | **(79,256,536)** | **71,177,434** |
| Share-based payments | - | - | 1,870,800 | - | 1,870,800 | - | 1,870,800 |
| Private placements, net of share issue costs | 15,846,154 | 11,610,581 | - | - | - | - | 11,610,581 |
| Warrant liability | - | (2,371,174) | - | - | - | - | (2,371,174) |
| Finders' warrants issued pursuant to private placement | - | (130,731) | 130,731 | - | 130,731 | - | - |
| Shares issued for cash on exercise of stock options | 725,000 | 564,750 | - | - | - | - | 564,750 |
| Fair value of cash stock options transferred to share capital | - | 177,250 | (177,250) | - | (177,250) | - | - |
| Total comprehensive loss for the year | - | - | - | - | - | (2,668,254) | (2,668,254) |
| **Balance, December 31, 2021** | **137,221,408** | **141,040,654** | **20,352,305** | **715,968** | **21,068,273** | **(81,924,790)** | **80,184,137** |

The accompanying notes are an integral part of these consolidated financial statements.

## 1. Nature of operations

Almaden Minerals Ltd. (the "Company" or "Almaden") was formed by amalgamation under the laws of the Province of British Columbia, Canada on February 1, 2002. The Company is an exploration stage public company that is engaged directly in the exploration and development of exploration and evaluation properties in Canada and Mexico. The address of the Company's registered office is Suite 1710 –1177 West Hastings Street, Vancouver, BC, Canada V6E 2L3.

The Company is in the business of exploring and developing mineral projects and its principal asset is the Ixtaca precious metals project located on its Tuligtic claim in Mexico. The Company has not yet determined whether this project has economically recoverable mineral reserves. The recoverability of amounts shown for mineral properties is dependent upon the establishment of a sufficient quantity of economically recoverable reserves, the ability of the Company to obtain the necessary financing or participation of joint venture partners to complete development of the properties, and upon future profitable production or proceeds from the disposition of exploration and evaluation assets.

## 2. Basis of presentation

*(a) Statement of Compliance with International Financial Reporting Standards ("IFRS")*

These consolidated financial statements have been prepared in accordance and compliance with IFRS as issued by the International Accounting Standards Board ("IASB") and interpretations of the International Financial Reporting Interpretations Committee ("IFRIC").

*(b) Basis of preparation*

These consolidated financial statements have been prepared on a historical cost basis except for the revaluation of certain financial assets and financial liabilities at fair value through profit or loss. In addition, these financial statements have been prepared using the accrual basis of accounting, except for cash flow information.

These consolidated financial statements, including comparatives, have been prepared on the basis of IFRS standards that are effective as at December 31, 2021.

Certain amounts in prior years have been reclassified to conform to the current period presentation.

*(c) Functional currency*

The functional and reporting currency of the Company and its subsidiaries is the Canadian dollar.

## 2. Basis of presentation *(Continued)*

### *(d) Significant accounting judgments and estimates*

The preparation of these consolidated financial statements requires management to make judgements and estimates that affect the reported amounts of assets and liabilities at the date of the consolidated financial statements and reported amounts of expenses during the reporting period. Actual outcomes could differ from these judgements and estimates. The consolidated financial statements include judgements and estimates which, by their nature, are uncertain. The impacts of such judgements and estimates are pervasive throughout the consolidated financial statements, and may require accounting adjustments based on future occurrences. Revisions to accounting estimates are recognized in the period in which the estimate is revised and the revision affects both current and future periods.

Significant assumptions about the future and other sources of judgements and estimates that management has made at the statement of financial position dates, that could result in a material adjustment to the carrying amounts of assets and liabilities, in the event that actual results differ from assumptions made, relate to, but are not limited to, the following:

Critical Judgments

- The analysis of the functional currency for each entity of the Company determined by conducting an analysis of the consideration factors identified in IAS 21, "The Effect of Changes in Foreign Exchange Rates". In concluding that the Canadian dollar is the functional currency of the parent and its subsidiary companies, management considered the currency that mainly influences the cost of providing goods and services in each jurisdiction in which the Company operates. As no single currency was clearly dominant, the Company also considered secondary indicators including the currency in which funds from financing activities are denominated and the currency in which funds are retained.

Estimates

- A global pandemic related to COVID-19 was declared in March 2020. The current and expected impacts on global commerce have been, and are anticipated to be, far-reaching. To date, there has been significant volatility in commodity prices and foreign exchange rates, restrictions on the conduct of business in many jurisdictions, including travel restrictions, and supply chain disruptions. There is significant ongoing uncertainty surrounding COVID-19 and the extent and duration of the impact that it may have;
- The estimated useful lives of property, plant and equipment which are included in the consolidated statements of financial position and the related depreciation included in profit or loss;
- The recoverability of the value of the exploration and evaluation assets which is recorded in the consolidated statements of financial position (Note 3(f));

## 2. Basis of presentation *(Continued)*

*(d) Significant accounting judgments and estimates (Continued)*

Estimates *(Continued)*

- The Company uses the Black-Scholes option pricing model to determine the fair value of options, warrants, and derivative financial liabilities in order to calculate share-based payments expense, warrant liability and the fair value of finders' warrants and stock options. Certain inputs into the model are estimates that involve considerable judgment or could be affected by significant factors that are out of the Company's control;
- The provision for income taxes which is included in profit or loss and the composition of deferred income tax liability included in the consolidated statement of financial position and the evaluation of the recoverability of deferred tax assets based on an assessment of the Company's ability to utilize the underlying future tax deductions against future taxable income prior to expiry of those deductions;
- The assessment of indications of impairment of each exploration and evaluation asset and property plant and equipment and related determination of the net realizable value and write-down of those assets where applicable (Note 3(f));
- The estimated incremental borrowing rate used to calculate the lease liabilities;
- The estimated fair value of gold in trust; and
- The estimated initial fair value of gold loan payable.

## 3. Significant accounting policies

*(a) Basis of consolidation*

These consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries as follows:

| | Jurisdiction | Nature of operations |
|---|---|---|
| Puebla Holdings Inc. | Canada | Holding company |
| Minera Gorrion, S.A. de C.V. | Mexico | Exploration company |
| Molinos de Puebla, S.A. de C.V. | Mexico | Holding company |

Inter-company balances and transactions, including unrealized income and expenses arising from inter-company transactions, are eliminated in preparing these consolidated financial statements.

*(b) Foreign currencies*

Transactions in currencies other than the functional currency are recorded at the rates of exchange prevailing on the transaction dates. At each financial position reporting date, monetary assets and liabilities that are denominated in foreign currencies are translated at the rates prevailing at the date of the statement of financial position. Non-monetary items that are measured in terms of historical cost in a foreign currency are not retranslated.

## 3. Significant accounting policies *(Continued)*

*(c) Financial instruments*

A financial asset is classified as measured at: amortized cost, fair value through other comprehensive income (FVOCI), or fair value through profit or loss (FVTPL). The classification of financial assets is generally based on the business model in which a financial asset is managed and its contractual cash flow characteristics. Derivatives embedded in contracts where the host is a financial asset in the scope of the standard are never separated. Instead, the hybrid financial instrument as a whole is assessed for classification. The Company's financial assets consist primarily of cash and cash equivalents, and accounts receivable and are classified at amortized cost.

Financial liabilities comprise the Company’s trade and other payables. Financial liabilities are initially recognized on the date they are originated and are derecognized when the contractual obligations are discharged or cancelled or expire. Trade and other payables and lease obligations are recognized initially at fair value and subsequent are measured at amortized costs using the effective interest method, when materially different from the initial amount. Derivative financial liabilities are classified as FVTPL. Fair value is determined based on the present value of future cash flow, discounted at the market rate of interest.

*(i) Impairment of financial assets*

An ‘expected credit loss’ (ECL) model applies to financial assets measured at amortized cost, contract assets and debt investments at FVOCI, but not to investments in equity instruments. The Company's financial assets measured at amortized cost and subject to the ECL model include cash and cash equivalents, and accounts receivable.

*(ii) Embedded derivatives*

Derivatives may be embedded in other financial instruments (the “host instrument”). Embedded derivatives are treated as separate derivatives when their economic characteristics and risks are not clearly and closely related to those of the host instrument, the terms of the embedded derivative are the same as those of a stand-alone derivative, and the combined contract is not held for trading or designated at fair value. These embedded derivatives are measured at fair value with subsequent changes recognized in profit or loss.

The Company issues warrants exercisable in a currency other than the Company’s functional currency and as a result, the warrants are derivative financial instruments.

Derivative financial instruments are initially recognized at fair value and subsequently measured at fair value with changes in fair value recognized in profit or loss. Transaction costs are recognized in profit or loss as incurred.

*(d) Cash and cash equivalents*

Cash equivalents include term deposits and money market instruments which are readily convertible into cash or have maturities at the date of purchase of less than ninety days.

## 3. Significant accounting policies *(Continued)*

*(e) Property, plant and equipment*

Property, plant and equipment are stated at cost less accumulated depreciation and impairment losses, and are depreciated annually on a declining-balance basis if available-for-use at the following rates:

| | |
|---|---|
| Furniture, fixtures and other | 20% |
| Computer hardware and software | 30% |
| Geological library | 20% |
| Field equipment | 20% |
| Mill equipment | Straight line over mine life (11 years) |

*(f) Exploration and evaluation assets*

The Company is in the exploration stage with respect to its investment in exploration and evaluation assets and, accordingly, follows the practice of capitalizing all costs relating to the acquisition of, exploration for and development of mineral claims to which the Company has rights and crediting all proceeds received from farm-out arrangements or recovery of costs against the cost of the related claims. Acquisition costs include, but are not exclusive to land surface rights acquired. Deferred exploration costs include, but are not exclusive to geological, geophysical studies, annual mining taxes, exploratory drilling and sampling. At such time as commercial production commences, these costs will be charged to profit or loss on a unit-of-production method based on proven and probable reserves. The aggregate costs related to abandoned mineral claims are charged to profit or loss at the time of any abandonment or when it has been determined that there is evidence of an impairment.

The Company considers the following facts and circumstances in determining if it should test exploration and evaluation assets for impairment:

(i) the period for which the Company has the right to explore in the specific area has expired during the period or will expire in the near future, and is not expected to be renewed;

(ii) substantive expenditure on further exploration for and evaluation of mineral resources in the specific area is neither budgeted nor planned;

(iii) exploration for and evaluation of mineral resources in the specific area have not led to the discovery of commercially viable quantities of mineral resources and the entity has decided to discontinue such activities in the specific area; and

(iv) sufficient data exists to indicate that, although a development in the specific area is likely to proceed, the carrying amount of the exploration and evaluation assets is unlikely to be recovered in full from successful development or by sale.

An impairment charge may be reversed but only to the extent that this does not exceed the original carrying value of the property that would have resulted if no impairment had been recognized. General exploration costs in areas of interest in which the Company has not secured rights are expensed as incurred.

## 3. Significant accounting policies *(Continued)*

*(f) Exploration and evaluation assets (Continued)*

The recoverability of amounts shown for exploration and evaluation assets is dependent upon the discovery of economically recoverable reserves, the ability of the Company to obtain financing to complete development of the properties, and on future production or proceeds of disposition.

The Company recognizes in profit or loss costs recovered on exploration and evaluation assets when amounts received or receivable are in excess of the carrying amount.

Once the technical feasibility and commercial viability of the extraction of mineral resources in an area of interest are demonstrable, exploration and evaluation assets attributable to that area of interest are first tested for impairment and then reclassified to development asset within property, plant and equipment.

All capitalized exploration and evaluation expenditures are monitored for indications of impairment.

Where a potential impairment is indicated, assessments are performed for each area of interest. To the extent that exploration expenditure is not expected to be recovered, it is charged to profit or loss. Exploration areas where reserves have been discovered, but require major capital expenditure before production can begin, are continually evaluated to ensure that commercial quantities of reserves exist or to ensure that additional exploration work is underway as planned.

*(g) Impairment of property, plant and equipment*

Property, plant and equipment are reviewed for impairment at least annually, or if there is any indication that the carrying amount may not be recoverable. If any such indication is present, the recoverable amount of the asset is estimated in order to determine whether impairment exists. Where the asset does not generate cash flows that are independent from other assets, the Company estimates the recoverable amount of the cash generating unit to which the asset belongs.

An asset's recoverable amount is the higher of fair value less costs of disposal and value in use. In assessing value in use, the estimated future cash flows are discounted to their present value, using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset for which estimates of future cash flows have not been adjusted.

If the recoverable amount of an asset or cash generating unit is estimated to be less than its carrying amount, the carrying amount is reduced to the recoverable amount by way of recording an impairment charge to profit or loss. Where an impairment subsequently reverses, the carrying amount is increased to the revised estimate of recoverable amount but only to the extent that this does not exceed the carrying value that would have been determined if no impairment had previously been recognized.

*(h) Income taxes*

Income tax expense comprises current and deferred tax. Current tax and deferred tax are recognized in profit or loss except to the extent that it relates to items recognized directly in equity or in other comprehensive income.

## 3. Significant accounting policies *(Continued)*

*(h) Income taxes (Continued)*

Current tax is the expected tax payable or receivable on the taxable income or loss for the year, using tax rates enacted at the reporting date, and any adjustment to tax payable in respect of previous years.

Deferred tax is recognized in respect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for taxation purposes. Deferred tax is not recognized for the following temporary differences: the initial recognition of assets or liabilities in a transaction that is not a business combination and that affects neither accounting nor taxable profit or loss, and differences relating to investments in subsidiaries and jointly controlled entities to the extent that it is probable that they will not reverse in the foreseeable future. In addition, deferred tax is not recognized for taxable temporary differences arising on the initial recognition of goodwill. Deferred tax is measured at the tax rates that are expected to be applied to temporary differences when they reverse, based on the laws that have been enacted or substantively enacted by the reporting date.

Deferred tax assets and liabilities are offset if there is a legally enforceable right to offset current tax liabilities and assets, and they relate to income taxes levied by the same tax authority on the same taxable entity, or on different tax entities, but they intend to settle current tax liabilities and assets on a net basis or their tax assets and liabilities will be realized simultaneously.

A deferred tax asset is recognized for unused tax losses, tax credits and deductible temporary differences, to the extent that it is probable that future taxable profits will be available against which they can be utilized. Deferred tax assets are reviewed at each reporting date and are reduced to the extent that it is no longer probable that the related tax benefit will be realized.

*(i) Share-based payments*

The Company's stock option plan allows Company employees, directors, officers and consultants to acquire shares of the Company. The fair value of options granted is recognized as share-based payment expense with a corresponding increase in equity reserves. An individual is classified as an employee when the individual is an employee for legal or tax purposes (direct employee) or provides services similar to those performed by a direct employee.

Fair value is measured at grant date, and each tranche is recognized using the graded vesting method over the period during which the options vest. The fair value of the options granted is measured using the Black-Scholes option-pricing model, taking into account the terms and conditions upon which the options were granted. At each financial position reporting date, the amount recognized as an expense is adjusted to reflect the actual number of stock options that are expected to vest. In situations where equity instruments are issued to consultants and some or all of the goods or services received by the entity as consideration cannot be specifically identified, they are measured at the fair value of the share-based payment. Otherwise, share-based payments are measured at the fair value of goods or services received.

## 3. Significant accounting policies *(Continued)*

### *(j) Share capital*

Proceeds from the exercise of stock options and warrants are recorded as share capital in the amount for which the option or warrant enabled the holder to purchase a share in the Company, in addition to the proportionate amount of reserves originally created at the issuance of the stock options or warrants. Share capital issued for non-monetary consideration is valued at the closing market price at the date of issuance. The proceeds from the issuance of units are allocated between common shares and common share purchase warrants based on the residual value method. Under this method, the proceeds are allocated to common shares based on the fair value of a common share at the announcement date of the unit offering and any residual remaining is allocated to common share purchase warrants.

Certain of the Company's warrants are exercisable in a currency other than the functional currency of the Company. As a result, the fair value allocated to the warrant is recorded as a derivative financial liability with residual value being attributed to the equity unit. The fair value of the warrant is determined using the Black-Scholes Option Pricing Model and is marked to market at the end of each period. Upon exercise of the warrant, the fair value of the warrant at the date of exercise is transferred to share capital.

### *(k) Reclamation and closure cost obligations*

Decommissioning and restoration provisions are recorded when a present legal or constructive obligation exists as a result of past events where it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation, and a reliable estimate of the amount of the obligation can be made.

The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the reporting date, taking into account the risks and uncertainties surrounding the obligation and discount rates. Where a provision is measured using the cash flows estimated to settle the present obligation, its carrying amount is the present value of those cash flows discounted for the market discount rate.

Over time, the discounted liability is increased for the changes in the present value based on the current market discount rates and liability risks. When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, the receivable is recognized as an asset if it is virtually certain that reimbursement will be received and the amount receivable can be measured reliably.

When the Company enters into an option agreement on its exploration and evaluations assets, as part of the option agreement, responsibility for any reclamation and remediation becomes the responsibility of the optionee.

## 3. Significant accounting policies *(Continued)*

*(l) Net loss per share*

The Company presents the basic and diluted net loss per share data for its common shares, calculated by dividing the loss attributable to common shareholders of the Company by the weighted average number of common shares outstanding during the period. Diluted net loss per share is determined by adjusting the net loss attributable to common shareholders and the weighted average number of common shares outstanding for the effects of all dilutive potential common shares (Note 12).

*(m) Leases*

At inception of a contract, the Company assesses whether a contract is, or contains, a lease. A contract is, or contains, a lease if the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. The Company assesses whether the contract involves the use of an identified asset, whether the right to obtain substantially all of the economic benefits from use of the asset during the term of the arrangement exists, and if the Company has the right to direct the use of the asset. At inception or on reassessment of a contract that contains a lease component, the Company allocates the consideration in the contract to each lease component on the basis of their relative standalone prices.

As a lessee, the Company recognizes a right-of-use asset and a lease liability at the commencement date of a lease. The right-of-use asset is initially measured at cost, which is comprised of the initial amount of the lease liability adjusted for any lease payments made at or before the commencement date, plus any decommissioning and restoration costs, less any lease incentives received.

The right-of-use asset is subsequently depreciated using the straight line method from the commencement date to the earlier of the end of the lease term, or the end of the useful life of the asset. In addition, the right-of-use asset may be reduced due to impairment losses, if any, and adjusted for certain remeasurements of the lease liability.

A lease liability is initially measured at the present value of the lease payments that are not paid at the commencement date, discounted by the interest rate implicit in the lease, or if that rate cannot be readily determined, the incremental borrowing rate. Lease payments included in the measurement of the lease liability are comprised of:

- fixed payments, including in-substance fixed payments, less any lease incentives receivable;
- variable lease payments that depend on an index or a rate, initially measured using the index or rate as at the commencement date;
- amounts expected to be payable under a residual value guarantee;
- exercise prices of purchase options if the Company is reasonably certain to exercise that option; and
- payments of penalties for terminating the lease, if the lease term reflects the lessee exercising an option to terminate the lease.

*Expressed in Canadian dollars*

## 3. Significant accounting policies *(Continued)*

*(m) Leases (Continued)*

The lease liability is measured at amortized cost using the effective interest method. It is remeasured when there is a change in future lease payments arising from a change in an index or rate, or if there is a change in the estimate or assessment of the expected amount payable under a residual value guarantee, purchase, extension or termination option. Variable lease payments not included in the initial measurement of the lease liability are charged directly to profit or loss.

The Company has elected not to recognize right-of-use assets and lease liabilities for short-term leases that have a lease term of 12 months or less and leases of low-value assets. The lease payments associated with these leases are charged directly to profit or loss on a straight-line basis over the lease term.

*(n) Standards issued or amended but not yet effective*

The Company has not applied the following revised IFRS that has been issued but was not yet effective at December 31, 2021. This accounting standard is not currently expected to have a significant effect on the Company's accounting policies or financial statements.

IAS 16, *Property, Plant and Equipment - Proceeds before Intended Use* (effective January 1, 2022). The amendment prohibits deducting from the cost of property, plant and equipment amounts received from selling items produced while preparing the asset for its intended use. Instead, a company will recognize such sale proceeds and related cost in profit or loss.

## 4. Accounts receivable and prepaid expenses

Accounts receivable and prepaid expenses consist of the following:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Accounts receivable (Note 11(b)) | **$ 92,005** | $ 122,967 |
| Prepaid expenses | **63,633** | 52,041 |
| | **$ 155,638** | $ 175,008 |

At December 31, 2021, the Company has recorded value added taxes of $308,457 (2020 - $120,964) included in exploration and evaluation assets, as the value added tax relates to certain projects and is expected to be recovered when the assets are sold (Note 7).

## 5. Right-of-use assets and lease liabilities

The Company has lease agreements for its headquarter office space in Vancouver, B.C. Upon transition to IFRS 16, the Company recognized $394,654 of ROU assets and $394,654 of lease liabilities.

*Expressed in Canadian dollars*

## 5. Right-of-use assets and lease liabilities *(Continued)*

One lease contains an extension option exercisable only by the Company was exercised on November 22, 2021. The lease was therefore extended from March 31, 2022 to March 31, 2027. The Company reassessed this significant event as a lease modification and has estimated that the potential future lease payments under the extended lease term would result in an increase in lease liability by $508,799.

The continuity of lease liabilities for the years ended December 31, 2021 and 2020 are as follows:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Opening balance | **$ 170,731** | $ 292,679 |
| Modification by extending the lease term | **508,799** | - |
| Less: lease payments | **(144,253)** | (143,428) |
| Interest expense | **13,330** | 21,480 |
| | **548,607** | 170,731 |
| Less: current portion of lease liabilities | **(82,677)** | (134,950) |
| **Long-term portion of lease liabilities** | **$ 465,930** | $ 35,781 |

The Company entered into a sublease arrangement with a third party to lease an office unit from May 1, 2021 to March 31, 2022 under the same terms of the Company's lease. The Company remains beholden to the obligations set out in its lease dated October 31, 2018. The rental income during the period ended December 31, 2021 from this operating sublease was $22,452 and recorded in interest and other income.

The continuity of ROU assets for the years ended December 31, 2021 and 2020 are as follows:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Opening balance | **$ 151,790** | $ 273,222 |
| Modification by extending the lease term | **508,799** | - |
| Less: amortization of ROU assets | **(121,479)** | (121,432) |
| | **$ 539,110** | $ 151,790 |

During the year ended December 31, 2021, the Company recognized occupancy expenses of $40,542 (2020 - $45,248; 2019 - $39,561) related to short term leases.

As at December 31, 2021, the remaining payments for the operating lease are due as follows:

| | **2022** | **2023** | **2024** | **2025** | **2026** | **Total** |
|---|---|---|---|---|---|---|
| Office lease | $171,759 | $167,374 | $170,672 | $173,970 | $177,268 | $861,043 |

*Expressed in Canadian dollars*

## 6. Property, plant and equipment

| | Furniture and fixtures and other | Computer hardware | Computer software | Geological library | Field equipment | Mill equipment | Total |
|---|---|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ | $ | $ |
| Cost | | | | | | | |
| **December 31, 2020** | **158,219** | **256,873** | **198,607** | **51,760** | **245,647** | **13,968,566** | **14,879,672** |
| Additions/reduction (1) | - | 10,131 | 374 | - | - | - | 10,505 |
| **December 31, 2021** | **158,219** | **267,004** | **198,981** | **51,760** | **245,647** | **13,968,566** | **14,890,177** |
| **Accumulated depreciation** | | | | | | | |
| **December 31, 2020** | **147,662** | **238,060** | **185,130** | **50,534** | **232,621** | **-** | **854,007** |
| Depreciation | 3,728 | 5,983 | 4,076 | 245 | 2,606 | - | 16,638 |
| **December 31, 2021** | **151,390** | **244,043** | **189,206** | **50,779** | **235,227** | **-** | **870,645** |
| Carrying amounts | | | | | | | |
| December 31, 2020 | 10,557 | 18,813 | 13,477 | 1,226 | 13,026 | 13,968,566 | 14,025,665 |
| **December 31, 2021** | **6,829** | **22,961** | **9,775** | **981** | **10,420** | **13,968,566** | **14,019,532** |

*Expressed in Canadian dollars*

## 6. Property, plant and equipment *(Continued)*

| | Furniture and fixtures and other | Computer hardware | Computer software | Geological library | Field equipment | Mill equipment | Total |
|---|---|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ | $ | $ |
| Cost | | | | | | | |
| **December 31, 2019** | **158,219** | **251,346** | **197,351** | **51,760** | **245,647** | **14,098,446** | **15,002,769** |
| Additions/reduction [(1)] | - | 5,527 | 1,256 | - | - | (129,880) | (123,097) |
| **December 31, 2020** | **158,219** | **256,873** | **198,607** | **51,760** | **245,647** | **13,968,566** | **14,879,672** |
| **Accumulated depreciation** | | | | | | | |
| **December 31, 2019** | **143,541** | **231,597** | **179,713** | **50,228** | **229,364** | **-** | **834,443** |
| Depreciation | 4,121 | 6,463 | 5,417 | 306 | 3,257 | - | 19,564 |
| **December 31, 2020** | **147,662** | **238,060** | **185,130** | **50,534** | **232,621** | **-** | **854,007** |
| Carrying amounts | | | | | | | |
| December 31, 2019 | 14,678 | 19,749 | 17,638 | 1,532 | 16,283 | 14,098,446 | 14,168,326 |
| **December 31, 2020** | **10,557** | **18,813** | **13,477** | **1,226** | **13,026** | **13,968,566** | **14,025,665** |

(1) At December 31, 2019, the Company accrued in accounts payable USD$250,000 ($324,700) for a storage extension fee of the mill equipment in Alaska to October 31, 2020. On June 12, 2020, the landlord agreed to reduce the storage fee from USD$250,000 to USD$150,000 that resulted in a USD$100,000 ($129,880) reduction in capitalized mill equipment in property, plant and equipment. The remaining outstanding storage fee of USD$50,000 is recorded in accounts payable as at December 31, 2020.

*Expressed in Canadian dollars*

## 7. Exploration and evaluation assets

| Exploration and evaluation assets | Tuligtic $ | Other Property $ | Total $ |
|---|---|---|---|
| **Acquisition costs:** | | | |
| **Opening balance - (December 31, 2020)** | **10,319,510** | **1** | **10,319,511** |
| Additions | 892,246 | - | 892,246 |
| **Closing balance - (December 31, 2021)** | **11,211,756** | **1** | **11,211,757** |
| **Deferred exploration costs:** | | | |
| **Opening balance - (December 31, 2020)** | **48,286,318** | **-** | **48,286,318** |
| Costs incurred during the year | | | |
| Drilling and related costs | 178,070 | - | **178,070** |
| Professional/technical fees | 276,305 | - | **276,305** |
| Claim maintenance/lease costs | 159,942 | - | **159,942** |
| Geochemical, metallurgy | 22,639 | - | **22,639** |
| Travel and accommodation | 256,641 | - | **256,641** |
| Geology, geophysics and exploration | 299,960 | - | **299,960** |
| Supplies and miscellaneous | 196,508 | - | **196,508** |
| Environmental and permit | 741,436 | - | **741,436** |
| Value-added tax (Note 4) | 308,457 | | **308,457** |
| Refund - Value-added tax | (506,394) | - | **(506,394)** |
| **Total deferred exploration costs during the year** | **1,933,564** | **-** | **1,933,564** |
| **Closing balance - (December 31, 2021)** | **50,219,882** | **-** | **50,219,882** |
| **Total exploration and evaluation assets** | **61,431,638** | **1** | **61,431,639** |

*Expressed in Canadian dollars*

## 7. Exploration and evaluation assets *(Continued)*

| Exploration and evaluation assets | Tuligtic $ | Other Property $ | Total $ |
|---|---|---|---|
| **Acquisition costs:** | | | |
| **Opening balance - (December 31, 2019)** | **9,460,274** | **1** | **9,460,275** |
| Additions | 859,236 | - | 859,236 |
| **Closing balance - (December 31, 2020)** | **10,319,510** | **1** | **10,319,511** |
| **Deferred exploration costs:** | | | |
| **Opening balance - (December 31, 2019)** | **47,512,735** | **-** | **47,512,735** |
| Costs incurred during the year | | | |
| Professional/technical fees | 137,167 | - | **137,167** |
| Claim maintenance/lease costs | 159,934 | - | **159,934** |
| Geochemical, metallurgy | 11,947 | - | **11,947** |
| Technical studies | 117,058 | - | **117,058** |
| Travel and accommodation | 125,679 | - | **125,679** |
| Geology, geophysics and exploration | 111,773 | - | **111,773** |
| Supplies and miscellaneous | 115,587 | - | **115,587** |
| Environmental and permit | 6,916 | - | **6,916** |
| Value-added tax (Note 4) | 120,964 | | **120,964** |
| Refund - Value-added tax | (133,442) | - | **(133,442)** |
| **Total deferred exploration costs during the year** | **773,583** | **-** | **773,583** |
| **Closing balance - (December 31, 2020)** | **48,286,318** | **-** | **48,286,318** |
| **Total exploration and evaluation assets** | **58,605,828** | **1** | **58,605,829** |

Title to exploration and evaluation assets involves certain inherent risks due to the difficulties of determining the validity of certain claims as well as the potential for problems arising from the frequently ambiguous conveyancing history characteristic of many mineral claims. The Company has investigated title to all of its exploration and evaluation assets and, to the best of its knowledge, title to all of its interests are in good standing.

The following is a description of the Company's most significant property interests:

### *(a) Tuligtic*

In 2001, the Company acquired by staking a 100% interest in the Tuligtic property in Puebla, Mexico. The property contains the Ixtaca Zone.

In 2015, legal proceedings against the Mexican mining authorities regarding certain mining concessions held by the Company were initiated by the Ejido Tecoltemi. These mining concessions covered approximately 14,000 Ha, including the Company's project in the Ixtaca Zone and certain endowed lands of the Ejido (the "Ejido Land"), which comprise approximately 330 Ha (the "Original Concessions").

In 2015, Almaden commenced a process to voluntarily cancel approximately 7,000 Ha of its Original Concessions, including the area covering the Ejido Lands. Almaden divided the Original

## 7. Exploration and evaluation assets *(Continued)*

### *(a) Tuligtic (continued)*

Concessions into nine smaller concessions, which included two smaller mining concessions which overlapped the Ejido Lands (the "Overlapping Concessions") and then voluntarily cancelled the Overlapping Concessions. The applicable Mexican mining authorities issued the New Concessions and accepted the abandonment of the Overlapping Concessions in May and June of 2017 after the issuance of a Court Order.

In 2017, the Ejido Tecoltemi filed a legal complaint about the court order leading to the New Concessions. On February 1, 2018, the court reviewing the complaint ruled the Ejido's complaint was founded, and sent the ruling to the court hearing the Amparo. On December 21, 2018, the General Directorate of Mines issued a resolution that the New Concessions are left without effect, and the Original Concessions are in full force and effect. On February 13, 2019, the General Directorate of Mines delivered, to the court hearing the Amparo, mining certificates stating that the Original Concessions are valid, and the New Concessions are cancelled. On December 16, 2019 the General Directorate of Mines issued mineral title certificates directly to Almaden that the Original Concessions are active and owned by Minera Gorrión and the New Concessions are left without effect. Currently, applicable Mexican mining authority records show the Original Concessions as Almaden's sole mineral claims to the Ixtaca Project.

On January 21, 2020, Almaden filed an administrative challenge against the Mexican mining authorities' issuance of the December 2019 Certificates. Almaden's appeals to this change in mineral tenure are based on Mexican legal advice that the New Concessions remain in full force and effect. Almaden continues to file taxes and assessment reports on the New Concessions, which have been accepted by the Mexican mining authorities, and Almaden has not received any notifications from the Mexican mining authorities regarding unpaid taxes on the Original Concessions.

On February 14, 2020 and March 24, 2020, the Company entered into two amended option agreements to secure land holdings on the Tuligtic project. The Company has the option to acquire a 100% ownership of two land holdings for cash payments of $3,000,000 Mexico pesos (MXN) and USD$375,000 that were paid in early 2021 respectively. Payments are not refundable upon termination of the option agreement.

### *(b) Other Property*

The Company holds a 40% carried interest in the Logan property located in the Yukon Territory, Canada. The project is carried at a nominal value of $1.

### *(c) Other*

Expenditures incurred by the Company in Mexico are subject to Mexican Value added tax ("VAT"). The VAT is included in exploration and evaluation assets as incurred. Under Mexican law VAT paid can be used in the future to offset amounts resulting from VAT charge on sales. Under certain circumstances and subject to approval from tax authorities as Company can also apply for early refund of VAT prior to generating sales. During 2021, the Company received a VAT recovery of $506,394 and other income of $446,184 related to the VAT refund from prior years are recorded in interest and other income.

## 8. Gold loan payable and gold in trust

The Company has entered into a secured gold loan agreement ("Gold Loan") with Almadex Minerals Ltd. ("Almadex" or the "Lender") pursuant to which Almadex has agreed to loan up to 1,597 ounces of gold bullion to the Company. The approximate value of this gold as at May 14, 2019 was USD$2,072,060 or $2,790,858.

Under the terms of the Gold Loan, the Company will be entitled to draw-down the gold in minimum 400 ounce tranches. At any given time, the amount of gold ounces drawn multiplied by the London Bullion Market Association ("LBMA") AM gold price in US dollars, plus any accrued interest or unpaid fees, shall constitute the Loan Value.

The maturity date for the Gold Loan is March 31, 2024, and can be extended by two years at the discretion of the Company (the "Term"). Repayment of the Loan Value shall be made either through delivery of that amount of gold drawn, or through the issuance of common shares of the Company ("Shares"), according to the Lender's discretion. Mandatory prepayment shall be required in the event that the Company's Ixtaca gold-silver project located in Puebla State, Mexico (the "Ixtaca Project") enters into commercial production during the Term, requiring the Company to deliver 100 gold ounces per month to the Lender. In addition, the Company has the right to pre-pay the Loan Value at any time without penalty, in either gold bullion or Shares as chosen by the Lender, and the Lender has the right to convert the Loan Value into Shares at any time during the Term. The conversion rate is equal to 95% of the 5 trading day volume weighted average price of the Share on the Toronto Stock Exchange or an equivalent.

The interest rate of the Gold Loan is 10% of the Loan Value per annum, calculated monthly, paid in arrears. Interest payments can either be accrued to the Loan Value, or paid by the Company in cash or gold bullion. A standby fee of 1% per annum, accrued quarterly, will be applied to any undrawn amount on the Gold Loan.

In addition, the Company has issued Almadex 500,000 transferable share purchase warrants ("Warrants"), with an exercise price of $1.50 per Share and expiry date of May 14, 2024 as an arrangement fee to cover the administrative costs of setting up the credit facility. These warrants were valued at $50,000 using the Black-Scholes option-pricing model with the following assumptions: expected life of five years, risk-free interest rate of 1.54%, expected dividend yield of 0% and expected volatility of 44.25%.

Security for the loan is certain equipment related to the Rock Creek Mill, which is not required for the Ixtaca Project. The Gold Loan includes industry standard provisions in the event of default, material breach and change of control.

The Gold Loan was recorded at fair value at inception and is subsequently measured at amortized cost using the effective interest method, recognizing interest expense on an effective yield basis.

The Company has determined that the Gold Loan contains multiple derivatives which are embedded in the US dollar denominated debt instrument. As the convertible Gold Loan is denominated in US dollars and is convertible into common shares based upon a variable Canadian dollar conversion rate, the fixed for fixed criteria is not met. As such, the conversion option cannot be classified as an equity instrument and is deemed to have no value. The embedded derivative from indexation of the loan principal portion to the movement in the price of gold is classified as a derivate financial liability and is marked to market at each period end using the Black-Scholes option-pricing model.

*Expressed in Canadian dollars*

## 8. Gold loan payable and gold in trust *(Continued)*

At inception, the following assumptions were used: expected life of five years, risk-free interest rate of 1.57% and expected volatility of 11.06%. The fair value of the embedded derivative for the year ended December 31, 2021 increased by $18,156 based on the following assumptions used in the Black-Scholes option-pricing model: expected life of 2.25 years, risk-free interest rate of 1.23% and expected volatility of 15.63%.

The continuity of gold loan payable and derivative financial liabilities are as follows:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Gold loan payable – opening balance | **$ 2,842,756** | $ 2,541,338 |
| Accrued interest expense | **271,093** | 261,151 |
| Accrued standby fees | **8,743** | 9,536 |
| Accretion expense | **114,535** | 100,563 |
| Foreign exchange difference | **(9,582)** | (69,832) |
| Gold loan payable | **$ 3,227,545** | $ 2,842,756 |
| Derivative financial liabilities – opening balance | **$ 375,417** | $ 430,965 |
| Change in fair value through profit & loss | **18,156** | (44,049) |
| Foreign exchange difference | **(1,953)** | (11,499) |
| Derivative financial liabilities | **$ 391,620** | $ 375,417 |

As at December 31, 2021, Almaden has 397 ounces (397 ounces at December 31, 2020) of gold bullion on its account at a fair value of $915,995 ($955,781 at December 31, 2020).

On January 22, 2020, the Company received $818,360 on the sale of 400 ounces of gold in trust and has recorded a gain on sale of gold in trust of $19,413.

The continuity of gold in trust are as follows:

| | **December 31, 2021** | | December 31, 2020 | |
|---|---|---|---|---|
| | **Ounces** | **$** | Ounces | $ |
| Gold in trust, opening balance | **397** | **955,781** | 797 | 1,576,366 |
| Sale of gold in trust | **-** | **-** | (400) | (818,360) |
| Gain on sale | **-** | **-** | - | 19,413 |
| Change in fair value through profit & loss | **-** | **(35,775)** | - | 199,379 |
| Foreign exchange difference | **-** | **(4,011)** | - | (21,017) |
| | **397** | **915,995** | 397 | 955,781 |

## 9. Warrant liability

In connection with the registered direct offering private placement completed during the year ended December 31, 2021, the Company issued a total of 7,923,077 warrants exercisable at US$0.80 per share. The fair value of these warrants was $2,371,174, valued using the Black-Scholes Pricing model with the following assumptions:

## 9. Warrant liability *(Continued)*

| | |
|---|---|
| Risk-free interest rate | 0.53% |
| Expected life of warrants | 3.00 years |
| Expected annualized volatility | 72.42% |
| Dividend | Nil |
| Forfeiture rate | 0% |

The fair value is recorded as a derivative financial liability as these warrants are exercisable in US dollars, differing from the Company's functional currency. The change in fair value resulted in a gain of $1,747,884 and is recognized in the consolidated statements of loss and comprehensive loss for the year ended December 31, 2021. The fair value warrants were re-valued at period end using the Black-Scholes Pricing Model with the following assumptions:

| | |
|---|---|
| Risk-free interest rate | 0.95% |
| Expected life of warrants | 2.21 years |
| Expected annualized volatility | 78.39% |
| Dividend | Nil |
| Forfeiture rate | 0% |

## 10. Share capital and reserves

### *(a) Authorized share capital*

At December 31, 2021, the authorized share capital comprised an unlimited number of common shares. The common shares do not have a par value. All issued shares are fully paid.

### *(b) Details of private placements and other issues of common shares in 2021, 2020 and 2019*

On March 18, 2021, the Company closed a registered direct offering private placement for the purchase and sale of 15,846,154 common shares and common share warrants to purchase up to 7,923,077 common shares at a combined purchase price of US$0.65 per unit for aggregate gross proceeds of US$10.3 million (CAD$12,838,950). The common share warrants will be immediately exercisable, have an exercise price of US$0.80 per share and will expire three years from the date of issuance. Share issue costs included a finder's fee of $834,532 in cash, and finders' warrants to purchase up to 435,769 common shares at a price of US$0.80 per common share until March 18, 2024. The fair value of the finders' warrants was $130,731. In connection with the registered direct offering, the Company also incurred $393,837 in share issue costs. These amounts were recorded as a reduction to share capital. The proceeds of the registered direct offering were allocated $10,467,776 to share capital and $2,371,174 to warrants.

Share issue costs of $40,990 was recorded for fees paid related to the Short Form Base Shelf Prospectus file subsequent to year-end on February 25, 2021.

On August 6, 2020, the Company closed a non-brokered private placement by the issuance of 3,100,000 units at a price of $0.65 per unit for gross proceeds of $2,015,000. Each unit consists of one common share and one non-transferable common share purchase warrant. Each whole warrant allows the holder to purchase one common share of the Company at a price of $0.90 per share until August 6, 2023. Share issue costs included a finder's fee of $52,341 in cash. In connection with the private placement, the Company also incurred $108,674 in share issue costs. These amounts were recorded as a reduction to share capital. The proceeds of the private placement were allocated

*Expressed in Canadian dollars*

## 10. Share capital and reserves

***(b) Details of private placements and other issues of common shares in 2021, 2020 and 2019*** *(Continued)*

entirely to share capital.

On March 27, 2020, the Company closed a non-brokered private placement by the issuance of 5,509,658 units at a price of $0.37 per unit for gross proceeds of $2,038,573. Each unit consists of one common share and one non-transferable common share purchase warrant. Each whole warrant allows the holder to purchase one common share of the Company at a price of $0.50 per share until March 27, 2023. In connection with the private placement, the Company also incurred $42,349 in share issue costs. These amounts were recorded as a reduction to share capital. The proceeds of the private placement were allocated entirely to share capital.

### *(c) Warrants*

The continuity of warrants for the years ended December 31, 2021, 2020 and 2019 are as follows:

| Expiry date | Exercise price | December 31, 2020 | Issued | Exercised | Expired | December 31, 2021 |
|---|---|---|---|---|---|---|
| June 7, 2022 | $1.35 | 4,720,000 | - | - | - | 4,720,000 |
| March 27, 2023 | $0.50 | 5,489,658 | - | - | - | 5,489,658 |
| August 6, 2023 | $0.90 | 3,100,000 | - | - | - | 3,100,000 |
| March 18, 2024 | USD$0.80 | - | 7,923,077 | - | - | 7,923,077 |
| March 18, 2024 | USD$0.80 | - | 435,769 | | | 435,769 |
| May 14, 2024 | $1.50 | 500,000 | - | - | - | 500,000 |
| Warrants outstanding and exercisable | | **13,809,658** | **8,358,846** | **-** | **-** | **22,168,504** |
| Weighted average exercise price | | **$ 0.92** | **$ 1.00** | **-** | **-** | **$ 0.95** |

The weighted average remaining life of warrants outstanding at December 31, 2021 was 1.51 years (2020 – 2.08 years).

| Expiry date | Exercise price | December 31, 2019 | Issued | Exercised | Expired | December 31, 2020 |
|---|---|---|---|---|---|---|
| June 1, 2020 | $2.45 | 4,928,900 | - | - | (4,928,900) | - |
| June 7, 2020 | $1.35 | 192,450 | - | - | (192,450) | - |
| June 7, 2022 | $1.35 | 4,720,000 | - | - | - | 4,720,000 |
| March 27, 2023 | $0.50 | - | 5,509,658 | (20,000) | - | 5,489,658 |
| August 6, 2023 | $0.90 | - | 3,100,000 | - | - | 3,100,000 |
| May 14, 2024 | $1.50 | 500,000 | - | - | - | 500,000 |
| Warrants outstanding and exercisable | | **10,341,350** | **8,609,658** | **(20,000)** | **(5,121,350)** | **13,809,658** |
| Weighted average exercise price | | **$ 1.88** | **$ 0.64** | **$ 0.50** | **$ 2.41** | **$ 0.92** |

*Expressed in Canadian dollars*

## 10. Share capital and reserves *(Continued)*

### *(c) Warrants (Continued)*

The weighted average remaining life of warrants outstanding at December 31, 2020 was 2.08 years (2019 – 1.53 years).

| Expiry date | Exercise price | December 31, 2018 | Issued | Exercised | Expired | December 31, 2019 |
|---|---|---|---|---|---|---|
| June 1, 2019 | $2.00 | 295,734 | - | - | (295,734) | - |
| August 7, 2019 | $2.00 | 1,259,704 | - | - | (1,259,704) | - |
| August 7, 2019 | $1.35 | 10,411 | - | - | (10,411) | - |
| June 1, 2020 | $2.45 | 4,928,900 | - | - | - | 4,928,900 |
| June 7, 2020 | $1.35 | 192,450 | - | - | - | 192,450 |
| June 7, 2022 | $1.35 | 4,720,000 | - | - | - | 4,720,000 |
| May 14, 2024 | $ 1.50 | - | 500,000 | - | - | 500,000 |
| Warrants outstanding and exercisable | | **11,407,199** | **500,000** | **-** | **(1,565,849)** | **10,341,350** |
| Weighted average exercise price | | **$ 1.91** | **$ 1.50** | **-** | **$ 2.00** | **$ 1.88** |

The weighted average remaining life of warrants outstanding at December 31, 2019 was 1.53 years (2018 – 2.14 years).

The weighted average fair value of finders' warrants granted during the years ended December 31, 2021, 2020 and 2019 calculated using the Black-Scholes option-pricing model at the issue dates, are as follows:

**Weighted average assumptions used**

| Number of warrants | Date of issue | Fair value per share | Risk free interest rate | Expected life (in years) | Expected volatility | Expected dividends |
|---|---|---|---|---|---|---|
| 435,769 | March 18, 2021 | $ 0.30 | 0.53% | 3 | 72.42% | $Nil |
| 500,000 | May 14, 2019 | $ 0.10 | 1.54% | 5 | 44.25% | $Nil |

### *(d) Share purchase option compensation plan*

The Company's stock option plan permits the issuance of options up to a maximum of 10% of the Company's issued share capital. Stock options issued to any consultant or person providing investor relations services cannot exceed 2% of the issued and outstanding common shares in any twelve month period. At December 31, 2021, the Company had reserved 1,732,141 stock options that may be granted. The exercise price of any option cannot be less than the volume weighted average trading price of the shares for the five trading days immediately preceding the date of the grant.

The maximum term of all options is five years. The Board of Directors determines the term of the option (to a maximum of five years) and the time during which any option may vest. Options granted to consultants or persons providing investor relations services shall vest in stages with no more than 25% of such option being exercisable in any three month period. All options granted during the years ended December 31, 2021, 2020 and 2019 vested on the grant date.

*Expressed in Canadian dollars*

## 10. Share capital and reserves *(Continued)*

### *(d) Share purchase option compensation plan (Continued)*

The Company's stock option plan permits the option holder to exercise cashless by surrendering a portion of the underlying option shares to pay for the exercise price and the corresponding withholding taxes, if applicable.

The continuity of stock options for the years ended December 31, 2021, 2020 and 2019 are as follows:

| Expiry date | Exercise price | December 31, 2020 | Granted | Exercised | Expired | December 31, 2021 |
|---|---|---|---|---|---|---|
| February 7, 2021 | $ 1.11 | 300,000 | - | - | (300,000) | - |
| February 7, 2021 | $ 0.84 | 425,000 | - | (375,000) | (50,000) | - |
| March 29, 2021 | $ 1.08 | 400,000 | - | - | (400,000) | - |
| March 29, 2021 | $ 0.90 | 100,000 | - | - | (100,000) | - |
| May 6, 2021 | $ 0.69 | 557,000 | - | (275,000) | (282,000) | - |
| July 7, 2021 | $ 0.80 | 1,612,000 | - | (75,000) | (1,537,000) | - |
| August 13, 2021 | $ 1.01 | 150,000 | - | - | (150,000) | - |
| September 16, 2021 | $ 0.90 | 1,155,000 | - | - | (1,155,000) | - |
| December 12, 2021 | $ 1.00 | 200,000 | - | - | (200,000) | - |
| March 4, 2022 | $ 0.47 | 1,125,000 | - | - | - | 1,125,000 |
| April 30, 2022 | $ 0.41 | 100,000 | - | - | - | 100,000 |
| April 30, 2022 | $ 0.58 | 220,000 | - | - | - | 220,000 |
| May 31, 2022 | $ 0.62 | 700,000 | - | - | (100,000) | 600,000 |
| June 9, 2022 | $ 0.64 | 2,180,000 | - | - | (200,000) | 1,980,000 |
| October 3, 2022 | $ 1.13 | 1,346,000 | - | - | (486,000) | 860,000 |
| December 15, 2022 | $ 0.89 | 972,000 | - | - | (72,000) | 900,000 |
| February 9, 2023 | $ 0.97 | - | 450,000 | - | (100,000) | 350,000 |
| March 3, 2023 | $ 0.96 | - | 325,000 | - | (75,000) | 250,000 |
| March 31, 2023 | $ 0.68 | - | 1,975,000 | - | - | 1,975,000 |
| May 8, 2023 | $ 0.69 | - | 100,000 | - | - | 100,000 |
| May 28, 2023 | $ 0.65 | - | 100,000 | - | - | 100,000 |
| July 8, 2023 | $ 0.62 | - | 2,470,000 | - | - | 2,470,000 |
| September 18, 2023 | $ 0.51 | - | 960,000 | - | - | 960,000 |
| Options outstanding and exercisable | | **11,542,000** | **6,380,000** | **(725,000)** | **(5,207,000)** | **11,990,000** |
| Weighted average exercise price | | **$ 0.80** | **$ 0.67** | **$ 0.78** | **$ 0.90** | **$ 0.68** |

The weighted average remaining life of stock options outstanding at December 31, 2021 was 0.98 years (2020 – 1.08 years).

*Expressed in Canadian dollars*

## 10. Share capital and reserves *(Continued)*

### *(d) Share purchase option compensation plan* *(Continued)*

| Expiry date | Exercise price | December 31, 2019 | Granted | Exercised | | Expired | December 31, 2020 |
|---|---|---|---|---|---|---|---|
| April 10, 2020 | $ 1.03 | 90,000 | - | - | | (90,000) | - |
| April 30, 2020 | $ 1.53 | 500,000 | - | - | | (500,000) | - |
| April 30, 2020 | $ 1.14 | 100,000 | - | - | | (100,000) | - |
| April 30, 2020 | $ 1.04 | 100,000 | - | - | | (100,000) | - |
| June 8, 2020 | $ 0.98 | 2,180,000 | - | - | | (2,180,000) | - |
| September 30, 2020 | $ 1.25 | 1,095,000 | - | (25,000) | | (1,070,000) | - |
| September 30, 2020 | $ 0.83 | 106,000 | - | (106,000) | (i) | - | - |
| September 30, 2020 | $ 0.79 | 170,000 | - | (150,000) | (i) | (20,000) | - |
| December 13, 2020 | $ 0.86 | 762,000 | - | (635,000) | (i) | (127,000) | - |
| February 7, 2021 | $ 1.11 | 300,000 | - | - | | - | 300,000 |
| February 7, 2021 | $ 0.84 | 425,000 | - | - | | - | 425,000 |
| March 29, 2021 | $ 1.08 | 400,000 | - | - | | - | 400,000 |
| March 29, 2021 | $ 0.90 | 100,000 | - | - | | - | 100,000 |
| May 6, 2021 | $ 0.69 | 557,000 | - | - | | - | 557,000 |
| July 7, 2021 | $ 0.80 | 1,612,000 | - | - | | - | 1,612,000 |
| August 13, 2021 | $ 1.01 | 150,000 | - | - | | - | 150,000 |
| September 16, 2021 | $ 0.90 | 1,160,000 | - | - | | (5,000) | 1,155,000 |
| December 12, 2021 | $ 1.00 | 200,000 | - | - | | - | 200,000 |
| March 4, 2022 | $ 0.47 | - | 1,130,000 | (5,000) | | - | 1,125,000 |
| April 30, 2022 | $ 0.41 | - | 115,000 | (15,000) | | - | 100,000 |
| April 30, 2022 | $ 0.58 | - | 220,000 | - | | - | 220,000 |
| May 31, 2022 | $ 0.62 | - | 700,000 | - | | - | 700,000 |
| June 9, 2022 | $ 0.64 | - | 2,180,000 | - | | - | 2,180,000 |
| October 3, 2022 | $ 1.13 | - | 1,346,000 | - | | - | 1,346,000 |
| December 15, 2022 | $ 0.89 | - | 972,000 | - | | - | 972,000 |
| Options outstanding and exercisable | | **10,007,000** | **6,663,000** | **(936,000)** | | **(4,192,000)** | **11,542,000** |
| Weighted average exercise price | | **$ 0.97** | **$ 0.74** | **$ 0.85** | | **$ 1.12** | **$ 0.80** |

(i) In accordance with the Company's stock option plan, options holders exercised 100,000, 68,000 and 580,000 stock options on a cashless basis at an exercise price of $0.79, $0.83 and $0.86 respectively. The total number of shares issued in connection with the cashless exercise of options was 105,877.

The weighted average remaining life of stock options outstanding at December 31, 2020 was 1.08 years (2019 – 1.02 years).

*Expressed in Canadian dollars*

## 10. Share capital and reserves *(Continued)*

### *(d) Share purchase option compensation plan* *(Continued)*

| Expiry date | Exercise price | December 31, 2018 | Granted | Exercised | Expired | December 31, 2019 |
|---|---|---|---|---|---|---|
| January 2, 2019 | $ 1.04 | 375,000 | - | - | (375,000) | - |
| March 17, 2019 | $ 1.35 | 207,000 | - | - | (207,000) | - |
| May 4, 2019 | $ 1.99 | 175,000 | - | - | (175,000) | - |
| May 19, 2019 | $ 1.84 | 75,000 | - | - | (75,000) | - |
| June 12, 2019 | $ 1.89 | 75,000 | - | - | (75,000) | - |
| July 2, 2019 | $ 1.32 | 150,000 | - | - | (150,000) | - |
| July 2, 2019 | $ 1.19 | 60,000 | - | - | (60,000) | - |
| July 2, 2019 | $ 1.34 | 1,427,000 | - | - | (1,427,000) | - |
| September 19, 2019 | $ 1.40 | 1,160,000 | - | - | (1,160,000) | - |
| April 10, 2020 | $ 1.03 | 90,000 | - | - | - | 90,000 |
| April 30, 2020 | $ 1.53 | 500,000 | - | - | - | 500,000 |
| April 30, 2020 | $ 1.14 | 100,000 | - | - | - | 100,000 |
| April 30, 2020 | $ 1.04 | 100,000 | - | - | - | 100,000 |
| June 8, 2020 | $ 0.98 | 2,180,000 | - | - | - | 2,180,000 |
| September 30, 2020 | $ 1.25 | 1,095,000 | - | - | - | 1,095,000 |
| September 30, 2020 | $ 0.83 | 106,000 | - | - | - | 106,000 |
| September 30, 2020 | $ 0.79 | 170,000 | - | - | - | 170,000 |
| December 13, 2020 | $ 0.86 | 762,000 | - | - | - | 762,000 |
| February 7, 2021 | $ 1.11 | 300,000 | - | - | - | 300,000 |
| February 7, 2021 | $ 0.84 | - | 425,000 | - | - | 425,000 |
| March 29, 2021 | $ 1.08 | 400,000 | - | - | - | 400,000 |
| March 29, 2021 | $ 0.90 | - | 100,000 | - | - | 100,000 |
| May 6, 2021 | $ 0.69 | - | 557,000 | - | - | 557,000 |
| July 7, 2021 | $ 0.80 | - | 1,612,000 | - | - | 1,612,000 |
| August 13, 2021 | $ 1.01 | - | 150,000 | - | - | 150,000 |
| September 16, 2021 | $ 0.90 | - | 1,160,000 | - | - | 1,160,000 |
| December 12, 2021 | $ 1.00 | 200,000 | - | - | - | 200,000 |
| Options outstanding and exercisable | | **9,707,000** | **4,004,000** | **-** | **(3,704,000)** | **10,007,000** |
| Weighted average exercise price | | **$ 1.19** | **$ 0.83** | **-** | **$ 1.38** | **$ 0.97** |

The weighted average remaining life of stock options outstanding at December 31, 2019 was 1.02 years (2018 – 1.24 years).

*Expressed in Canadian dollars*

## 10. Share capital and reserves *(Continued)*

### *(d) Share purchase option compensation plan* *(Continued)*

The fair value of options granted during the years ended December 31, 2021, 2020 and 2019, calculated using the Black-Scholes option-pricing model at grant date, are as follows:

| Number of options | Date of grant | Fair value per share | Risk free interest rate | Expected life (in years) | Expected volatility | Expected dividends |
|---|---|---|---|---|---|---|
| 960,000 | September 17, 2021 | $0.23 | 0.45% | 2 | 82.96% | $Nil |
| 2,470,000 | July 8, 2021 | $0.25 | 0.45% | 2 | 84.98% | $Nil |
| 100,000 | May 28, 2021 | $0.30 | 0.32% | 2 | 86.03% | $Nil |
| 100,000 | May 7, 2021 | $0.30 | 0.33% | 2 | 86.33% | $Nil |
| 1,975,000 | March 31, 2021 | $0.31 | 0.22% | 2 | 85.85% | $Nil |
| 325,000 | March 2, 2021 | $0.43 | 0.26% | 2 | 85.48% | $Nil |
| 450,000 | February 9, 2021 | $0.49 | 0.19% | 2 | 84.04% | $Nil |
| 972,000 | December 15, 2020 | $0.35 | 0.25% | 2 | 76.39% | $Nil |
| 1,346,000 | October 1, 2020 | $0.35 | 0.24% | 2 | 65.81% | $Nil |
| 2,180,000 | June 9, 2020 | $0.25 | 0.28% | 2 | 62.07% | $Nil |
| 700,000 | May 1, 2020 | $0.20 | 0.30% | 2 | 61.30% | $Nil |
| 220,000 | April 29, 2020 | $0.22 | 0.32% | 2 | 61.31% | $Nil |
| 115,000 | April 13, 2020 | $0.12 | 0.33% | 2 | 60.60% | $Nil |
| 1,130,000 | March 4, 2020 | $0.20 | 0.92% | 2 | 55.66% | $Nil |
| 1,160,000 | September 16, 2019 | $0.29 | 1.60% | 2 | 50.73% | $Nil |
| 150,000 | August 13, 2019 | $0.28 | 1.35% | 2 | 50.20% | $Nil |
| 1,612,000 | July 4, 2019 | $0.19 | 1.58% | 2 | 45.82% | $Nil |
| 557,000 | May 6, 2019 | $0.17 | 1.59% | 2 | 45.42% | $Nil |
| 100,000 | March 1, 2019 | $0.22 | 1.68% | 2 | 50.79% | $Nil |
| 425,000 | January 3, 2019 | $0.31 | 1.91% | 2 | 50.28% | $Nil |

Total share-based payments expenses as a result of options granted and vested during the year ended December 31, 2021 was $1,870,800 (2020 - $1,784,500; 2019 - $933,120).

## 11. Related party transactions and balances

### *(a) Compensation of key management personnel*

Key management includes members of the Board, the Chairman, the President and Chief Executive Officer, the Chief Financial Officer, the Executive Vice President, the Vice President Operations & Projects, and the Vice President, Project Development. The net aggregate compensation paid or payable to key management for services after recovery from Azucar Minerals Ltd. (Azucar) and Almadex Minerals Ltd. (Note 11 (b)) is as follows:

*Expressed in Canadian dollars*

## 11. Related party transactions and balances *(Continued)*

### *(a) Compensation of key management personnel* (Continued)

| | | December 31, 2021 | | December 31, 2020 | | December 31, 2019 |
|---|---|---|---|---|---|---|
| Professional fees | **$** | **60,000** | $ | 65,000 | $ | 276,491 |
| Salaries and benefits [(1)] | | **450,522** | | 101,200 | | 404,800 |
| Share-based payments | | **1,551,850** | | 1,471,300 | | 768,020 |
| Directors' fees | | **102,500** | | 70,000 | | 70,000 |
| | **$** | **2,164,872** | $ | 1,707,500 | $ | 1,519,311 |

(1) Effective May 1, 2019, the Chairman has deferred payment of his salary of $8,000 per month. The Company owes $256,000 to the Chairman as at December 31, 2021 (2020 - $160,000; 2019 - $64,000), which is recorded in accounts payable.

### *(b) Administrative Services Agreements*

The Company recovers a portion of rent, office and license expenses from Azucar pursuant to an Administrative Services Agreement dated May 15, 2015 and First Amending Agreement dated December 16, 2015 between the Company and Azucar.

The Company also recovers a portion of rent, office and license expenses from Almadex pursuant to an Administrative Services Agreement dated March 29, 2018 between the Company and Almadex.

During the year ended December 31, 2021, the Company received $412,812 (2020 - $935,872; 2019 - $639,320) from Azucar for administrative services fees included in other income and received $969,532 (2020 - $468,227; 2019 - $320,093) from Almadex for administrative services fees included in other income.

At December 31, 2021, included in accounts receivable is $15,063 (2020 - $81,623) due from Azucar and $69,298 (2020 - $40,678) due from Almadex in relation to expenses recoveries.

Under the Administrative Services Agreements, the Company is the sole and exclusive manager of Azucar and Almadex that provides general management services, office space, executive personnel, human resources, geological technical support, accounting and financial services at cost with no mark-up or additional direct charge. The three companies are considered related parties though common directors and officers.

### *(c) Other related party transactions*

At December 31, 2021, the Company accrued $72,130 (2020 - $37,689) payable to Almadex for exploration and drilling services in Mexico.

During the year ended December 31, 2021, the Company employed the Chairman's daughter for a salary of $41,300 less statutory deductions (2020 - $41,300; 2019 - $41,300) for marketing and administrative services provided to the Company.

*Expressed in Canadian dollars*

## 12. Net loss per share

*Basic and diluted net loss per share*

The calculation of basic net loss per share for the year ended December 31, 2021 was based on the loss attributable to common shareholders of $2,668,254 (2020 - $3,129,368; 2019 - $3,763,075) and a weighted average number of common shares outstanding of 133,842,894 (2020 - 117,264,220; 2019 - 111,726,719).

The calculation of diluted net loss per share for the year ended December 31, 2021, 2020 and 2019 did not include the effect of stock options and warrants, as they were considered to be anti-dilutive.

## 13. Supplemental cash flow information

Supplemental information regarding non-cash transactions is as follows:

| **Investing and financing activities** | **December 31, 2021** | December 31, 2020 | December 31, 2019 |
|---|---|---|---|
| Exploration and evaluation assets expenditures included in trade and other payables | **$ 89,203** | $ 48,038 | $ 166,154 |
| Right-of-use assets | **(508,799)** | - | (394,654) |
| Gold in trust | **-** | - | (2,790,858) |
| Gold loan payable | **-** | - | 2,412,534 |
| Derivative financial liabilities | **-** | - | 378,324 |
| Warrant liability | **2,371,174** | - | - |
| Fair value of finders' warrants | **130,731** | - | - |
| Lease liabilities | **508,799** | - | 394,654 |
| Fair value of cash stock options transferred to share capital on exercise of options | **177,250** | 51,980 | - |
| Fair value of cashless stock options transferred to share capital on exercise of options | **-** | 178,480 | - |

*Expressed in Canadian dollars*

## 13. Supplemental cash flow information *(Continued)*

Supplemental information regarding the split between cash and cash equivalents is as follows:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Cash | **$ 2,133,076** | $ 1,234,698 |
| Term Deposits | **8,037,300** | 1,300,000 |
| | **$ 10,170,376** | $ 2,534,698 |

## 14. Income Taxes

**(a)** The provision for income taxes differs from the amounts computed by applying the Canadian statutory rates to the net loss before income taxes due to the following:

| | **December 31, 2021** | December 31, 2020 | December 31, 2019 |
|---|---|---|---|
| Loss before income taxes | **$ (2,354,113)** | $ (3,129,368) | $ (3,763,075) |
| Statutory rate | **27.00%** | 27.00% | 27.00% |
| Expected income tax | **(635,611)** | (844,929) | (1,016,030) |
| Effect of different tax rates in foreign jurisdictions | **5,281** | 27,574 | (23,478) |
| Non-deductible share-based payments | **505,116** | 481,815 | 251,942 |
| Other permanent items | **(620,413)** | 1,937 | 10,121 |
| Change in deferred tax assets not recognized | **733,447** | 300,505 | 50,106 |
| Share issuance costs | **(331,660)** | (80,711) | (2,638) |
| True-ups and other | **657,981** | 113,809 | 729,977 |
| Deferred income tax (recovery) expense | **$ 314,141** | $ - | $ - |

***(b)*** The Company's deferred income tax liability relates to the Mexican income tax and Special Mining Duty ("SMD") associated with the Tuligtic project.

*Expressed in Canadian dollars*

## 14. Income Taxes *(Continued)*

The significant components of deferred income tax assets (liabilities) are as follows:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Deferred tax assets | | |
| Non-capital losses | **$ 3,818,755** | $ 4,132,896 |
| Deferred tax liabilities | | |
| Exploration and evaluation assets | **(5,567,776)** | (5,567,778) |
| Net deferred tax liabilities | **$ (1,749,021)** | $ (1,434,882) |

**(c)** Deductible temporary differences, unused tax losses and unused tax credits for which no deferred tax assets have been recognized are attributable to the following:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Non-capital loss carry forwards | **$ 23,308,252** | $ 21,385,090 |
| Capital loss carry forwards | **24,538,993** | 24,538,993 |
| Exploration and evaluation assets | **8,188,922** | 8,188,922 |
| Share issue costs | **1,293,588** | 807,644 |
| Property, plant and equipment | **372,155** | - |
| Donations | **32,960** | 32,960 |
| Investment tax credit | **223,873** | 239,849 |
| | **$ 57,958,743** | $ 55,193,458 |

At December 31, 2021, the Company had operating loss carry forwards available for tax purposes in Canada of $23,308,252 (2020 - $23,680,582) which expire between 2032 and 2041.

## 15. Financial instruments

The fair values of the Company's cash and cash equivalents, accounts receivable and trade and other payables approximate their carrying values because of the short-term nature of these instruments.

Except for warrant liability and derivative financial liabilities, the Company does not carry any financial instruments at FVTPL.

The Company is exposed to certain financial risks, including currency risk, credit risk, liquidity risk, interest rate risk and commodity and equity price risk.

## 15. Financial instruments *(Continued)*

### (a) Currency risk

The Company's property interests in Mexico make it subject to foreign currency fluctuations and inflationary pressures which may adversely affect the Company's financial position, results of operations and cash flows. The Company is affected by changes in exchange rates between the Canadian dollar, the US dollar and the Mexican peso. The Company does not invest in foreign currency contracts to mitigate the risks.

As at December 31, 2021, the Company is exposed to foreign exchange risk through the following monetary assets and liabilities denominated in currencies other than the functional currency of the applicable subsidiary:

| All amounts in Canadian dollars | **US dollar** | **Mexican peso** |
|---|---|---|
| Cash and cash equivalents | $ 5,805,604 | $ 330,983 |
| Accounts receivable and prepaid expenses | 5,933 | 51 |
| Gold in trust | 915,995 | - |
| Total assets | $ 6,727,532 | $ 331,034 |
| | | |
| Trade and other payables | $ 5,827 | $ 88,947 |
| Gold loan payable | 3,227,545 | - |
| Derivatives financial liabilities | 391,620 | - |
| Total liabilities | $ 3,624,992 | $ 88,947 |
| | | |
| **Net assets** | $ 3,102,540 | $ 242,087 |

A 10% change in the US dollar exchange rate relative to the Canadian dollar would change the Company's net loss by $310,000.

A 10% change in the Mexican peso relative to the Canadian dollar would change the Company's net loss by $24,000.

### (b) Credit risk

The Company's cash and cash equivalents are held in large financial institutions, located in both Canada and Mexico. Cash equivalents mature at less than ninety days during the twelve months following the statement of financial position date. The Company's accounts receivable consist of amounts due from related parties which were subsequently collected.

To mitigate exposure to credit risk on cash and cash equivalents, the Company has established policies to limit the concentration of credit risk with any given banking institution where the funds are held, to ensure counterparties demonstrate minimum acceptable credit risk worthiness and ensure liquidity of available funds.

As at December 31, 2021, the Company's maximum exposure to credit risk is the carrying value of its cash and cash equivalents, and accounts receivable.

## 15. Financial instruments *(Continued)*

### (c) Liquidity risk

Liquidity risk is the risk that the Company will not be able to meet its financial obligations as they fall due. The Company manages liquidity risk through the management of its capital structure.

Trade and other payables are due within twelve months of the statement of financial position date.

### (d) Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. The Company is exposed to varying interest rates on cash and cash equivalents. The Company has no debt bearing variable interest rate.

A 1% change in the interest rate would change the Company's net loss by $102,000.

### (e) Commodity and equity price risk

The ability of the Company to explore its exploration and evaluation assets and the future profitability of the Company are directly related to the market price of gold and other precious metals. The Company monitors gold prices to determine the appropriate course of action to be taken by the Company. Equity price risk is defined as the potential adverse impact on the Company's performance due to movements in individual equity prices or general movements in the level of the stock market.

### (f) Classification of financial instruments

IFRS 13 establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value as follows:

Level 1 – quoted prices (unadjusted) in active markets for identical assets or liabilities;

Level 2 – inputs other than quoted prices included in Level 1 that are observable for the asset or liability, either directly (i.e. as prices) or indirectly (i.e. derived from prices); and

Level 3 – inputs for the asset or liability that are not based on observable market data (unobservable inputs).

The following table sets forth the Company's financial assets and liabilities measured at fair value by level within the fair value hierarchy.

| | Level 1 | Level 2 | Level 3 | Total |
|---|---|---|---|---|
| | $ | $ | $ | $ |
| Derivative financial liabilities | - | 391,620 | - | 391,620 |
| Warrant liability | - | 623,290 | - | 623,290 |

*Expressed in Canadian dollars*

## 16. Management of capital

The Company considers its capital to consist of components of equity. The Company's objectives when managing capital are to safeguard the Company's ability to continue as a going concern in order to pursue the exploration of its exploration and evaluation assets and to maintain a flexible capital structure which optimizes the costs of capital at an acceptable risk.

The Company manages the capital structure and makes adjustments to it in light of changes in economic conditions and the risk characteristics of the underlying assets. To maintain or adjust the capital structure, the Company may attempt to issue new shares and, acquire or dispose of assets.

In order to maximize ongoing exploration efforts, the Company does not pay out dividends. The Company's investment policy is to invest its short-term excess cash in highly liquid short-term interest-bearing investments with short term maturities, selected with regards to the expected timing of expenditures from continuing operations.

The Company expects its current capital resources will be sufficient to carry its exploration plans and operations for the foreseeable future. There were no changes to the Company's approach to the management of capital during the period.

## 17. Segmented information

The Company operates in one reportable operating segment, being the acquisition and exploration of mineral resource properties.

The Company's non-current assets are located in the following geographic locations:

| | **December 31, 2021** | December 31, 2020 |
|---|---|---|
| Canada | **$ 587,684** | $ 205,898 |
| United States | **13,968,566** | 13,968,566 |
| Mexico | **61,434,031** | 58,608,820 |
| | **$ 75,990,281** | $ 72,783,284 |

## 18. Subsequent events

On February 17, 2022, the Company announced that the Supreme Court of Justice of Mexico (SCJN) reached a decision in respect of the mineral title lawsuit involving the Company's minerals claims. The draft decision determines that the Mexican mineral title law is constitutional, but that before issuing Almaden's mineral titles, the Ministry of the Economy should have provided for a consultation procedure with relevant indigenous communities. The draft orders the Ministry of the Economy to declare Almaden's mineral titles ineffective and to re-issue them following the Ministry's compliance with its obligation to carry out the necessary procedures to consult with indigenous communities. The final decision of the SCJN may be modified and differ from the draft described above. The decision will take effect at the time of official notification of the decision to the Company which is expected in April 2022.

## 18. Subsequent events *(Continued)*

On March 7, 2022, the Company granted employees, consultants, officers and directors an aggregate of 1,125,000 stock options in accordance with the terms of the Company's stock option plan, each of which is exercisable into one common share at an exercise price of $0.38 per share until March 7, 2027.

# Almaden Minerals Ltd.
# Corporate Organizational Chart
# December 31, 2021

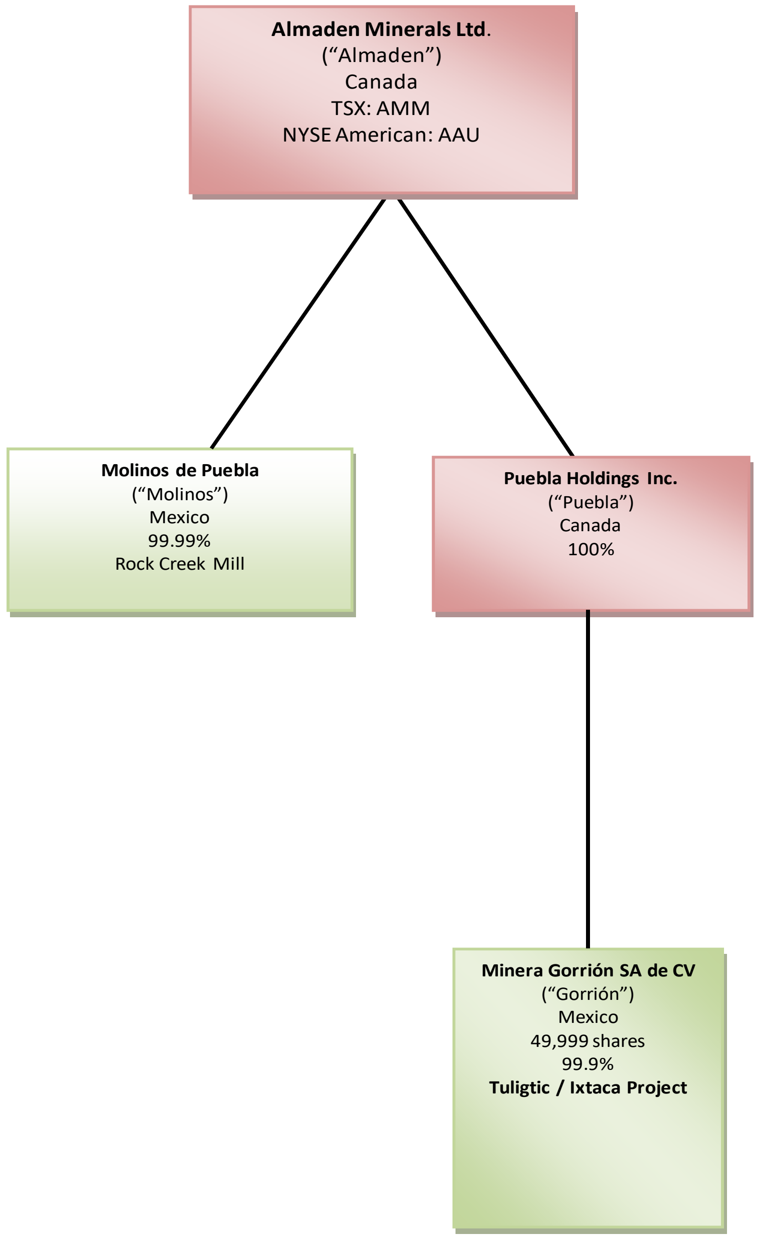


**EXHIBIT 12.1**

**SECTION 302 OF THE SARBANES-OXLEY ACT**
**CEO CERTIFICATION**

I, Morgan Poliquin, certify that:

1. I have reviewed this annual report on Form 20-F of Almaden Minerals Ltd.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Company as of, and for, the periods presented in this report;

4. The Company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Company and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the Company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the Company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting; and

5. The Company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Company's auditors and the audit committee of the Company's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Company's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Company's internal control over financial reporting.

Date: April 28, 2022

*/s/Morgan Poliquin*

Morgan Poliquin
Chief Executive Officer

**EXHIBIT 12.2**

**SECTION 302 OF THE SARBANES-OXLEY ACT**
**CFO CERTIFICATION**

I, Korm Trieu, certify that:

1. I have reviewed this annual report on Form 20-F of Almaden Minerals Ltd.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Company as of, and for, the periods presented in this report;

4. The Company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Company and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the Company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the Company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting; and

5. The Company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Company's auditors and the audit committee of the Company's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Company's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Company's internal control over financial reporting.

Dated: April 28, 2022

*/s/Korm Trieu*
Korm Trieu
Chief Financial Officer

**EXHIBIT 13.1**

**SECTION 906 OF THE SARBANES-OXLEY ACT**
**CEO CERTIFICATION**

In connection with the annual report of Almaden Minerals Ltd. (the “Company”) on Form 20-F for the fiscal year ending December 31, 2021 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Morgan Poliquin, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

*/s/”Morgan Poliquin”*

Name: Morgan Poliquin
Title: Chief Executive Officer
April 28, 2022

**EXHIBIT 13.2**

**SECTION 906 OF THE SARBANES-OXLEY ACT**
**CFO CERTIFICATION**

In connection with the annual report of Almaden Minerals Ltd. (the "Company") on Form 20-F for the fiscal year ending December 31, 2021 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Korm Trieu, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/"*Korm Trieu"*

Name: Korm Trieu
Title: Chief Financial Officer
April 28, 2022

**Jesse J. Aarsen**
**Moose Mountain Technical Services**
**#210 1510 – 2nd Street North**
**Cranbrook, British Columbia, Canada V1C 3L2**

## CONSENT OF QUALIFIED PERSON

I, Jesse Aarsen, in connection with the Annual Report on Form 20-F for Almaden Minerals Ltd. for the year ended December 31, 2021 (the "20-F"):

(a) Consent to the public filing of the Technical Report Summary entitled "Ixtaca Gold-Silver Project, Puebla State, Mexico" dated April 28, 2022, that was prepared in accordance with Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission as an exhibit to the 20-F;

(b) Consent to the use of my name and my status as the "Qualified Person", or any information, reference, quotation or summarization from the Technical Report Summary for which I am responsible in the 20-F; and

(c) Confirm that I have read the portions of the 20-F relating to the Technical Report Summary, and that such portions of the 20-F fairly and accurately reflect such information.

Dated at Vancouver, BC, this 28th day of April, 2022

*"Jesse J. Aarsen"*

Jesse J. Aarsen, P.Eng
Moose Mountain Technical Services

# Ixtaca Gold-Silver Project
# Puebla State, Mexico

# S-K 1300 Technical Report Summary





Submitted to:
**Almaden Minerals Ltd.**

**Effective Date: 24 January 2019**

**Report Date: 28 April 2022**


**Report Authors:**
Jesse Aarsen, P.Eng.

**Company:**
Moose Mountain Technical Services
EGBC Permit to Practice #1003309

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# 1.0 Summary

## 1.1 Introduction

This Technical Report Summary ("TRS") on the Ixtaca project is a review and summary of the previous technical reports carried out up to and including the date of the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019 (the "Study", or "FS"). The 2019 study was filed as a Feasibility Study following Canadian NI 43-101 standards, 2014 CIM Definition Standards and 2019 CIM Best Practices Guidelines. However, since SK-1300 standards are different than those in Canada, such as a narrower range for cost estimates and contingencies, the 2019 report may not have met SK-1300 requirements for a Feasibility Study. The Company has informed the author that no significant technical work has been conducted subsequent to the Study and that all exploration, legal, permitting and other project updates subsequent to the Study are provided in the Company's public disclosure record. This TRS of the Ixtaca Gold-Silver Project (the "Project") has been prepared for Almaden Minerals Ltd. ("Almaden" or "the Company") by Moose Mountain Technical Services ("MMTS"). The Ixtaca Project is 100% owned by Almaden, subject to a 2% NSR owned by Almadex Minerals Ltd. ("Almadex"), and encompasses the Ixtaca Zone Deposit (Ixtaca Gold-Silver Deposit) that includes the Ixtaca Main, North, and Chemalaco Zones of the Tuligtic Property.

All currency amounts are referred to in U.S. dollars (USD) unless otherwise indicated.

The Study uses:

- The Rock Creek Mill with average throughput of 7,650 tonnes per day;
- A throughput ramp-up to 15,300 tonnes per day of mill feed in Year 5;
- Base case metal prices of $US 1275/oz gold and $US 17/oz silver (75:1 silver-to-gold ratio).

Study highlights**:**

- Average annual production of 108,500 ounces gold and 7.06 million ounces silver (203,000 gold equivalent ounces, or 15.2 million silver equivalent ounces) over first 6 years;
- After-tax IRR of 42% and after-tax payback period of 1.9 years;
- After-tax NPV of $310 million at a 5% discount rate;
- Initial Capital of $174 million;
- Conventional open pit mining with a Proven and Probable Mineral Reserve of 1.39 million ounces of gold and 85.2 million ounces of silver (See Table 1-2);
- Pre-concentration uses ore sorting to produce a total of 48 million tonnes of mill feed averaging 0.77 g/t gold and 47.9 g/t silver (1.41 g/t gold equivalent over life of mine; 2.03 g/t gold equivalent over first 6 years);
- Average LOM annual production of 90,800 ounces gold and 6.14 million ounces silver (173,000 gold equivalent ounces, or 12.9 million silver equivalent ounces);
- Operating cost $716 per gold equivalent ounce, or $9.55 per silver equivalent ounce;

- All-in Sustaining Costs ("AISC"), including operating costs, sustaining capital, expansion capital, private and public royalties, refining and transport of $850 per gold equivalent ounce, or $11.30 per silver equivalent ounce.
- Elimination of tailings dam by using filtered tailings significantly reduces the project footprint and water usage.

## 1.2 Property Description and Location

The Tuligtic Property (the "Property") is held 100 percent (%) by Compania Minera Gorrión S.A. de C.V. ("Minera Gorrión"), a wholly owned subsidiary of Almaden Minerals Ltd. (together referred to as "Almaden"). The Property originally consisted of approximately 14,000 hectares, but during 2015 Almaden filed an application to reduce the aggregate claim size to those areas still considered prospective. The Tuligtic Property currently comprises seven mineral claims totalling 7,220 hectares (ha) located within Puebla State, 80 kilometres (km) north of Puebla City, and 130km east of Mexico City. Almadex Minerals Ltd. holds a 2% Net Smelter Return Royalty (NSR) on the Property. The Company has informed the author that material changes to the claim size and legal and permitting status of the Property since the date of the Study are provided in the Company's public disclosure record since that time.

## 1.3 Accessibility, Climate, Local Resources, Infrastructure, Physiography

The Tuligtic Property is road accessible and is located within Puebla State, 80 kilometres (km) north of Puebla City, and 130km east of Mexico City. The Ixtaca Deposit within the Tuligtic Property is located 8km northwest of the town of San Francisco Ixtacamaxtitlán, the county seat of the municipality of Ixtacamaxtitlán, Puebla State.

The topography on the Tuligtic Property is generally moderate to steep hills with incised stream drainages. Elevation ranges from 2,300 metres (m) above sea level in the south to 2,800m in the north. Vegetation is dominantly cactus and pines and the general area is somewhat cultivated with subsistence vegetables, bean and corn crops. The region has a temperate climate with average temperatures ranging from 16°C in June to 12°C in December. The area experiences an average of 600 to 720 mm of precipitation annually with the majority falling during the rainy season, between June and September.

Electricity is available on the Property from the national electricity grid that services nearby towns such as Santa Maria and Zacatepec.

At the time of the Study, Almaden had secured through purchase agreements with numerous independent owners approximately 1,139 hectares required for the proposed production plan. This was completed through friendly land purchase agreements with locals, considering fair market value. There are no communities that require relocation as part of the Project development. Mineral Claim owners have the right to obtain the temporary occupancy, or creation of land easements required to carry out exploration and mining operations, under the Federal Mining Law.

## 1.4 History

Throughout the Property there is evidence that surficial clay deposits have once been mined prior to Almaden's acquisition of the project. Almaden acquired the Cerro Grande claims of the Tuligtic Property by staking in 2001 following the identification of surficial clay deposits that have been interpreted to represent high-level epithermal alteration. Subsequent geologic mapping, rock, stream silt, soil sampling, and induced polarization (IP) geophysical surveys identified porphyry copper and epithermal gold targets within an approximately 5 x 5km area of intensely altered rock. In July 2010, Almaden initiated a diamond drilling program to test epithermal alteration within the Tuligtic Property, resulting in the discovery of the Ixtaca Zone. The first hole, TU-10-001 intersected 302.42 metres (m) of 1.01g/t Au and 48g/t Ag and multiple high grade intervals including 44.35m of 2.77g/t Au and 117.7g/t Ag.

## 1.5 Geological Setting and Mineralization

The Tuligtic Property covers a roughly 5 by 5 kilometre area of high level epithermal alteration characterised by intense kaolinite-alunite alteration and silicification in volcanic rocks. This alteration is interpreted to represent the upper portion of a well preserved epithermal system.

The epithermal system is hosted by both volcanic rocks and older carbonate units. Minor disseminated and vein mineralisation is hosted by the volcanic rocks (referred to as tuff, ash and volcanics). The bulk of the deposit is hosted by the carbonate units as vein swarms.

Within the Tuligtic Property, variably cherty and bedded light grey to dark coloured limestone (referred to as limestone) of the Late Jurassic to Early Cretaceous Upper Tamaulipas formation is underlain by transitional calcareous clastic rocks including minor brown grainstones, and thinly bedded grey, black and green coloured shaley units (referred to as shale or black shale). The brown grainstone marks the transition between limestone and shale. During the Laramide orogeny, this entire carbonate package was intensely deformed into a series of thrust-related east verging anticlines. The shale units appear to occupy the cores of the anticlines while the limestone units occupy the cores of major synclines at the Ixtaca Zone. The carbonate units are crosscut by intensely altered intermediate composition dykes. The deformed Mesozoic sedimentary sequence is discordantly overlain by epithermal altered Cenozoic bedded crystal tuff of the upper Coyoltepec subunit (referred to as volcanic, ash and tuff).

The Ixtaca deposit is a low sulphidation epithermal vein system. Most of the gold silver mineralisation occurs as zones of high grade vein and veinlets (vein swarms) in the carbonate basement units. A small portion of the gold silver mineralisation occurs above the unconformity as disseminated mineralisation in the altered volcanic rocks. The mineralisation is not oxidised and is hosted by classic banded and colloform low-sulphidation style carbonate-quartz veining. Spatially widespread polished section and SEM mineralogic studies of mineralised epithermal veins demonstrate that the gold is dominantly hosted by electrum (an alloy of gold and silver) and the gold-silver sulphide uytenbogaardtite ($Ag_3AuS_2$). Apart from electrum and uytenbogaardite, the dominant silver minerals are silver rich polybasite, pyrargerite, proustite and naumannite. The ore minerals are accompanied by minor pyrite, galena (no silver detected in the SEM work on the galena) and sphalerite. The mineral assemblage is very similar to other precious metal low sulphidation vein systems worldwide with low base metal contents.

To date two main vein orientations have been identified in the Ixtaca deposit:

- 060 degrees trending sheeted veins hosted by limestone;
- 330 degrees trending veins hosted by shale;

The bulk of the resource and over 80% of the recoverable metal in the FS is hosted by the limestone in the Main Ixtaca and Ixtaca North zones as swarms of sheeted and anastomosing high grade banded epithermal veins. There is no disseminated mineralisation within the host rock to the vein swarms, which is barren and unaltered limestone. To the northeast of the limestone hosted mineralisation, the Chemalaco zone, a 330 striking and west dipping vein zone hosted by shale, also forms part of the deeper resource.

The Main Ixtaca and Ixtaca North vein swarms are spatially associated with two altered and mineralised sub parallel ENE (060 degrees) trending, sub-vertical to steeply north dipping dyke zones. The Main Ixtaca dyke zone is approximately 100m wide and consists of a series of 2m to over 20m true width dykes. The Ixtaca North dyke zone is narrower and comprises a steeply north-dipping zone of two or three discrete dykes ranging from 5 to 20m in width.

Individual veins within the Main Ixtaca and Ixtaca North vein zones cannot be separately modelled. Wireframes were created that constrain the higher grade, more densely veined areas, however as the vein swarms are anastomosing and sheeted in nature, these wireframes include significant barren limestone material enclosed by veins within the vein swarm.

The Main and North zones have been defined over 650m and tested over 1000m strike length with high-grade mineralization intersected to depths up to 350m vertically from surface. The strike length of the Chemalaco Zone has been extended to 450m with high-grade mineralization intersected to a vertical depth of 550m, or approximately 700m down-dip. In 2016 Almaden conducted a drill program to test for additional veins to the north of the Ixtaca North Zone. This program resulted in better definition of the Ixtaca North zone and successfully demonstrated that limestone mineralisation remains open to the north and at depth.

The Chemalaco Zone dips moderately-steeply at approximately 22 degrees to the WSW. An additional sub-parallel zone has been defined underneath the Chemalaco Zone dipping 25 to 50 degrees to the WSW, intersected to a vertical depth of 250m, approximately 400m down-dip over a 250m strike length. The Chemalaco zone remains open to depth and along strike to the northwest. Additional parallel veins further to the east have been identified in core and the zone remains open in this direction as well.

## 1.6 Exploration

Between 2001 and 2013, Almaden's exploration at the Tuligtic Property included geologic mapping and prospecting, alteration mineralogical characterization, rock and soil geochemical sampling, ground magnetics, IP and resistivity, Controlled Source Audio-frequency Magnetotelluric (CSAMT), and Controlled Source Induced Polarization (CSIP) geophysical surveys resulting in the identification of additional anomalous zones including the Ixtaca, Ixtaca East, Caleva, Azul, Sol zones, Tano, and SE Alteration zones. Since 2010, a total of 590 diamond drillholes have been drilled at the Tuligtic Property, totalling 192,121 m (not including geotechnical holes). During this timeframe the Company focussed on Ixtaca Zone Deposit resource and development work which has meant that many of the epithermal targets have not yet been tested by drilling.

## 1.7 Drilling

The 230 holes drilled between July, 2010 and November 13, 2012 totalled 83,346m and identified the Main Ixtaca, Ixtaca North and Chemalaco zones. Diamond drilling at 25 to 50m section spacing defined the Main Ixtaca and Ixtaca North as NE-oriented sub-vertical zones and a strike length of approximately 650m. High-grade mineralization was intersected to depths of 200 to 300m vertically from surface. The

Chemalaco Zone was identified as dipping moderately-steeply over a strike length of 350m along a series of five ENE (070 degrees) oriented sections spaced at intervals of 50 to 100m. High grade mineralization having a true-width ranging from less than 30 and up to 60m was intersected beneath approximately 30m of tuff to a vertical depth of 550m, or approximately 600m down-dip.

During 2013 and subsequent to the November 13, 2012 cut-off of the maiden mineral Resource Estimate, Almaden drilled 198 holes totalling 55,467m. A total of 79 holes were drilled at the Main Ixtaca Zone, 40 holes at the Ixtaca North Zone and 79 holes at the Chemalaco Zone. Drilling during 2013 focused on expanding the deposit and upgrading resources previously categorized as Inferred to higher confidence Measured and Indicated categories.

Drilling during 2014 and 2015, subsequent to the 2014 Resource Estimate, Almaden had completed 52 additional drill holes totalling 17,128m (49 within the Ixtaca Deposit and 3 exploration drill holes outside the Ixtaca Deposit. Of the holes drilled within the Ixtaca Deposit during 2014 through 2016, 4 were metallurgical holes that twinned existing holes. The remainder were exploration holes testing mineralized zones at depth.

Drilling during 2014 through 2016 comprised 86 additional drill holes totalling 28,131m (including 3 exploration drill holes at the (Casa) Azul Zone, and 1 at the Tano Zone). Of the holes drilled within the Ixtaca Deposit during 2014, 2015, and 2016, 4 were metallurgical holes that twinned existing holes and 27 were geotechnical holes. During 2016 a total of 33 holes totalling 10,514m further delineated and expanded the Ixtaca North Zone mineralization as well as identifying new veins to the north and at depth. The remainder were exploration holes testing mineralized zones at depth below the PEA pit described in this report. Past drilling at the Casa Azul zone intersected porphyritic intrusive and limestone-skarn mineralization returning locally elevated zinc, copper and silver values.

Drilling during 2017 through 2018 comprised 76 additional drill holes totalling 25,176m. Of the holes drilled within the Ixtaca Deposit during 2017 and 2018, 4 were metallurgical holes that twinned existing holes and 11 were geotechnical holes. During 2017 and 2018 a total of 21 additional holes were drilled in the Main zone, 18 in the Ixtaca North zone, and 5 additional holes in the Chemalaco Zone. The remainder were exploration holes drilled at surface in the surrounding areas.

## 1.8 Sample Preparation, Analyses and Security

All strongly altered or epithermal-mineralized intervals of core have been sampled. Almaden employs a maximum sample length of 2 to 3m in unmineralized lithologies, and a maximum sample length of 1m in mineralized lithologies. During the years 2010 and 2011 Almaden employed a minimum sample length of 20cm. The minimum sample length was increased to 50cm from 2012 onwards to ensure the availability of sufficient material for replicate analysis. Drill core is half-sawn using industry standard diamond core saws. After cutting, half the core is placed in a new plastic sample bag and half are placed back in the core box. Sample numbers are written on the outside of the sample bags and a numbered tag placed inside the bag. Sample bags are sealed using a plastic cable tie. Sample numbers are checked against the numbers on the core box and the sample book.

ALS Minerals (ALS) sends its own trucks to the Project to take custody of the samples at the Santa Maria core facility and transports them to its sample preparation facility in Guadalajara or Zacatecas, Mexico.

Prepared sample pulps are then forwarded by ALS personnel to the ALS North Vancouver, British Columbia laboratory for analysis.

Drill core samples have been subject to gold determination via a 50 gram (g) AA finish FA fusion with a lower detection limit of 0.005ppm Au (5ppb) and upper limit of 10ppm Au (ALS method Au-AA24). Over limit gold values (>10ppm Au) are subject to gravimetric analysis (ALS method Au-GRA22). Silver, base metal and pathfinder elements for drill core samples are analyzed by 33-element ICP-AES, with a 4-acid digestion, a lower detection limit of 0.5ppm Ag and upper detection limit of 100ppm Ag (ALS method ME-ICP61). Over limit silver values (>100ppm Ag) are subject to 4-acid digestion ICP-AES analysis with an upper limit of 1,500ppm Ag (ALS method ME-OG62). Ultra-high grade silver values (>1,500ppm Ag) are subject to gravimetric analysis with an upper detection limit of 10,000ppm Ag (Ag-GRA22).

Drill core samples are subject to Almaden's internal QA/QC program that includes the insertion of analytical standard, blank and duplicate samples into the sample stream. A total of fifteen QA/QC samples are present in every 100 samples sent to the laboratory. QA/QC sample results are reviewed following receipt of each analytical batch. QA/QC samples falling outside established limits are flagged and subject to review and possibly re-analysis, along with the ten preceding and succeeding samples.

## 1.9 Data Verification

An independent consultant was retained to audit the Tuligtic Property exploration database, and to review the exploration program and QA/QC protocols at site. The consultant first visited the Tuligtic Property from October 17 to October 20, 2011. Additional visits to the Tuligtic Property were carried out on September 23, 2012, November 20, 2013, and September 12, 2019. During each of the property visits the consultant completed a traverse of the Ixtaca Zone, observed the progress of ongoing diamond drilling operations, and recorded the location of select drill collars. Almaden's complete drill core library was made available and the consultant reviewed mineralized intercepts from a series of holes across the Ixtaca Zone. The consultant collected quartered drill core samples as 'replicate' samples from select reported mineralized intercepts.

Based on the results of the traverses, drill core review, and 'replicate' sampling the consultant has no reason to doubt the reported exploration results. The analytical data is considered to be representative of the drill samples and suitable for inclusion in the Resource Estimate. In addition to the in-house Quality Assurance Quality Control (QAQC) measures employed by Almaden, the consultant completed an independent review of Almaden's drillhole and QAQC databases. The review included an audit of approximately 8% of drill core analyses used in the mineral resource estimate. A total of 10,885 database gold and silver analyses were verified against original analytical certificates. Similarly, 10% of the original drill collar coordinates and down hole orientation survey files were checked against those recorded in the database; and select drill sites were verified in the field by the consultant. The QAQC audit included independent review of blank, field duplicate and certified standard analyses. All QAQC values falling outside the limits of expected variability were flagged and followed through to ensure completion of appropriate reanalyses. No discrepancies were noted within the drillhole assay database, and all QAQC failures were dealt with and handled with appropriate reanalyses.

## 1.10 Metallurgy

Metallurgical test work and mineralogy has been undertaken on each of the Ixtaca Zone metallurgical domains between 2012 and 2018 at a number of laboratories.

There are 3 distinct metallurgical domains hosting precious metal mineralization at Ixtaca:

- Limestone ore contains most of the economic mineralization and contributes 75% of metal production in the FS (90% of metal production in the payback period).
- Volcanic ore contributes 12% of metal production in the FS.
- Black Shale ore contributes 13% of metal production in the FS.

The testwork has consistently demonstrated that economic mineralization responds well to processing by pre-concentration with XRT ore sorting, gravity concentration, intensive leaching of gravity concentrate, flotation, flotation concentrate regrind, leaching with 24 hours Carbon-in-Leach (CIL) to complete gold leaching and 72 hours of agitated leach to complete silver leaching.

The majority of economic mineralization is fine grained, requiring a primary grind $P_{80}$ of 75 µm for liberation, and regrind prior to leaching.

Test work has demonstrated repeatable good overall recoveries for gold and silver in the primary Limestone ore domain. Silver over all recoveries from the volcanic and black shale domains is good. Gold recoveries in volcanic and black shale are poor due to refractory mineralization in the volcanic and preg-robbing organic carbon in the black shale. Ongoing test work indicates that gold recovery improvements in the black shale can be achieved with organic carbon rejection by carbon pre-flotation or flotation cleaning using an organic carbon depressant.  Good carbon rejection and subsequent leach recovery was also achieved by ultra fine gravity concentration of black shale concentrates.

## 1.11 Resource Estimate

On January 31, 2013 the Company announced a maiden resource on the Ixtaca Zone, which was followed by a resource update on January 22, 2014 and another on May 17, 2017.  Since that time an additional 104 holes have been completed, and this data is also included in the Mineral Resource Estimate, and summarised in Table 1-1. The data available for the resource estimation consisted of 649 drill holes assayed for gold and silver. Wireframes constraining mineralised domains were constructed based on geologic boundaries defined by mineralisation intensity and host rock type. Higher grade zones occur where there is a greater density of epithermal veining. These higher grade domains have good continuity and are cohesive in nature.

Of the total drill holes, 558 intersected the mineralised solids and were used to make the resource estimate.  Capping was completed to reduce the effect of outliers within each domain. Uniform down hole 3 meter composites were produced for each domain and used to produce semivariograms for each variable. Grades were interpolated into blocks 10 x 10 x 6 meters in dimension by ordinary kriging. Specific gravities were determined for each domain from drill core.  Estimated blocks were classified as either Measured, Indicated or Inferred based on drill hole density and grade continuity.

Table 1-1 shows the Measured, Indicated and Inferred Mineral Resource Statement with the Base Case 0.3 g/t AuEq Cut-Off highlighted from the 8 July 2018 Resource Statement. Also shown are the 0.5, 0.7

and 1.0 g/t AuEq cut-off results. AuEq calculation is based on average prices of $1250/oz gold and $18/oz silver.

**Table 1-1 Ixtaca Zone Measured, Indicated and Inferred Mineral Resource Statement**

| MEASURED RESOURCE | | | | | | | |
|---|---|---|---|---|---|---|---|
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **43,380,000** | **0.62** | **36.27** | **1.14** | **862** | **50,590** | **1,591** |
| 0.50 | 32,530,000 | 0.75 | 44.27 | 1.39 | 788 | 46,300 | 1,454 |
| 0.70 | 25,080,000 | 0.88 | 51.71 | 1.63 | 711 | 41,700 | 1,312 |
| 1.00 | 17,870,000 | 1.06 | 61.69 | 1.95 | 608 | 35,440 | 1,118 |
| INDICATED RESOURCE | | | | | | | |
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **80,760,000** | **0.44** | **22.67** | **0.77** | **1,145** | **58,870** | **1,994** |
| 0.50 | 48,220,000 | 0.59 | 30.13 | 1.02 | 913 | 46,710 | 1,586 |
| 0.70 | 29,980,000 | 0.74 | 37.79 | 1.29 | 715 | 36,430 | 1,240 |
| 1.00 | 16,730,000 | 0.96 | 47.94 | 1.65 | 516 | 25,790 | 888 |
| INFERRED RESOURCE | | | | | | | |
| AuEq Cut-off | Tonnes > Cut-off | Grade>Cut-off | | | Contained Metal x 1,000 | | |
| (g/t) | (tonnes) | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| **0.30** | **40,410,000** | **0.32** | **16.83** | **0.56** | **412** | **21,870** | **726** |
| 0.50 | 16,920,000 | 0.44 | 25.43 | 0.80 | 237 | 13,830 | 436 |
| 0.70 | 7,760,000 | 0.57 | 33.80 | 1.06 | 142 | 8,430 | 264 |
| 1.00 | 3,040,000 | 0.79 | 43.64 | 1.42 | 77 | 4,270 | 139 |

1. *Ixtaca Mineral Resources Estimate have an effective date of 8 July 2018.*
2. *Base Case 0.3 g/t AuEq Cut-Off grade is highlighted. Also shown are the 0.5, 0.7 and 1.0 g/t AuEq cut-off results. AuEq calculation based on average prices of $1250/oz gold and $18/oz silver. The Base Case cut-off grade includes consideration of the open pit mining method, 90% metallurgical recovery, mining costs of $1.82/t, average processing costs of $11.7, G&A costs of $1.81/t*
3. *Mineral Resources are reported inclusive of those Mineral Resources that have been converted to Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
4. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal or other relevant issues. The Mineral Resources have been classified according to the definitions outlined in the SEC Disclosure by Registrants Engaged in Mining Operations.*
5. *All figures were rounded to reflect the relative accuracy of the estimates and may result in summation differences.*

## 1.12 Geomechanical

A geomechanical investigation program on site for the Project was completed from February 12, 2018 to April 27, 2018. Drilling commenced on February 12, 2018 and was completed on April 23, 2018. The program was designed to characterize geomechanical conditions in support of the development of the FS pit design. The slope angle recommendations contained in this report may be used for final design and mine planning, subject to completion of the recommendations contained in Section 23.3.3 of this report. It was noted that all large earthwork and open pit projects at a final design level will be modified and changed based on slope monitoring, observed conditions, and recommendations of professional engineers engaged on the project.

Four major geomechanical domains have been identified in the project. The rock slopes are composed of limestone and shale and an ash tuff volcanic domain that controls the stability of the upper 50 to 250 meters (m) of the ground. The volcanic ash tuff domain is a very weak rock unit that has engineering properties similar to stiff soils. It is weak and easily erodible. A fourth domain of dikes was identified but is not a significant percentage of the final wall rock slopes. In the author's opinion,the quality and quantity of core hole data and rock mass characterization issufficient for a FS study.

### 1.12.1 Ash Tuff and Upper Volcanics

Rock quality designation (RQD) values of the volcanic domain are in the 0 to 20 range. Even though larger piece lengths were observed the rock hardness was less than R2 (weak rock with strengths less than 5 MPa) not meeting the RQD criteria. The rock mass rating (RMR76) ranges from 30 to 50, which indicates a weak and poor to fair quality rock mass.

When the ash tuff cuts are exposed they will be subjected to the deformation, erosion, and failure mechanisms because of their low strength. Even though the ash tuff slope cuts have been designed to meet the minimum slope acceptance criteria at a factor of safety of 1.3, some local slope failure mechanisms might occur that are not addressed by global or inter-ramp stability analysis. These failure mechanisms include gullying, piping, and erosion. These mechanisms will be exacerbated by precipitation onto exposed slopes that have not been vegetated or covered by erosion control. Berm and bench surfaces should be graded at 2° to 3° to assist drainage off benches.

### 1.12.2 Rock Units (Limestone, Shale, Dikes)

The rock units consist of limestone, shale, and dikes. Structural features (discontinuities) encountered during this field investigation consisted of joints, lithological contacts, veins, dikes, foliation, faults, shear zones, and fractures in these three domains.

The limestone domain is characterized as moderately strong rock with UCS values ranging from 10 to 40 megapascals (MPa). RQD values in the limestone range from 60 to 100. The limestone is moderately jointed and has a rock mass rating ranging from 50 to 70 indicating a good rock mass.

The shale domain is a weak rock mass with UCS values ranging from 5 to 20 MPa. The shale unit is a highly foliated and weak rock mass and has a varying foliation dipping between 40° to 50° at a dip direction of 250°. RQD values in the shale range from 50 to 100 and the rock mass rating ranges from 40 to 65, which indicates a fair to good quality rock mass. The bulk of the final wall will be controlled by the rock mass properties of the shale domain.

The intrusive dikes have not been differentiated in the geotechnical model as they will be governed by the strength of the shale or limestone rock mass. The dikes are characterized as strong with UCS values ranging from 50 to 70 MPa and have a RMR76 of 55 to 80 indicating the dikes are a strong and good rock mass where present.

## 1.13 Proposed Development Plan

A mining design, production schedule, and cost model has been developed for the Ixtaca Zone of the Tuligtic Property. This current work focuses on the near surface high grade limestone hosted portions of the Ixtaca Zone deposit. The mine schedule includes an open pit mining operation with a process plant to produce gold and silver doré. The plant will operate initially at an average plant throughput of 7,650 tonnes per day (tpd) and expanding to 15,300 tpd by Year 5. The process plant includes conventional crushing, ore sorting, grinding, gravity, flotation, and concentrate leaching using CIL. Mining will use a contractor owned and operated fleet.

A series of pit optimizations have been completed using the resource block model, applying a range of metal prices and recoveries, estimated costs for mining, processing, and pit slopes. The operational pits are designed based on the optimized shell, and the potentially mineable portion of the resource is estimated within those pits. The ultimate pit contains a total of 73.1 million tonnes of crusher feed at a strip ratio of 4.45:1. The crusher feed tonnages include mining recovery and mining loss & dilution. Mineral Reserves are shown in the Table below assuming a diluted NSR cut-off grade of $14/t and are stated as Run-of-Mine (ROM) which represent tonnes of ore delivered to the crusher (pre ore-sorting):

**Table 1-2 Recovered In-pit Reserve and Diluted Grade**

| | ROM Tonnes | Diluted Average Grades | | Contained Metal | |
|---|---|---|---|---|---|
| | (millions) | Au (g/t) | Ag (g/t) | Au - '000 oz | Ag - '000 oz |
| **Proven** | 31.6 | 0.70 | 43.5 | 714 | 44,273 |
| **Probable** | 41.4 | 0.51 | 30.7 | 673 | 40,887 |
| **TOTAL** | 73.1 | 0.59 | 36.3 | 1,387 | 85,159 |

*Notes to Mineral Reserve table:*

- *Mineral Reserves have an effective date of November 30, 2018.The qualified person responsible for the Mineral Reserves is Jesse Aarsen, P.Eng of Moose Mountain Technical Services.*
- *The cut-off grade used for ore/waste determination is NSR>=$14/t*
- *All Mineral Reserves in this table are Proven and Probable Mineral Reserves. The Mineral Reserves are not in addition to the Mineral Resources but are a subset thereof. All Mineral Reserves stated above account for mining loss and dilution.*
- *Associated metallurgical recoveries (gold and silver, respectively) have been estimated as 90% and 90% for limestone, 50% and 90% for volcanic, 50% and 90% for black shale.*
- *Reserves are based on a US$1,300/oz gold price, US$17/oz silver price and an exchange rate of US$1.00:MXP20.00.*
- *Reserves are converted from resources through the process of pit optimization, pit design, production schedule and supported by a positive cash flow model.*
- *Rounding as required by reporting guidelines may result in summation differences.*

The Ixtaca General Arrangement layout is show in Figure 1-1.

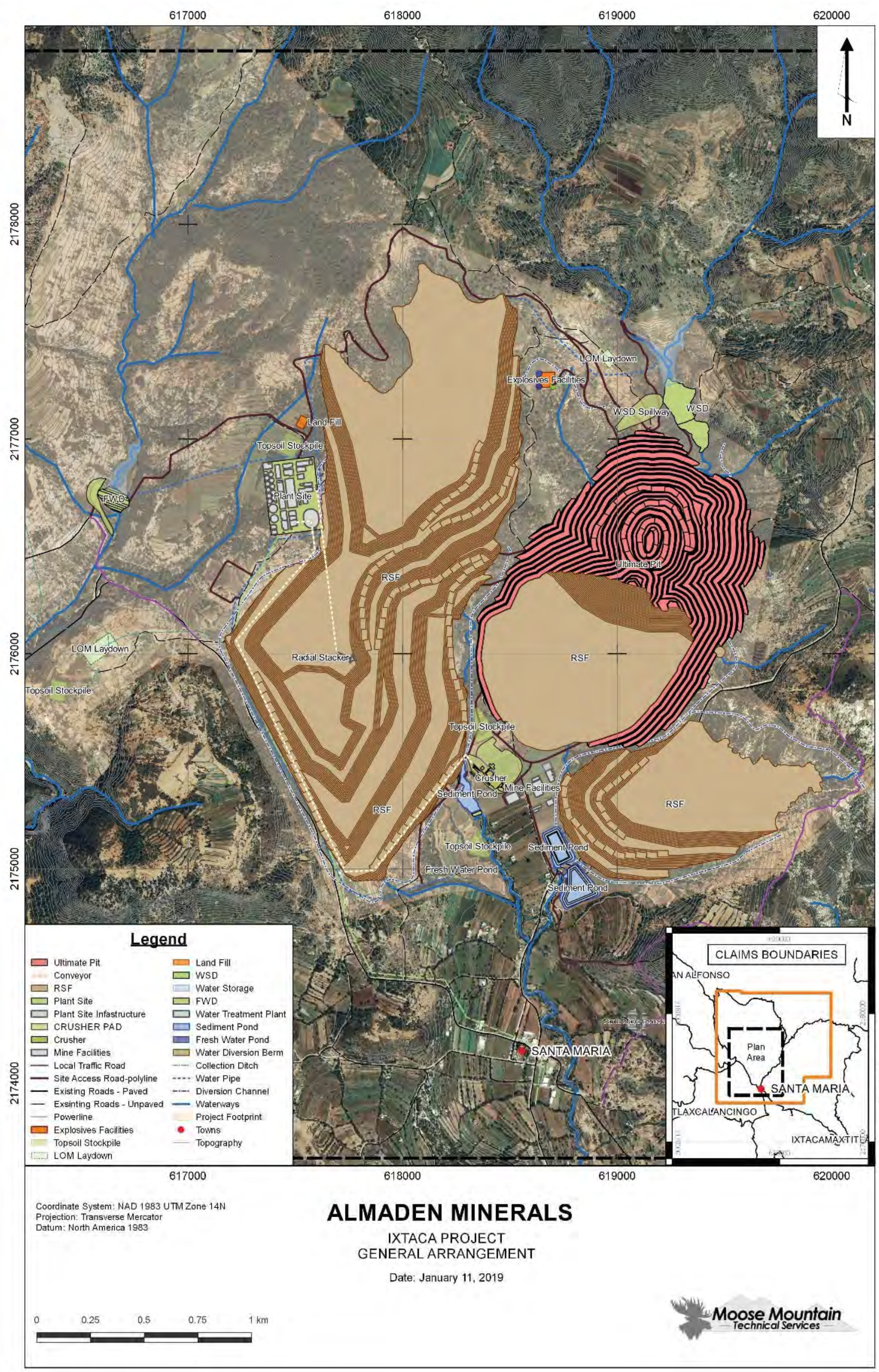



**Figure 1-1 Ixtaca General Arrangement**

## 1.14 Production and Processing

The Study incorporates the Rock Creek process plant which has been purchased by Almaden. Run of mine ore will be crushed in a three-stage crushing circuit to -9 mm.

Product from the secondary crusher will be screened in to coarse (+20mm), mid-size (12 to 20 mm), and fine (-12mm) fractions. Coarse and mid-size ore will be sorted by an XRT ore sort machine to eject waste rock. Fine ore will bypass the ore sorting and is sent directly to the mill.

The Study incorporates ore sorting, test work for which has shown the ability to separate barren or low grade limestone host rock encountered within the vein swarm from vein and veined material (see Almaden news release of July 16th 2018). Ore sort waste from Limestone and Black Shale is below waste/ore cutoff grade and is placed in the waste rock dump. Ore sort 'waste' from the Volcanic unit is low grade ore and will be stockpiled for processing later in the mine life. Ore sorting pre-concentration increases the mill feed gold and silver grades by 32% and 31% respectively compared to run of mine (ROM) grades. Table 1-3 shows ROM grades with ore sort waste removed from the ROM, and the resulting mill feed.

**Table 1-3 Ore Sort Mill Feed grade improvement**

| | | ROM Ore | Ore sort Waste | Mill Feed |
|---|---|---|---|---|
| Limestone | million tonnes | 51.5 | 18.8 | 32.7 |
| | Au g/t | 0.572 | 0.24 | 0.763 |
| | Ag g/t | 37.5 | 12.0 | 52.2 |
| Black Shale | million tonnes | 12.2 | 6.3 | 5.8 |
| | Au g/t | 0.517 | 0.25 | 0.806 |
| | Ag g/t | 44.4 | 20.0 | 70.8 |
| Volcanic | million tonnes | 9.4 | - | 9.4 |
| | Au g/t | 0.790 | - | 0.790 |
| | Ag g/t | 18.6 | - | 18.6 |
| **TOTAL** | million tonnes | 73.1 | 25.1 | 48.0 |
| | Au g/t | 0.591 | 0.24 | 0.773 |
| | Ag g/t | 36.3 | 14.0 | 47.9 |

Crushed ore is transported to the grinding circuit by an over land conveyor. Grinding to 75 microns is carried out by with ball milling in a closed circuit with cyclones. Cyclone underflow is screened and the screen undersize is treated in semi-batch centrifugal gravity separators to produce a gravity concentrate.

The gravity concentrate will be treated in an intensive cyanide leach unit with gold and silver recovered from electrowinning cells.

The cyclone overflow will be treated in a flotation unit to produce a flotation concentrate. After regrinding the flotation concentrate leaching will be carried out in 2 stages. CIL leaching for 24 hours will complete gold extraction, followed by agitated tank leaching to complete silver leaching. A carbon desorption process will recover gold and silver from the CIL loaded carbon, and a Merrill Crowe process will recover gold and silver from pregnant solution from the agitated leach circuit.

Cyanide destruction on leach residue is carried out using the $SO_2$/Air process. Final tailings are thickened and filtered then dry stacked and co-disposed with mine waste rock.

Average process recoveries from mill feed to final product over the life of mine are summarized in Table 1-4 for each ore type.

**Table 1-4 Average Life of Mine Process Recoveries from Mill Feed**

| | Gold | Silver |
|---|---|---|
| Limestone | 88.5% | 86.8% |
| Volcanic | 64.4% | 76.3% |
| Black Shale | 54.5% | 84.7% |

## 1.15 Tailings Co-disposal and Water Management

### 1.15.1 West T/RSF

The mine plan will not include a separate tailings management facility. Instead the tailings and waste rock will be co-disposed in the West Tailings and Rock Storage Facility (West T/RSF or Co-disposal). Tailings produced by the flotation process will be sent through a ceramic vacuum filter to achieve a volumetric moisture content of approximately 15% to 20%. The filtered tailings will be surrounded by a limestone waste rock buttress and will be deposited inside the buttress and compacted in layers with waste rock. Approximately 48 million tonnes of tailings and 216 million tonnes of waste rock consisting of limestone, volcanics, and black shale will be stored in the West Tailings and Rock Storage Facility.

### 1.15.2 Water Management

Diversion channels are designed around project facilities to manage upstream stormwater, runoff from RSF slopes and to minimize seepage into the open pit highwall. The channels route flow through sediment settling ponds before releasing water downstream of the project.

The operational top surface of the West Tailings and Rock Storage Facility (West T/RSF) will be sloped to drain all stormwater to lined sumps. A pumping and piping system from the sumps will convey all stormwater runoff from the 100-year, 24-hour storm event from the filtered tailings surface to the process plant.

Stormwater runoff collected in the open pit will be pumped from a sump at the pit bottom to the Pit Collection Pond located outside the pit. In addition, passive groundwater inflows to the pit will also be collected in the pit sump and pumped to the Pit Collection Pond. From the Pit Collection Pond stormwater and passive groundwater will either pumped to the process plant or will gravity flow to the sediment pond before being released downstream of the project.

Two water storage reservoirs, upstream of the Fresh Water Dam and Water Storage Dam, collect and store upstream runoff as sources of fresh water for the process plant. The Water Storage Dam also supplies a consistent flow of fresh water to the downstream communities.

## 1.16 Capital and Operating Costs

The capital cost and operating estimates for the Ixtaca Project were developed for the Study. All capital and operating costs are reported in USD unless specified otherwise. The overall capital cost estimate meets the American Association of Cost Engineers (AACE) Class 3 requirement of an accuracy range between -10% and +15% of the final project cost.

The total estimated initial capital cost is $174.2 million and sustaining capital (including expansion capital of $64.5 million) is $111.3 million over the LOM. The estimated expansion capital of $64.5 million will be funded from cashflow. The estimated LOM operating costs are $26.8 per tonne mill feed.

The initial capital costs are summarized in Table 1-5 below:

**Table 1-5 Projected Initial Capital Costs (USD million)**

| | **$ Millions** |
|---|---|
| **Direct Costs** | |
| Mining | $22.2 |
| Process | $80.2 |
| Onsite Infrastructure | $24.3 |
| Offsite Infrastructure | $7.5 |
| **Indirects**, EPCM, Contingency and Owners Cost | $39.9 |
| **Total** | **$174.2** |

** Numbers may not add due to rounding*

The LOM average costs are summarized in Table 1-6 below:

**Table 1-6 Summary of Average LOM Operating Costs ($/tonne mill feed)**

| | | |
|---|---|---|
| Mining costs | $/tonne milled | $15.2 |
| Processing | $/tonne milled | $10.5 |
| G&A | $/tonne milled | $1.1 |
| Total | $/tonne milled | $26.8 |

**Numbers may not add due to rounding*

## 1.17 Economic Analysis

The Study project economics are based on gold price of $1275/oz and silver price of $17/oz derived from current common peer usage. The project revenue is split between gold and silver with 53% of the revenue coming from gold and 47% from silver. The after-tax economic analysis includes a corporate income tax rate of 30% as well as the two new mining duties:

a) 7.5% special mining duty and,
b) 0.5% extraordinary mining duty.

LOM Revenue for gold and silver are summarized in Table 1-7.

**Table 1-7 Revenue before transport, refining, and royalties**

| | Revenue | |
|---|---|---|
| | **$ million** | **%** |
| Gold | 1,205 | 53% |
| Silver | 1,074 | 47% |
| **Total** | **2,279** | **100%** |

All in unit sustaining costs are summarized in Table 1-8.

**Table 1-8 Summary All-in sustaining cost (exclusive of initial capital)**

| | **Total $ million** | **$/ oz AuEq** | **$/ oz AgEq** |
|---|---|---|---|
| Cash operating Cost | 1,283 | 716 | 9.6 |
| Sustaining Capital Cost | 111 | 62 | 0.8 |
| Almadex Royalty | 45 | 25 | 0.3 |
| Mexican royalty taxes | 66 | 37 | 0.5 |
| Refining + Transport | 17 | 9 | 0.1 |
| **Total** | **1,522** | **850** | **11.3** |

A summary of financial outcomes comparing base case metal prices to alternative metal price conditions are presented in Table 1-9. Alternate prices cases consider the project's economic outcomes at varying prices witnessed at some point over the three years prior to this study.

**Table 1-9 Summary of Ixtaca Economic Sensitivity to Precious Metal Prices (Base Case is Bold)**

| | | | | | |
|---|---|---|---|---|---|
| Gold Price ($/oz) | 1125 | 1200 | **1275** | 1350 | 1425 |
| Silver Price ($/oz) | 14 | 15.5 | **17** | 18.5 | 20 |
| | | | | | |
| Pre-Tax NPV 5% ($million) | 229 | 349 | **470** | 591 | 712 |
| Pre-Tax IRR (%) | 35% | 46% | **57%** | 67% | 77% |
| Pre-Tax Payback (years) | 2.0 | 1.8 | **1.6** | 1.4 | 1.3 |
| | | | | | |
| After-Tax NPV 5% ($million) | 151 | 233 | **310** | 388 | 466 |
| After-Tax IRR (%) | 25% | 34% | **42%** | 49% | 57% |
| After-Tax Payback (years) | 2.6 | 2.1 | **1.9** | 1.7 | 1.5 |

A sensitivity analysis on metal prices (Table 1-9), operating costs (Table 1-10), foreign exchange rate (Table 1-11), and capital costs (Table 1-12), shows that the Project is most sensitive to fluctuations in gold price and foreign exchange rate assumptions, and less sensitive to variations in capital and operating costs.

**Table 1-10 Summary of Economic Results and Sensitivities to Operating Costs ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** |
| **Opex ($/t milled)** | -10% | | $26.8/t | | +10% | |
| **NPV (5% discount rate)** | $565 | $371 | $470 | $310 | $376 | $249 |
| **Internal Rate of Return (%)** | 64% | 47% | 57% | 42% | 49% | 36% |
| **Payback (years)** | 1.5 | 1.7 | 1.6 | 1.9 | 1.7 | 2.0 |

The Ixtaca project is also sensitive to the exchange rate between U.S. dollars and Mexican Pesos ("MXN"). The Study assumes an exchange rate of 20 MXN per U.S. dollar, and the following table shows the sensitivity of project economics to different exchange rates assuming base case metals prices.

**Table 1-11 Summary of Economic Results and Sensitivities to Exchange Rate ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** |
| **Exchange Rate (MXN:USD)** | 18 | | **20** | | 22 | |
| **NPV (5% discount rate)** | $409 | $270 | $470 | $310 | $521 | $342 |
| **Internal Rate of Return (%)** | 52% | 38% | 57% | 42% | 62% | 45% |
| **Payback (years)** | 1.7 | 2.0 | 1.6 | 1.9 | 1.5 | 1.8 |

The Initial Capital cost is estimated to be US$174.2 million. The following table shows the sensitivity of project economics to a 10% change in the initial capital costs, assuming base case metals prices.

**Table 1-12 Summary of Economic Results and Sensitivities to Capital Cost ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** | **Pre-Tax** | **After-Tax** |
| Initial Capital ($M) | -10% | | **174.2** | | +10% | |
| **NPV (5% discount rate)** | $493 | $326 | $470 | $310 | $448 | $294 |
| **Internal Rate of Return (%)** | 65% | 48% | 57% | 42% | 51% | 37% |
| **Payback (years)** | 1.5 | 1.7 | 1.6 | 1.9 | 1.7 | 2.0 |

The sensitivity analysis demonstrates robust economics.

## 1.18 Environmental and Social Considerations

Almaden has undertaken significant Environmental and Community/Social programs. These will continue as the Project progresses into advanced studies. The Environmental Impact Assessment (MIA) has been submitted to the regulators. Currently there are no known issues that can materially impact the ability to extract the mineral resources at the Ixtaca Project. Previous and ongoing environmental studies include meteorology, water quantity and quality, and flora and fauna.

Extensive geochemical studies have evaluated the potential for acid rock drainage and metal leaching from the waste rock and tailings using globally accepted standardised methods of laboratory testing and in compliance with Mexican regulations. Most of the waste rock at Ixtaca is limestone, and the studies of both waste rock and tailings have consistently shown that there is more than enough neutralising potential present in the waste rock to neutralise any acid generated. Testing to date also indicates low potential for metal leaching.

The mine will not require the resettlement of any communities. Successful engagement with the local communities proximate to the Project has been a cornerstone of the operation to date and continues to be a key focus for Almaden through Project development.

Open, transparent communication with stakeholders has been fundamental to Almaden's approach since staking the original Tuligtic claims in 2001. Over the past several years, Almaden has interacted with over 20,000 people from over 53 communities and 8 different states in the following ways:

- Coordinated nine large community meetings, with total attendance at these meetings approaching 4,100 people;
- Taken a total of approximately 480 people, drawn from local communities, to visit 24 mines;
- Arranged 46 sessions of "Dialogos Transversales", wherein community members are invited to attend discussions with experts on a diverse range of issues relating to the mining industry such as an overview of Mexican Mining Law, Human Rights and Mining, mineral processing, explosives, water in mining, risk management, and mine infrastructure amongst other things;
- Opened a central community office in the town of Santa Maria Zotoltepec, which is continually open to community members and includes an anonymous suggestion box;
- Invested in a "mobile mining module" which allows company representatives to establish a temporary presence in communities more distant from the project, and allows for those interested to learn more about the project;
- Employed as many local people as possible, reaching up to 70 people drawn from five local communities. Almaden operates the drills used at the project, and hence can draw and train a local workforce as opposed to bringing in external contractors;
- Initiated a program of scholarships for top performing local students, with 130 scholarships granted to date to individuals from 23 different communities (79 women and 51 men);
- Established several clubs, including reading, dancing, football, music, and theatre clubs, to contribute to the vitality of local communities;
- Focused on education, enabling over 4,300 people to be positively impacted by our investments, such as rehabilitation of school-related infrastructure, donation of electronic equipment, and scholarships for top-performing students.

In 2017, Almaden engaged a third-party consultant to lead a community consultation and impact assessment at the Ixtaca project. In Mexico, only the energy industry requires completion of such an assessment (known in Mexico as a Trámite Evaluación de Impacto Social, or "EVIS") as part of the permitting process. The purpose of these studies is to identify the people in the area of influence of a project ("Focus Area"), and assess the potential positive and negative consequences of project development to assist in the development of mitigation measures and the formation of social investment plans. To Almaden's knowledge, this is the first time a formal EVIS has been completed in the minerals industry in Mexico, and as such reflects the Company's commitment to best national and international standards in Ixtaca project development.

The EVIS and subsequent work on the development of a Social Investment Plan were conducted according to Mexican and international standards such as the Guiding Principles on Business and Human Rights, the Equator Principles, and the OECD Guidelines for Multinational Enterprises and Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector.

Fieldwork for the EVIS was conducted by an interdisciplinary group of nine anthropologists, ethnologists and sociologists graduated from various universities, who lived in community homes within the Ixtaca Focus Area during the study to allow for ethnographic immersion and an appreciation for the local customs and way of life. This third-party consultation sought voluntary participation from broad, diverse population groups, with specific attention to approximately one thousand persons in the Focus Area.

This extensive consultation resulted in changes to some elements of the mine design, including the planned construction of a permanent water reservoir to serve the local area long after mine closure, and the shift to drystack filtered waste management.

Positive impacts to the socio-economy of the region are expected to continue as the Project is developed into a mine and becomes a source of more jobs. Almaden plans to continue its open communication with the communities to provide for realistic expectations of any proposed mining operation and the social impacts of such a development.

The Company has informed the author that updates to the environmental and social considerations of the Ixtaca Property since the date of the Study are provided in the Company's public disclosure record since that time.

## 1.19 Project Execution Plan

A summary of key milestones for the project execution plan at the time of the Study include:

- Permit submission by Q1 2019
- Permit Approvals by Q4 2019
- Ixtaca construction starts in Q4 2019
- Rock Creek plant transported to Ixtaca site end of Q1 2020
- Plant startup in Q2 2021

The Company has informed the author that updates to the project execution plan since the date of the Study are provided in the Company's public disclosure record since that time.

## 1.20 Conclusions and Recommendations

The Ixtaca deposit is well suited for a potential mining operation. The Study's 11-year mine plan has robust economics and it is recommended that the project proceed to permitting and detailed design.

A significant opportunity to produce by-products from the limestone waste and tailings is described in Section 23.

## 2.0 Introduction

This Technical Report ("TRS") on the Ixtaca project is a review and summary of the previous technical work carried out up to the date of the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019 (the "Study", or "FS"). The 2019 study was filed as a Feasibility Study following Canadian NI 43-101 standards, 2014 CIM Definition Standards and 2019 CIM Best Practices Guidelines. However, since SK-1300 standards are different than those in Canada, such as a narrower range for cost estimates and contingencies, the 2019 report may not have met SK-1300 requirements for a Feasibility Study. The Company has informed the author that no significant technical work has been conducted subsequent to the Study and that all exploration, legal, permitting and other project updates subsequent to the Study are provided in the Company's public disclosure record. Almaden Minerals Ltd. requested Moose Mountain Technical Services ("MMTS") prepare a TRS (the "Report", or "TRS") on the results of the Ixtaca Gold-Silver Project in Mexico. The Ixtaca Gold-Silver Deposit (or "Ixtaca Project") of the Tuligtic Property, is 100 percent (%) held by Compania Minera Gorrión S.A. de C.V. (Minera Gorrión), a wholly owned subsidiary of Almaden Minerals Ltd. (together referred to as "Almaden"), subject to a 2% NSR in favour of Almadex Minerals Ltd.

Jesse Aarsen P.Eng., Principal – Mine Engineering, MMTS served as the Qualified Person (QPs) as defined in S-K 1300, SEC Disclosure by Registrant Engaged in Mining Operations.

QP site visits

**Table 2-1 QPs, and Site Visits**

| Qualified Person | Site Visit Dates | Scope Of Personal Inspection |
|---|---|---|
| | | |
| **Jesse Aarsen** | 30 April to 01 May 2013<br>27 to 28 August 2014<br>15 to 16 March 2016<br>12 to 16 December 2016<br>16 to 18 May 2018 | Reviewed open pit, waste rock dump, general site conditions. Reviewed drill core. Hosted potential contract miner site review for cost estimation purposes. |

The author, in writing this report use sources of information as listed in the references section. Government reports have been prepared by qualified persons holding post-secondary geology, or related university degree(s), and are therefore deemed to be accurate. These reports, which are used as background information, are referenced in this Report in the "Geological Setting and Mineralization" Section 7.0 below.

All currency amounts are referred to in United States dollars (USD) where indicated. All units in this Report are metric and Universal Transverse Mercator (UTM). Coordinates in this report and accompanying illustrations are referenced to North American Datum (NAD) 1983, Zone 14.

## 3.0 Property Description and Location

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated

January 24th 2019 and updated October 3, 2019. The Tuligtic property was staked by Almaden in 2001, following the identification of surficial clay deposits that were interpreted to represent high-level epithermal alteration. The Property originally consisted of approximately 14,000 hectares, but during 2015 Almaden filed applications to reduce the aggregate claim size at Tuligtic to those areas still considered prospective. The Property is held 100% by Minera Gorrion S.A. de C.V., a subsidiary of Almaden Minerals Ltd. through the holding company, Puebla Holdings Inc., subject to a 2% NSR in favour of Almadex Minerals Ltd. At the time of the Study, the Property consisted of seven mineral claims totaling 7,220 hectares (Table 3-1, and Figure 3-2). The Company has informed the author that material changes to the claim size, composition and legal and permitting status of the Property since the date of the Study are provided in the Company's public disclosure record since that time.

**Table 3-1 Tuligtic Property Mineral Claims**

| Claim Name | Claim Number | Valid Until Date | Area (hectares) |
|---|---|---|---|
| Cerro Grande - R1 | 245486 | March 5, 2053 | 2773 |
| Cerro Grande -R3 | 245488 | March 5, 2053 | 824 |
| Cerro Grande - R4 | 245489 | March 5, 2053 | 540 |
| Cerro Grande - R5 | 245490 | March 5, 2053 | 785 |
| Cerro Grande - R6 | 245491 | March 5, 2053 | 938 |
| Cerro Grande 2 - R2 | 245493 | February 23, 2059 | 652 |
| Cerro Grande 2 - R3 | 245494 | February 23, 2059 | 708 |
| | | **Total** | **7220** |

The Property is located at: 19 degrees 40 minutes north latitude and 97 degrees 51 minutes west longitude; or UTM NAD83 Zone 14 coordinates: 618,800m east and 2,176,100m north. The Tuligtic Property is road accessible and is located within Puebla State, 80 kilometres (km) north of Puebla City, and 130km east of Mexico City.

Following an amendment to the Mining Law of Mexico (the "Mining Law") on April 28, 2005, there is no longer a distinction between the exploration mining concessions and exploitation mining concessions. The Mining Law permits the owner of a mining concession to conduct exploration for the purpose of identifying mineral deposits and quantifying and evaluating economically usable reserves, to prepare and to develop exploitation works in areas containing mineral deposits, and to extract mineral products from such deposits. Mining concessions have a duration of 50 years from the date of their recording in the Registry and may be extended for an equal term if the holder requests an extension within five years prior to the expiration date.

To maintain a claim in good standing holders are required to provide evidence of the exploration and/or exploitation work carried out on the claim under the terms and conditions stipulated in the Mining Law, and to pay mining duties established under the Mexican Federal Law of Rights, Article 263. Exploration work can be evidenced with investments made on the lot covered by the mining claim, and the exploitation work can be evidenced the same way, or by obtaining economically utilizable minerals. The Regulation of the Mining Law indicates the minimum exploration expenditures or the value of the mineral products to be obtained (Table 3-2).

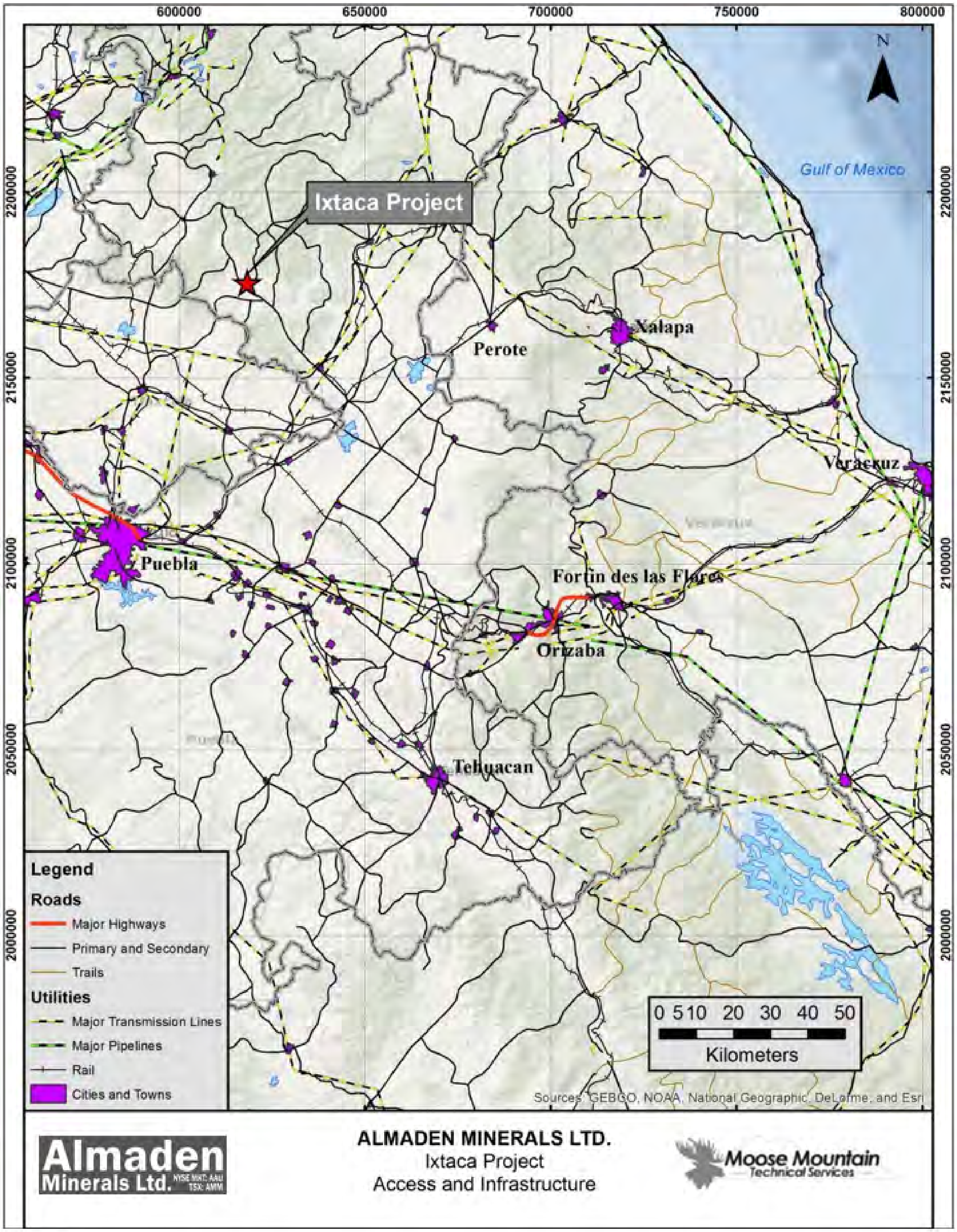



**Figure 3-1 General Location**

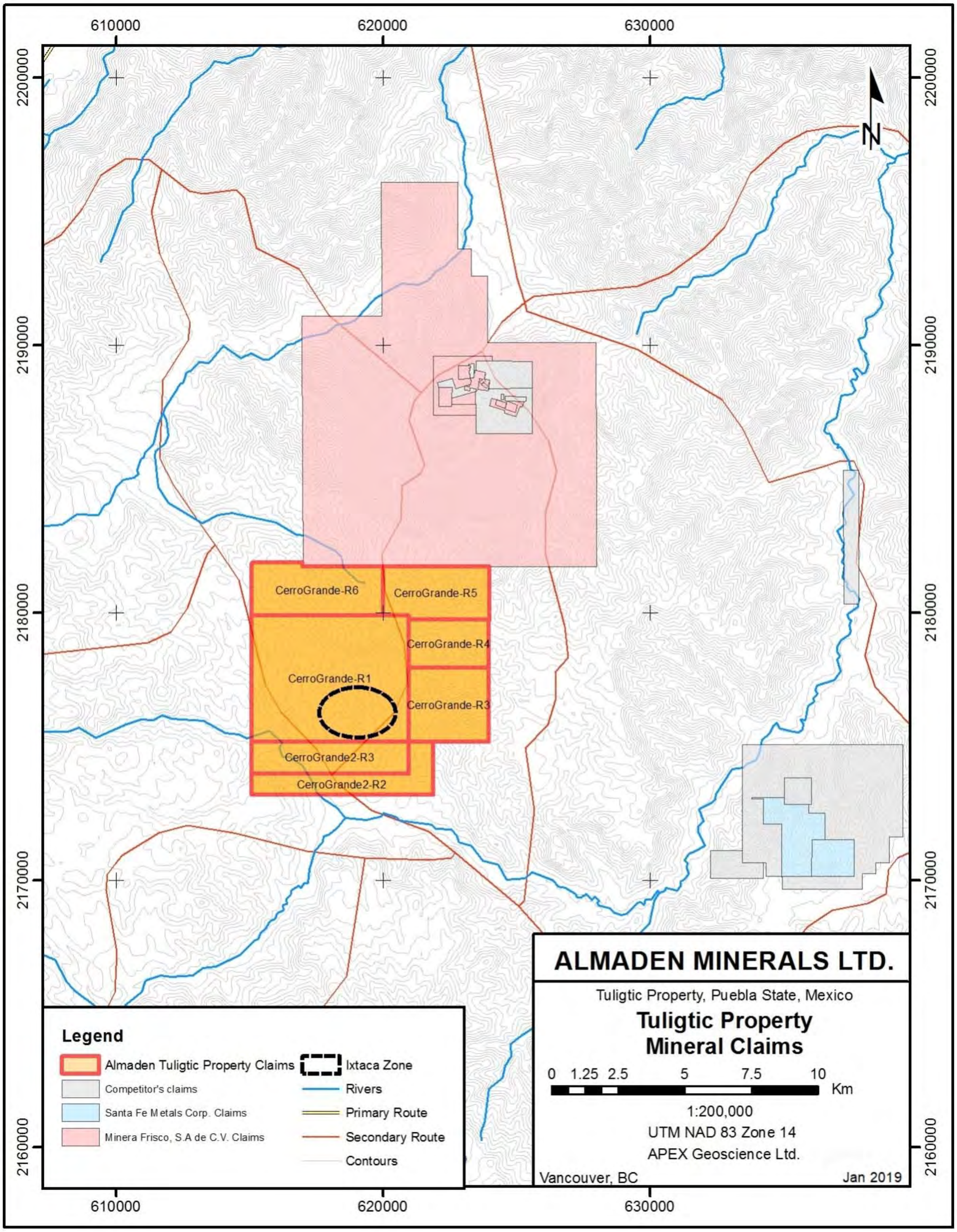



**Figure 3-2 Tuligtic Property Mineral Claims**

**Table 3-2 Exploitation Claim Minimum Expenditure/Production Value Requirements**

| Area (hectares) | Fixed quota in (MXN Pesos) | Additional annual quota per hectare in MXN Pesos | | | |
|---|---|---|---|---|---|
| | | Year | Year 2-4 | Year 5-6 | Year 7+ |
| <30 | 348.48 | 13.92 | 55.74 | 83.63 | 84.96 |
| 30 - 100 | 697.02 | 27.83 | 111.52 | 167.29 | 167.30 |
| 100 - 500 | 1,394.02 | 55.74 | 167.29 | 334.56 | 334.56 |
| 500 - 1000 | 4,182.12 | 51.58 | 159.37151. | 334.56 | 669.14 |
| 1000 - 5000 | 8,364.27 | 47.40 | 153.34 | 334.56 | 1,338.28 |
| 5000 - 50000 | 29,274.95 | 43.22 | 147.78 | 334.56 | 2,676.56 |
| > 50000 | 278,809.03 | 39.03 | 139.40 | 334.56 | 2,676.562,55 |

At the time of the Study, the Tuligtic Property was subject to annual exploration/exploitation expenditure requirements of approximately US$757,000 per year however the Company had significant historic expenditures to offset these requirements as appropriate.

Subject to the Mexico Mining Laws, any company conducting exploration, exploitation and refining of minerals and substances requires previous authorization from the Secretary of Environment and Natural Resources (SEMARNAT). Because mining exploration activities are regulated under Official Mexican Norms (specifically NOM-120) submission of an Environmental Impact Statement (“Manifestacion de Impacto Ambiental” or “MIA”) is not required provided exploration activities do not exceed disturbance thresholds established by NOM-120. Exploration activities require submission to SEMARNAT of a significantly less involved “Preventive Report” (Informe Preventivo) which outlines the methods by which the owner will maintain compliance with applicable regulations. If the exploration activities detailed within the Preventive Report exceed the disturbance thresholds established by NOM-120, SEMARNAT will inform the owner that an MIA is required within a period of no more than 30 days.

The present scale of exploration activities within the Tuligtic Property are subject to NOM-120 regulation. In future, if significantly increased levels of exploration activities are anticipated submission of an Environmental Impact Statement may be required. Almaden has negotiated voluntary surface land use agreements with surface landowners within the exploration area prior to beginning activities. At the time of the Study, Almaden had secured through purchase agreements 1,139.8 hectares, from numerous independent owners.

Other than as may be disclosed in the public disclosure of the Company since the time of the Study, the author is not aware of any environmental liabilities to which the Property may be subject, or any other significant risk factors that may affect access, title, or Almaden’s right or ability to perform work on the Property.

# 4.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019. The Ixtaca deposit, the epithermal gold-silver target within the Tuligtic Property, is located 8km northwest of the town of San Francisco Ixtacamaxtitlán, the county seat of the municipality of Ixtacamaxtitlán, Puebla State.

The Project is accessible by driving 40km east along Highway 119 from Apizaco; an industrial centre located approximately 50km north of Puebla City, and then north approximately 20km along a paved road to the town of Santa Maria. The trip from Apizaco to site can be driven in approximately 1.5 hours. There is also access to the Property using gravel roads from the northeast via Tezhuitan and Cuyoaco, from the south via Libres and from the northwest via Chignahuapan. The Xicohtencatl Industrial complex lies 30km southwest by paved road from the Tuligtic Property, and houses agricultural, chemical, biomedical and industrial manufacturing facilities and is serviced by rail. Puebla, the fourth largest city in Mexico has a population in excess of four million people, and includes one of the largest Volkswagen automotive plants outside Germany.

The topography on the Tuligtic Property is generally moderate to steep hills with incised stream drainages. Elevation ranges from 2,300 metres (m) above sea level in the south to 2,800m in the north. Vegetation is dominantly cactus and pines and the general area is somewhat cultivated with subsistence vegetables, bean and corn crops. The region has a temperate climate with mean monthly temperatures ranging from 16°C in June to 12°C in January. The area experiences approximately 714 mm of precipitation annually with the majority falling during the rainy season, between June and September. Annual evapotranspiration is estimated to be 774 mm.

Exploration can be conducted year round within the Property; however, road building and drilling operations may be impacted by weather to some degree during the rainy season.

Electricity is available on the Property from the national electricity grid that services nearby towns such as Santa Maria and Zacatepec.

The majority of the personnel working on the project are locals from nearby small towns.

The surface ownership over the mine development area is privately owned and the property acquired by the company to date has been by voluntary agreements. Land acquired by the company is not yet sufficient to cover the areas required for the mining operations as summarized in Figures 1-1 and Figure 15-3.

# 5.0 History

The information in this section was drawn from the most recent major study prepared entitled “The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study” dated January 24th 2019 and updated October 3, 2019. Throughout the Property there is evidence that surficial clay deposits have once been mined. This clay alteration attracted Almaden to the area and has been interpreted to represent high-level epithermal alteration. To the authors’ knowledge no modern exploration has been conducted on the Project prior to Almaden’s acquisition of claims during 2001 and there is no record of previous mining; as such, this is a maiden discovery.

On May 9, 2002, Almaden entered into a joint venture agreement with BHP Billiton World Exploration Inc. (BHP) to undertake exploration in eastern Mexico. Initial helicopter-borne reconnaissance programs were completed in May 2003 and March 2004 on select targets within the joint venture area of interest. The work resulted in the acquisition of five (5) separate properties, in addition to the previously acquired Cerro Grande claim of the present day Tuligtic Property. Following a review of the initial exploration data, effective January 20, 2005, BHP relinquished its interest in the six properties to Almaden (Almaden, 2005). The joint venture was terminated in 2006 (Almaden, 2006).

During January 2003, Almaden completed a program of geologic mapping, rock, stream silt sampling and induced polarization (IP) geophysical surveys at the Tuligtic Property (then known as the “Santa Maria Prospect”). The exploration identified both a porphyry copper and an epithermal gold target within an approximately 5 x 5km area of intensely altered rock. At the porphyry copper target, stockwork quartz-pyrite veins associated with minor copper mineralization overprint earlier potassic alteration within a multi-phase intrusive body. A single north-south oriented IP survey line identified a greater than 2km long elevated chargeability response coincident with the exposed altered and mineralized intrusive system. Volcanic rocks exposed 1km to the south of the mineralized intrusive display replacement silicification and sinter indicative of the upper parts of an epithermal system (the “Ixtaca Zone”). Quartz-calcite veins returning anomalous values in gold and silver and textural evidence of boiling have been identified within limestone roughly 100m below the sinter. The sinter and overlying volcanic rocks are anomalous in mercury, arsenic, and antimony (Almaden, 2004).

Additional IP surveys and soil sampling were conducted in January and February 2005, further defining the porphyry copper target as an area of high chargeability and elevated copper, molybdenum, silver and gold in soil. A total of eight (8) east-west oriented lines, 3km in length, spaced at intervals of 200m have been completed over mineralized intrusive rocks intermittently exposed within gullies cutting through the overlying unmineralized ash deposits (Almaden, 2006).

The Tuligtic Property was optioned to Pinnacle Mines Ltd. in 2006 and the option agreement was terminated in 2007 without completing significant exploration (Almaden, 2007).

The Property was subsequently optioned to Antofagasta Minerals S.A. (Antofagasta) on March 23, 2009. During 2009 and 2010 Antofagasta, under Almaden operation, carried out IP geophysical surveys and a diamond drill program targeting the copper porphyry prospect (Figure 6-3, Figure 7-2). Three additional IP survey lines were completed, and in conjunction with the previous nine (9) IP lines, a 2 x 2.5km chargeability high anomaly, open to the west and south, was defined (Almaden, 2011). The 2009 drilling consisted of 2,973m within seven (7) holes that largely intersected skarn type mineralization.

Highlights of the drill program include:

- 38m of 0.13% Copper (Cu) from 164 to 202m and 0.11% Cu from 416 to 462m within hole DDH-01;
- 20m of 0.17% Cu from 94 to 114m and 26m of 0.14% Cu from 316 to 342m in hole DDH-02;
- 58m of 0.17% Cu from 366 to 424m in hole DDH-03 (including 14m of 0.27% Cu from 410 to 424m);
- 2m of 0.63% Cu from 18 to 20m in hole DDH-04; and
- 20m of 0.11% Cu from 276 to 296m and 8m of 0.13% Cu in hole DDH-05.

Molybdenum values are anomalous ranging up to 801 parts-per-million (ppm) (0.08%). Elevated gold values were also encountered including 2m of 1.34 grams-per-tonne (g/t) from 178 to 180m in DDH-01.

On February 16, 2010, Almaden announced that Antofagasta terminated its option to earn an interest in the Property (Almaden, 2009).

In July 2010, Almaden initiated a preliminary diamond drilling program to test epithermal alteration within the Tuligtic Property, resulting in the discovery of the Ixtaca Zone. The target was based on exploration data gathered by Almaden since 2001 including high gold and silver in soil and a chargeability and resistivity high anomaly (derived from an IP geophysical survey conducted by Almaden) topographically beneath Cerro Caolin, a prominent clay and silica altered hill. This alteration, barren in gold and silver, was interpreted by Almaden to represent the top of an epithermal system which required drill testing to depth. The first hole, TU-10-001 intersected 302.42 metres of 1.01g/t gold and 48g/t silver and multiple high grade intervals including 44.35 metres of 2.77g/t gold and 117.7g/t silver.

# 6.0 Geological Setting and Mineralization

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24$^{th}$ 2019 and updated October 3, 2019.

## 6.1 Regional Geology

The Ixtaca Project is situated within the Trans Mexican Volcanic Belt (TMVB), a Tertiary to recent intrusive volcanic arc extending approximately east-west across Mexico from coast to coast and ranging in width from 10 to 300km (Figure 6-1). The TMVB is the most recent episode of a long lasting magmatic activity which, since the Jurassic, produced a series of partially overlapping arcs as a result of the eastward subduction of the Farallon plate beneath western Mexico (Ferrari, 2011). The basement rocks of the eastern half of the TMVB are Precambrian terranes, including biotite orthogneiss and granulite affected by granitic intrusions, grouped into the Oaxaquia microcontinent (Ferrari et al., 2011; Fuentes-Peralta and Calderon, 2008). These are overlain by the Paleozoic Mixteco terrane, consisting of a metamorphic sequence known as the Acatlan complex and a fan delta sedimentary sequence known as the Matzitzi formation. Another sedimentary complex is found on top of the Mixteco terrane, represented by various paleogeographic elements such as the Mesozoic basins of Tlaxiaco, Zongolica, Zapotitlan, and Tampico-Misantla (Fuentes-Peralta and Calderon, 2008). The subducting plates associated with the TMVB are relatively young, with the Rivera plate dated at 10Ma (million years) and the Cocos plate at 11 to 17Ma.

The timing and nature of volcanism in the TMVB has been described by Garcia-Palomo et al. (2002). The oldest volcanic rocks in the central-eastern part of the TMVB were erupted approximately 13.5Ma ago, followed by a nearly 10Ma hiatus. Volcanic activity in the area resumed around 3.0-1.5Ma. The composition of volcanic rocks ranges from basalt to rhyolite and exhibits calc-alkaline affinity. Extensive silicic volcanism in this area has been related to partial melting of the lower crust, hydrated by infiltration of slab-derived fluids during flat subduction (Ferrari et al., 2011). The Sierra Madre Occidental (SMO) style of volcanism is silicic and explosive as opposed to intermediate and effusive volcanism characteristic of the TMVB. Volcanic centres in the region have been controlled by NE-SW trending normal faults, associated with horst-and-graben structures, resulting from a stress field with a least principal stress ($\sigma 3$) oriented to the NW.

The regional trend of the arc rocks is WNW; though more northerly trending transforms faults, forming at a high angle to the TMVB, provide a structural control on the volcanic units (Coller, 2011). Compressional strike-slip and extensional faults also developed as a result of compressional and extensional periods during subduction. The NE-SW San Antonio fault system, which is still active during Late Pliocene, before the reactivation of the Taxco-Queretaro fault system, is characterized by extensional left-lateral oblique-slip kinematics (Coller, 2011). Bellotti et al. (2006) show that NNW trending regional faults have been right lateral in the Miocene, whereas the NNE to N-S trending faults observed at Ixtaca by Coller (2011) are related to the regional horst-and-graben development and likely to be purely extensional with possibly a component of right lateral movement, or transtensional.

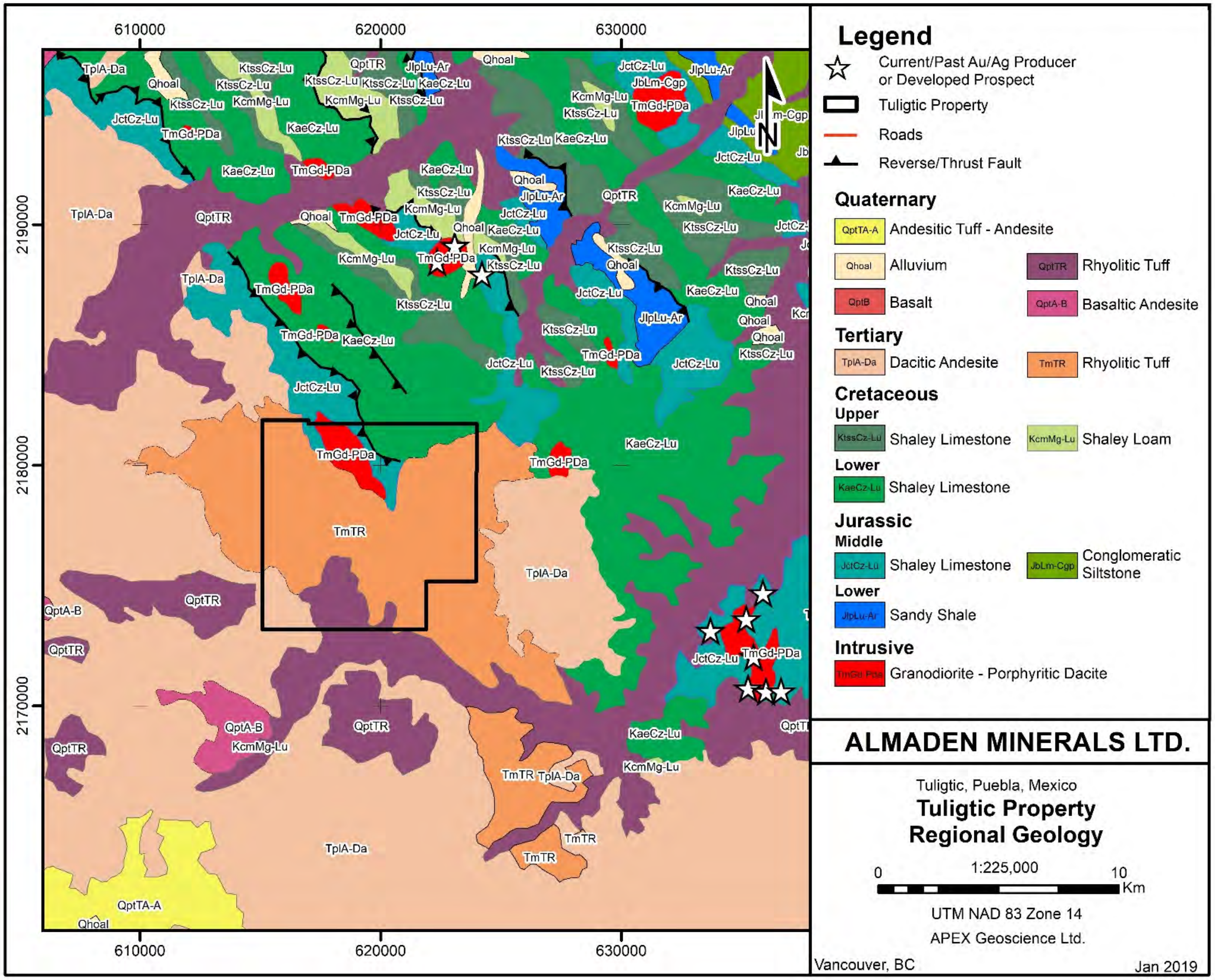



**Figure 6-1 Regional Geology**

## 6.2 Property Geology

The stratigraphy of the Tuligtic area can be divided into two main sequences: a Mesozoic sedimentary rock sequence related to the Zongolica basin and a sequence of late Tertiary igneous extrusive rocks belonging to the TMVB (Figure 6-3) (Fuentes-Peralta & Calderon, 2008; Tritlla et al., 2004). The sedimentary sequence is locally intruded by plutonic rocks genetically related to the TMVB (Figure 6-3). The sedimentary complex at Tuligtic corresponds to the Upper Tamaulipas formation (Reyes-Cortes 1997). This formation, Late Jurassic to Early Cretaceous in age, is regionally described (Reyes-Cortes, 1997) as a sequence of grey-to-white limestone, slightly argillaceous, containing bands and nodules of black chert (Figure 6-4). The drilling conducted by Almaden allows for more detailed characterisation of the Upper Tamaulipas Formation carbonate units in the Tuligtic area. The sequence on the Project consists of clastic calcareous rocks. The limestone unit variably bedded, generally light grey but locally dark grey to black, with local chert rich sections graded into what have been named transition units and shale (also black shale). The transition units are brown calcareous siltstones and grainstones. These rocks are not significant in the succession but mark the transition from limestone to underlying calcareous shale. Typical of the transition units are coarser grain sizes. The lower calcareous “shale” units exhibit pronounced laminated bedding and is typically dark grey to black in colour, although there are green coloured beds as well. The shale units appear to have been subjected to widespread calc-silicate alteration (Figure 6-5).

Both the shale and transition units have very limited surface exposure and may be recessive. The entire carbonate package of rocks has been intensely deformed by the Laramide orogeny, showing complex thrusting and chevron folding in the hinge zones of a series of thrust-related east verging anticlines in the Ixtaca area (Tritlla et al., 2004; Coller, 2011). The calcareous shale units appear to occupy the cores of the anticlines while the thick bedded limestone units occupy the cores of major synclines identified in the Ixtaca zone.

The Tamaulipas Formation carbonate rocks are intruded in the mid-Miocene by a series of magmatic rocks. The compositions are very variable, consisting of hornblende-biotite-bearing tonalites, quartz-plagioclase-hornblende diorites, and, locally, aphanitic diabase dykes (Carrasco-Nunez et al., 1997). In the central part of the Tuligtic Property porphyry mineralization is hosted by and associated with a hornblende-biotite-quartz phyric granodiorite body. The contact between the granodiorite and the limestone is marked by the development of a prograde skarn.

In the Ixtaca deposit epithermal area of the Project, the limestone basement units are crosscut by intermediate dykes that are often intensely altered. In the vicinity of the Ixtaca zone these dykes are well mineralized especially at their contacts with limestone country rock. Petrography has shown that epithermal alteration in the dykes, marked by illite, adularia, quartz and pyrite overprints earlier calc-silicate endoskarn mineralogies (Leitch, 2011). Two main orientations are identified for dykes in the Ixtaca area; 060 degrees (parallel to the Main Ixtaca and Ixtaca North zones) and 330 degrees (parallel to the Chemalaco Zone).

An erosional unconformity surface has been formed subsequent to the intrusion of the porphyry mineralization-associated granodiorites. This paleo topographical surface locally approximates the current topography. Although not well exposed the unconformity is marked by depression localised accumulations of basal conglomerate comprised of intrusive and sedimentary boulders.

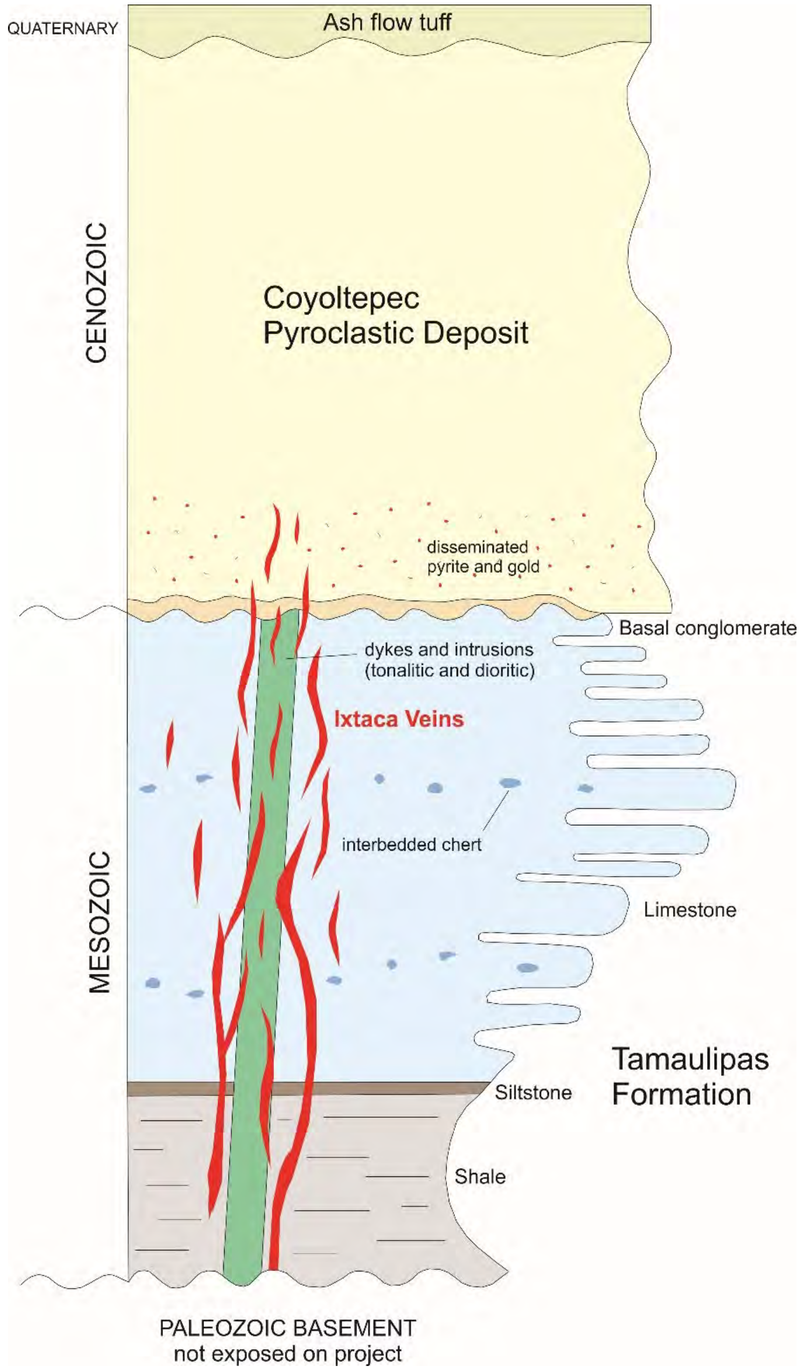



**Figure 6-2 Stratigraphic Column of the Ixtaca Area**

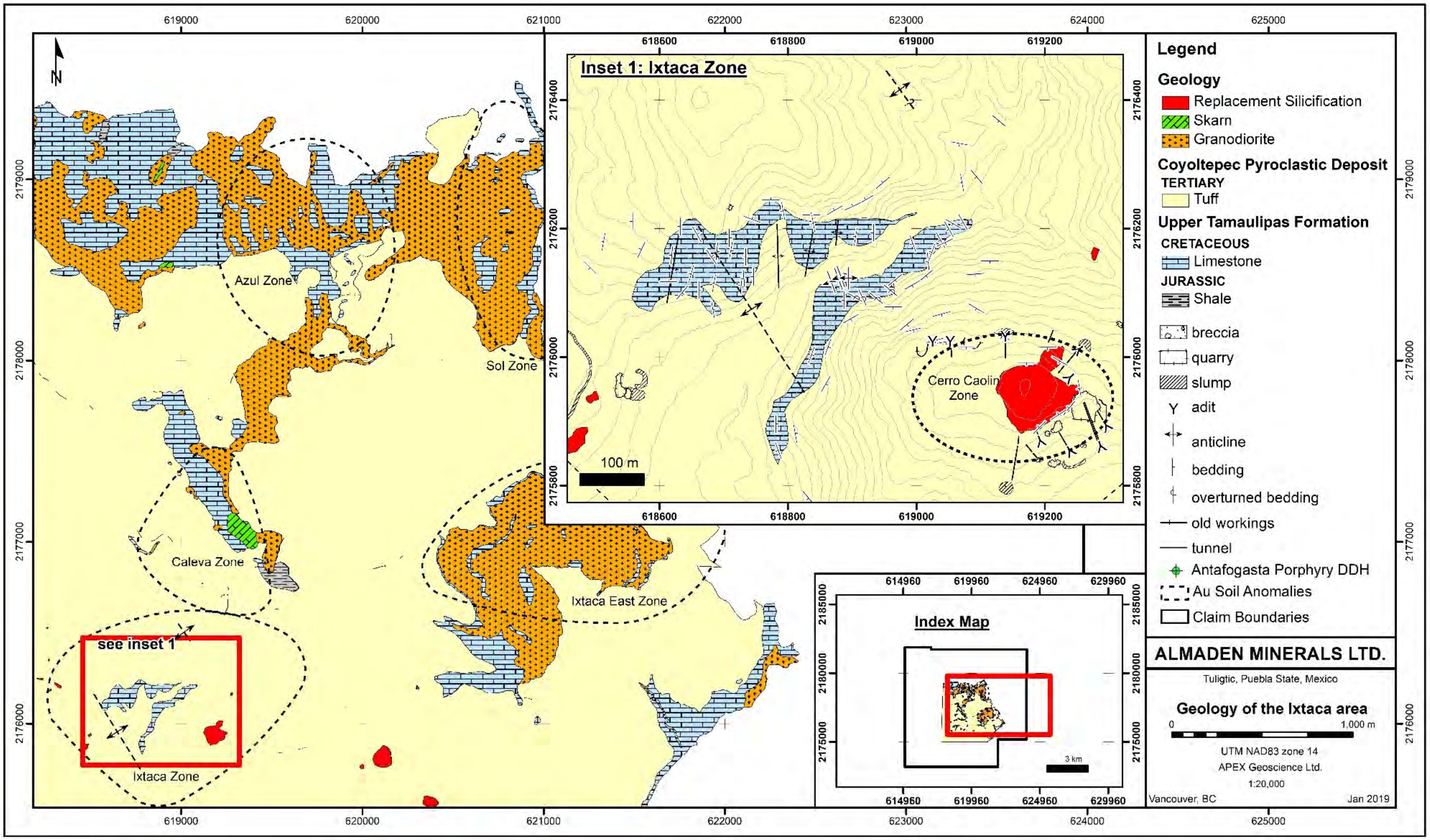



**Figure 6-3 Geology of the Ixtaca Area**

**Figure 6-4 Chert Limestone**

This deformed Mesozoic sedimentary sequence is discordantly overlain by late Cenozoic extrusive rocks whose genetic and tectonic interrelations are yet to be fully explained. Two main volcaniclastic units are recognized in the area of Tuligtic: the Coyoltepec Pyroclastic deposit and the Xaltipan Ignimbrite (Carrasco-Nunez et al., 1997). Both units are covered by a thin (up to 1m) quaternary 'tegument' (Morales-Ramirez 2002) of which only a few patches are left in the area of the Property, but it is still widespread in the surrounding areas. This tegument is unconsolidated and composed of a very recent ash fall tuff rich in heavy minerals (mainly magnetite, apatite, and pyroxene).

The extensively altered pre-mineral Coyoltepec pyroclastic deposit is divided by Carrasco-Nunez et al. (1997) into two subunits: the lower Coyoltepec subunit, which is not exposed in the area of the Project, consists of a stratified sequence of surge deposits and massive, moderately indurated pyroclastic flow deposits with minor amounts of pumice and altered lithic clasts.

The upper Coyoltepec subunit, the main unit outcropping in the Tuligtic area, consists of a basal breccia or conglomerate overlain by bedded crystal tuff (volcanic). The basal breccia is comprised of a lithic rhyolite tuff matrix composed of massive, indurated, coarse-gravel sized, lithic-rich pyroclastic flow deposits with pumice, andesitic fragments, free quartz, K-feldspar, plagioclase crystals, and minor amounts of limestone and shale clasts (Tritlla et al., 2004). The Coyoltepec volcanics (referred to as ash, volcanic and tuff) are altered and mineralized. Gold silver mineralization is marked by widespread disseminated pyrite and quartz-calcite veinlets. The Coyoltepec volcanics are locally oxidised and weathered near surface and along structures.

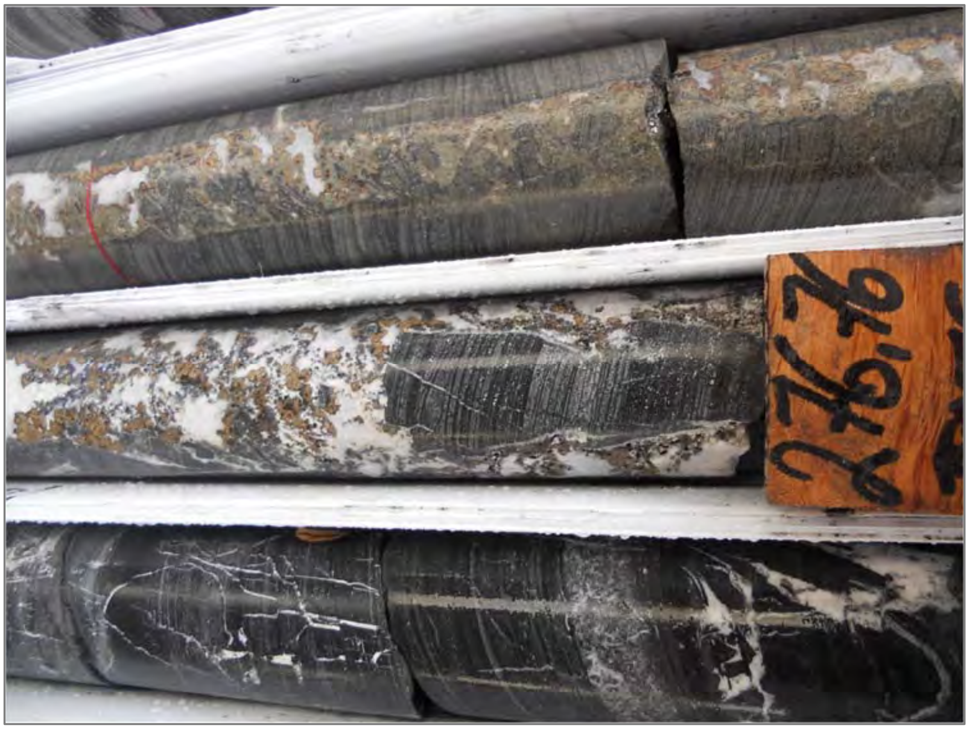


**Figure 6-5 Shale (Calcareous Silstone) from the Chemalaco Zone**

The post-mineral Xaltipan ignimbrite is not seen in the Ixtaca area and mainly found in topographic lows south of the Tuligtic Property. It consists of a very recent (0.45 ± 0.09Ma, Carrasco-Nunez et al., 1997), pinkish to brownish-grey rhyolitic ignimbrite unit with different grades of welding, containing abundant pumice fragments, andesite lithic fragments, and small clasts of black obsidian (Tritlla et al., 2004; Figure 6-6).

**Figure 6-6 Post Mineral Unconsolidated Volcanic Ash Deposits. Generally less than 1m thick**

## 6.3 Mineralization

Two styles of alteration and mineralization are identified in the area: (1) copper- molybdenum porphyry style alteration and mineralization hosted by diorite and quartz- diorite intrusions; (2) silver-gold low-sulphidation epithermal quartz-bladed calcite veins hosted by carbonate rocks and spatially associated with overlying volcanic hosted texturally destructive clay alteration and replacement silicification.

Outcropping porphyry-style alteration and mineralization is observed in the bottoms of several drainages where the altered intrusive complex is exposed in erosional windows beneath post mineral unconsolidated ash deposits. Multiple late and post mineral intrusive phases are identified crossing an early intensely altered and quartz-veined medium-grained feldspar phyric diorite named the Principal Porphyry. Other intrusive types include late and post mineral mafic dykes and an inter-mineral feldspar-quartz phyric diorite. Late mineral mafic dykes are fine grained and altered to chlorite with accessory pyrite. Calc-silicate (garnet-clinopyroxene) altered limestone occurs in proximity to the intrusive contacts and is crosscut by late quartz-pyrite veins. Early biotite alteration of the principal porphyry consists of biotite-orthoclase flooding of the groundmass. Quartz veins associated with early alteration have irregular boundaries and are interpreted to be representative of A-style porphyry veins. These are followed by molybdenite veins which are associated with the same wall rock alteration. Chalcopyrite appears late in the early alteration sequence. Late alteration is characterized by intense zones of muscovite-illite-pyrite overprinting earlier quartz-K-feldspar-pyrite ± chalcopyrite veining and replacing earlier hydrothermal orthoclase and biotite. Stockwork quartz-pyrite crosscuts the A-style veins and is associated with muscovite-illite alteration of biotite. The quartz-sericite alteration can be texturally destructive resulting in white friable quartz-veined and pyrite rich rock. Pyrite is observed replacing chalcopyrite and in some instances chalcopyrite remains only as inclusions within late stage pyrite grains.

Epithermal mineralization on the Tuligtic Property is considered to have no genetic relationship to the porphyry alteration and mineralization described above. The epithermal system is well preserved and there is evidence of a paleosurface as steam heated kaolinite and replacement silica alteration occur at higher elevations where the upper part of the Coyoltepec pyroclastic deposit is preserved (Figure 6-7 below looks toward Cerro Caolin with Relative positions of Altered Volcanics, Unconformity, Limestone and the Main Ixtaca Vein Swarm).

The Upper Tamaulipas formation carbonates (limestone and shale units), the dykes that crosscut it and the upper Coyoltepec volcanic subunit (variously referred to as volcanics, tuff or ash) are the host rocks to the epithermal system at Ixtaca. The epithermal alteration occurs over a roughly 5 by 5 kilometre area and occurs as intense kaolinite-alunite alteration and silicification in volcanic rocks. This alteration is interpreted to represent the upper portion of a well preserved epithermal system. The bulk of the mineralisation occurs in the carbonate (limestone and shale) as colloform banded epithermal vein zones (Figure 6-8and Figure 6-9). Unlike many epithermal vein systems in Mexico, the bulk of the veining in the Ixtaca zone has low base metal contents and gold and silver occur as electrum and other sulphides. SEM work has demonstrated that silver does not occur with galena or tetrahedrite in any significant way. In the main limestone unit (80% of recoverable metal in the FS) the silver to gold ratio of the mineralisation is roughly estimated to average ~65:1 while in the shale it is roughly estimated to be slightly higher at ~75:1.

The veining of Ixtaca epithermal system displays characteristics representative of low and intermediate sulphidation deposits. These include typical mill feed and gangue mineralogy (electrum Ag-sulphides, sphalerite, galena, adularia, quartz and carbonates), mineralization dominantly in open space veins (colloform banding, cavity filling).

At the base of the overlying clay altered volcanics disseminated gold-silver mineralisation occurs in association with pyrite and minor veining (Figure 6-10). Locally this mineralisation can be high grade but largely associated with lower Ag:Au ratios roughly estimated to average 20:1.

To date two main vein orientations have been identified in the Ixtaca deposit:

- 060 trending sheeted veins hosted by limestone;
- 330 trending veins hosted by shale;

The bulk of the resource and over 80% of the mill feed is hosted by the limestone in the Main Ixtaca and Ixtaca North zones as swarms of sheeted and anastomosing high grade banded epithermal veins. There is no disseminated mineralisation within the host rock to the vein swarms, which is barren and unaltered limestone. To the northeast of the limestone hosted mineralisation, the Chemalaco zone, a 330 striking and west dipping vein zone hosted by shale, also forms part of the deeper resource.

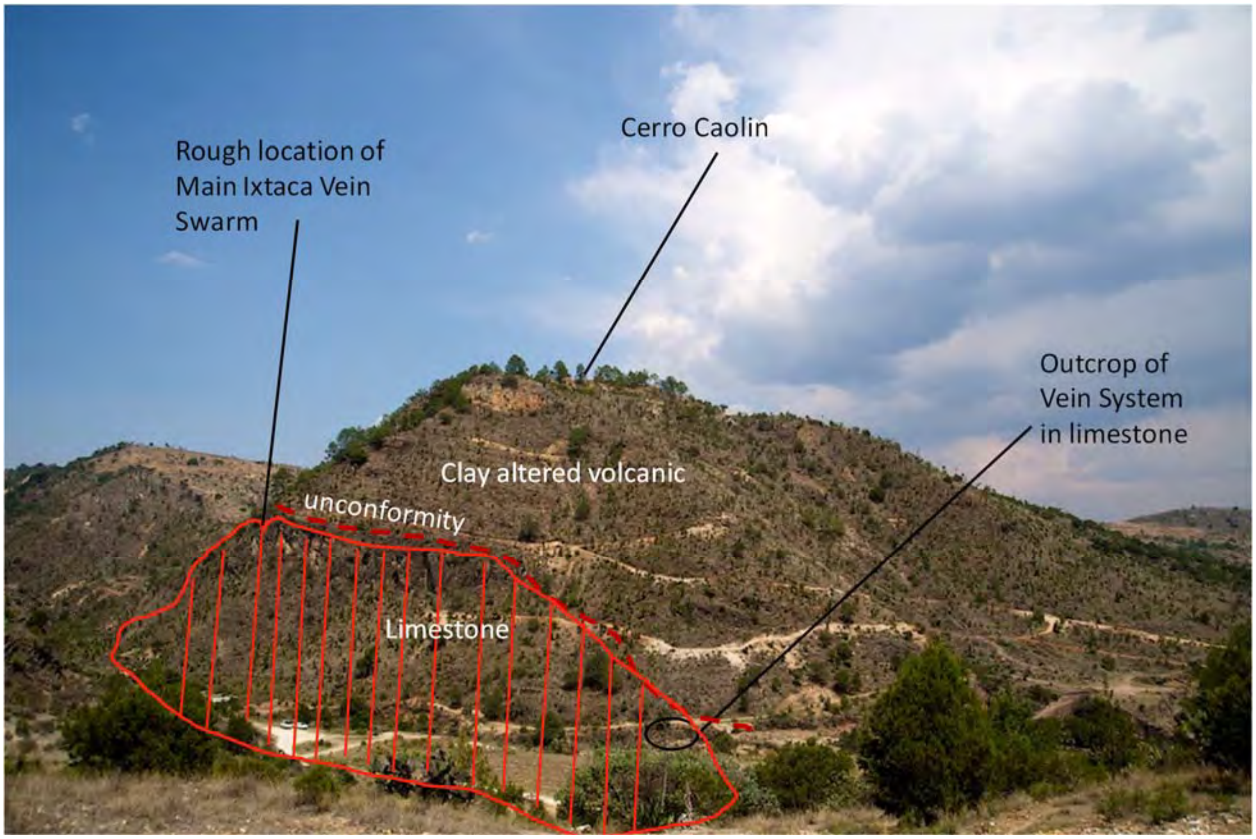



**Figure 6-7 Looking to the east of Cerro Caolin with Relative positions of Altered Volcanics, Unconformity, Limestone and the Main Ixtaca Vein Swarm**


**Figure 6-8** **Photo of Cerro Caolin of the Main Ixtaca Vein Swarm From North Looking to the South Showing the Contact between the Clay Altered Volcanic and Limestone Units**

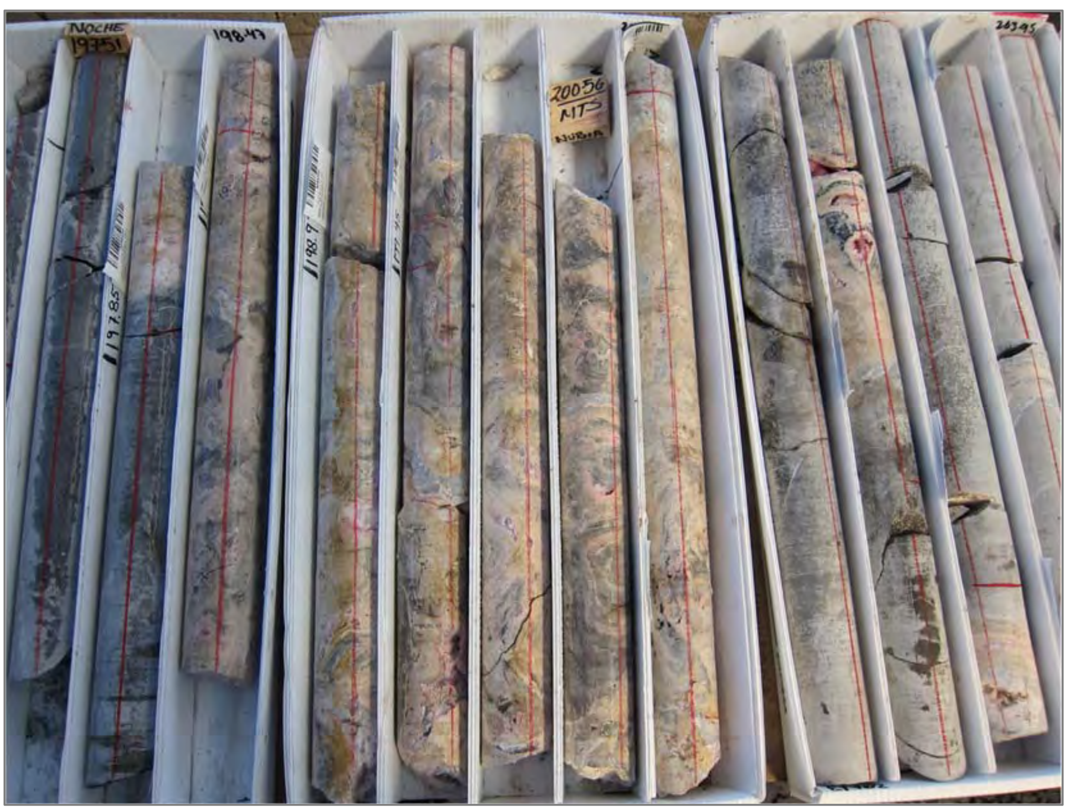


**Figure 6-9** **Example of Banded Veining of the Main Ixtaca Vein Swarm Zone of**

The Main Ixtaca and Ixtaca North vein swarms are spatially associated with two altered and mineralised sub parallel ENE (060 degrees) trending, sub-vertical to steeply north dipping dyke zones. The Main Ixtaca dyke zone is approximately 100m wide and consists of a series of 2m to over 20m true width dykes. The Ixtaca North dyke zone is narrower and comprises a steeply north-dipping zone of two or three discrete dykes ranging from 5 to 20m in width.

Individual veins and veinlets within the Main Ixtaca and Ixtaca North vein swarm zones cannot be separately modelled. Wireframes were created that constrain the higher grade, more densely veined areas, however as the vein swarms are anastomosing and sheeted in nature, therefore these wireframes include significant barren limestone material enclosed by veins within the vein swarm (See Figure 6-11).

The Main and North zones have been defined over 650m and tested over 1000m strike length with high-grade mineralization intersected to depths up to 350m vertically from surface. In 2016 Almaden conducted a drill program to test for additional veins to the north of the Ixtaca North Zone. This program resulted in better definition of the Ixtaca North zone and was successfully demonstrated that limestone mineralization remains open to the north and at depth.

The Chemalaco Zone dips moderately-steeply at approximately 22 degrees to the WSW. The strike length of the Chemalaco Zone has been extended to 450m with high-grade mineralization intersected to a vertical depth of 550m, or approximately 700m down-dip. An additional sub-parallel zone has been defined underneath the Chemalaco Zone dipping 25 to 50 degrees to the WSW, intersected to a vertical depth of 250m, approximately 400m down-dip over a 250m strike length. The Chemalaco zone remains open to depth and along strike to the northwest. Additional parallel veins further to the east have been identified in core and the zone is remains open in this direction as well. In the Chemalaco zone, assays indicate that, while mineralisation appears similar in core, higher silver grades occur in the upper portion of the drilled area and higher gold grades occur at depth.

The Main Ixtaca, Ixtaca North and Chemalaco vein zones are largely concealed by overlying altered volcanic rocks although the limestone and Main Ixtaca zone of veining does crop out on the west side of Cerro Caolin, the hill under which the Main Ixtaca Zone occurs. The volcanics above the Main Ixtaca Zone are intensely clay altered and locally silicified but barren of significant gold and silver at surface. The Cerro Caolin volcanic hosted clay alteration zone extends to the SE roughly one kilometer and represents a significant drill target.

**Figure 6-10 Altered, Veined and Mineralised Volcanics**

Studies of mineral assemblages in hand specimen, transmitted and reflected light microscopy and SEM analyses have been carried out in order to construct a paragenetic sequence of mineral formation. This work completed by Herrington (2011) and Staffurth (2012) reveals that veining occurs in three main stages. The first stage is barren calcite veining. This is followed by buff brown and pink colloform carbonate and silicate veins containing abundant silver minerals and lower gold. The third stage of veining contains both gold and silver mineralization. The dominant gold-bearing mineral is electrum, with varying Au:Ag ratios. The majority of grains contain 40-60wt (weight) % gold but a few have down to 20wt% (Staffurth, 2012). Gold content occasionally varies within electrum grains, and some larger grains seem to be composed of aggregates of several smaller grains of differing composition (Staffurth, 2012). Electrum often appears to have been deposited with late galena-clausthalite both of which are found as inclusions or in fractures in pyrite. It is also closely associated with silver minerals as well as sphalerite and alabandite. Gold is also present in uytenbogaardtite (Ag3AuS2). This mineral is associated with electrum, chalcopyrite, galena, alabandite, silver minerals, and quartz in stage three mineralization (Herrington, 2011; Staffurth, 2012). Apart from electrum and uytenbogaardtite, the dominant silver bearing minerals are polybasite (-pearceite) minor argentian tetrahedrite plus acanthite-naumannite, pyrargyrite and stephanite. They are associated with sulphides or are isolated in gangue minerals (Staffurth, 2012).

### 6.3.1 Steam Heated Alteration, Replacement Silicification and Other Surficial Geothermal Manifestations at Ixtaca

One of the most striking features of the Ixtaca epithermal system is the kaolinite alteration, replacement silicification, and sinter carapace that remains uneroded immediately above the Ixtaca Zone (Figure 6-12). This alteration has been identified over a roughly 5 x 5km area and is interpreted to represent the upper levels of a preserved epithermal system. All three alteration types have formed in the volcanic units.

When the source alkali- chloride epithermal fluids boil, along with water vapour, $CO_2$ and $H_2S$ also separate. These gases rise and above the water table $H_2S$ condenses in the vadose zone forming $H_2SO_4$. Near surface the $H_2SO_4$ alters volcanic rocks to kaolinite and alunite and can dissolve volcanic glass (Hedenquist and Henley 1985b). This process is interpreted to be responsible for the kaolinite alteration, known as steam-heated alteration in the economic geology literature (eg. White and Hedenquist, 1990). The resulting silica laden fluid can transport and re precipitate silica at the water table in permeable host rocks. This mechanism can result in large tabular alteration features often referred to as a silica caps. Since gold is not transported by the gases or sulphuric acid, the silica cap is usually devoid of gold and silver, which is the case at Ixtaca (White and Hedenquist, 1990).

Sinter is diagnostic of modern epithermal systems where silica-rich fluids emanate as hot springs at the earth's surface. Sinters are the highest level manifestation of an epithermal system and consequently the first feature to be removed by erosion. Most epithermal gold-silver deposits that have been recognized show some degree of erosion and ancient sinters are typically poorly preserved in the geological record. The presence of preserved steam heated and replacement silica alteration and sinter at Ixtaca is thus a clear indication that the deposit has not been significantly affected by erosion. At Ixtaca, the sinter facies and replacement silicification, where preserved, are located within the altered volcanic units.

Large areas of steam heated alteration zone remain unexplored on the property and, like at the Ixtaca deposit, have the potential to overlie epithermal gold silver veins. Perhaps most significantly the SE volcanic hosted clay alteration zone extends for a kilometer to the southeast from Cerro Caolin.

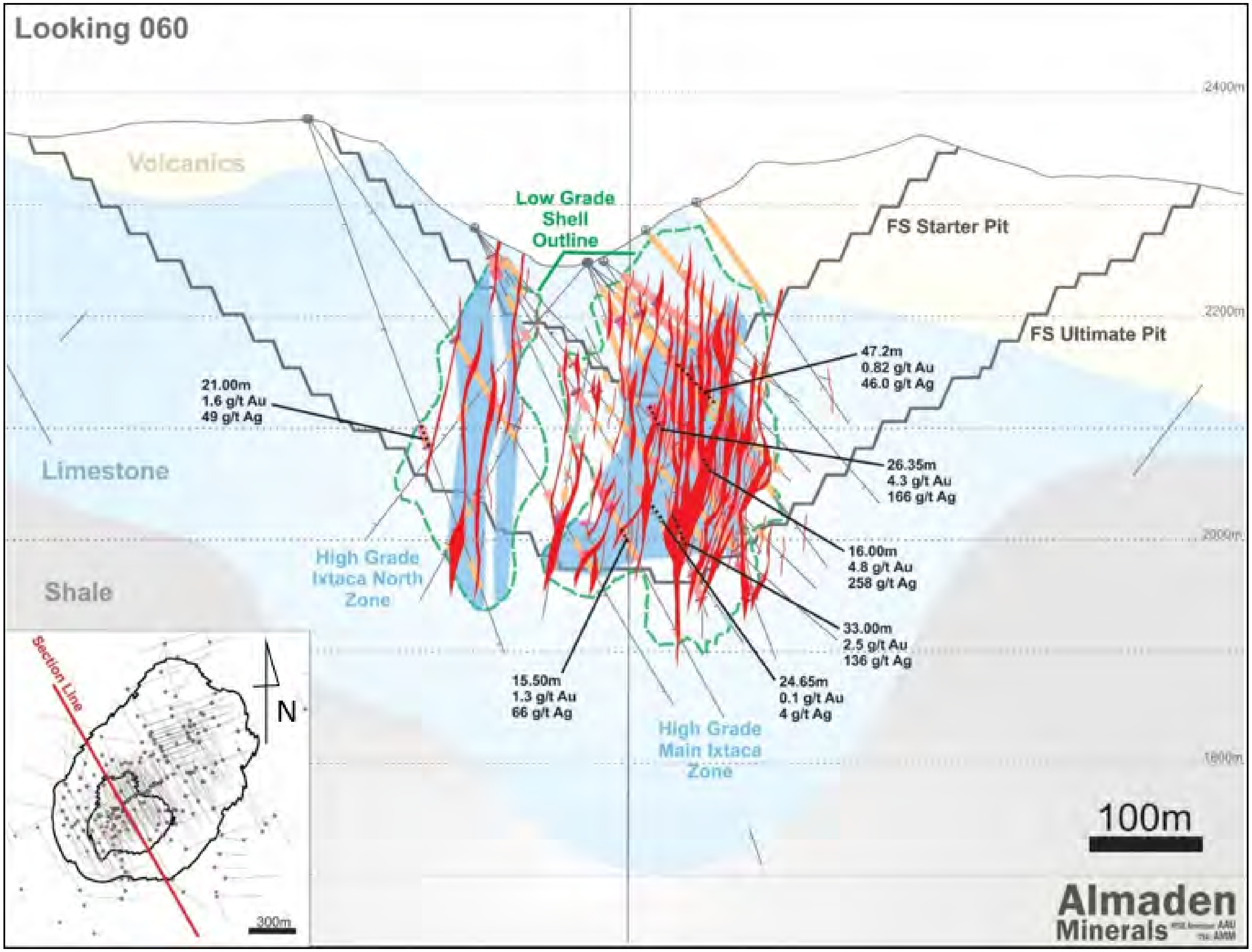



**Figure 6-11** The Vein System of the Ixtaca Main Zone , from Almaden , Jan 2019

**Figure 6-12 Photo (2001) of Historic Clay Exploration Pits in Clay Altered Volcanic Rocks. Looking to West. Photo Taken from near Section 10+300**

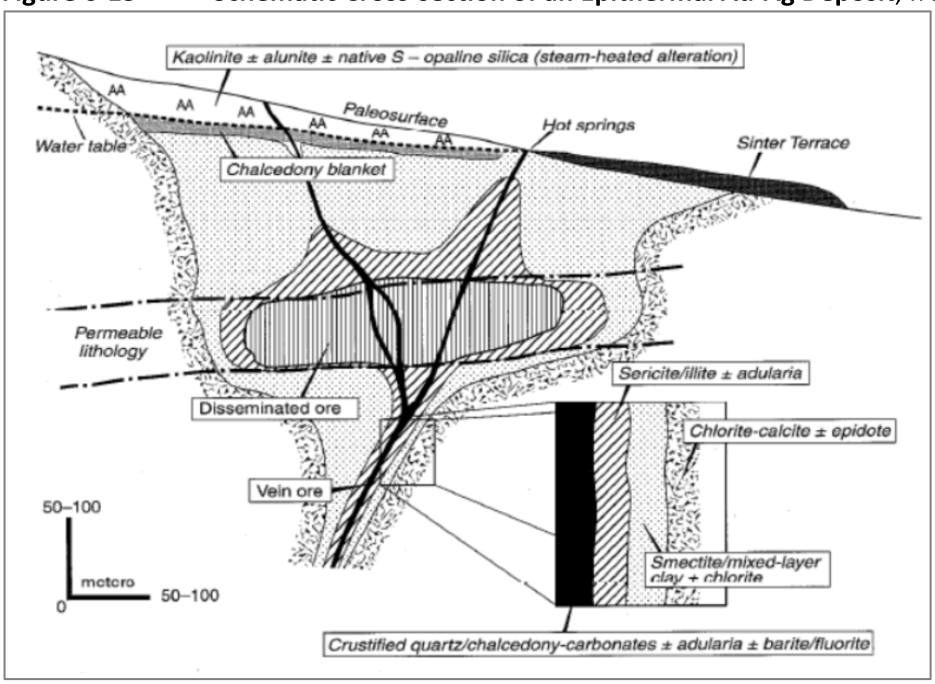
## 6.4 Deposit Types

The principal deposit-type of interest on the Tuligtic Property is low- to intermediate- sulphidation epithermal gold-silver mineralization (Figure 6-13) This style of mineralization is recognised at the Ixtaca Zone but property scale high level epithermal alteration suggests that mineralization of this type can exist elsewhere on the Project. These deposits are described more fully below. The Tertiary bodies intruding the Tamaulipas Limestones and the tertiary volcanics, makes the Property also prospective for Porphyry copper-gold-molybdenum (Cu-Au-Mo) and peripheral Pb-Zn Skarn deposits.

### 6.4.1 Epithermal Gold-Silver Deposits

Gold and silver deposits that form at shallow crustal depths (<1,500m) are interpreted to be controlled principally by the tectonic setting and composition of the mineralizing hydrothermal fluids. Three classes of epithermal deposits (high-sulphidation, intermediate-sulphidation and low-sulphidation) are recognized by the oxidation state of sulphur in the mineralogy, the form and style of mineralization, the geometry and mineralogy of alteration zoning, and the mill feed composition (Hedenquist et al., 2000; Hedenquist and White, 2005). Overlapping characteristics and gradations between epithermal classes may occur within a district or even within a single deposit. The appropriate classification of a newly discovered epithermal prospect can have important implications to exploration (Table 6-1).

**Figure 6-13 Schematic Cross-section of an Epithermal Au-Ag Deposit**, from Hedenquist et al., 2000




High-sulphidation and intermediate-sulphidation systems are most commonly hosted by subduction-related andesite-dacite volcanic arc rocks, which are dominantly calc-alkaline in composition. Low-sulphidation systems are more restricted, generally to rift-related bimodal (basalt, rhyolite) or alkalic volcanic sequences. The gangue mineralogy, metal contents and fluid inclusion studies indicate that near neutral pH hydrothermal fluids with low to moderate salinities form low- and intermediate-sulphidation class deposits whereas high-sulphidation deposits are related to more acidic fluids with variable low to high salinities. Low- and intermediate-sulphidation deposits are typically more vein-style while high-sulphidation deposits commonly consist primarily of replacement and disseminated styles of mineralization with subordinate veining. The characteristics of silver-gold mineralization in the Ixtaca Zone include banded, colloform and brecciated carbonate-quartz veining including locally abundant Mn-carbonate and rhodochrosite indicate that this is primarily a low to intermediate-sulphidation epithermal district (Figure 6-14).

Several of the larger examples of this deposit type occur in Mexico and include the prolific historic epithermal districts of Pachuca, Guanajuato and Fresnillo. Nevertheless these districts are base metal rich while Ixtaca is a precious metals deposit.

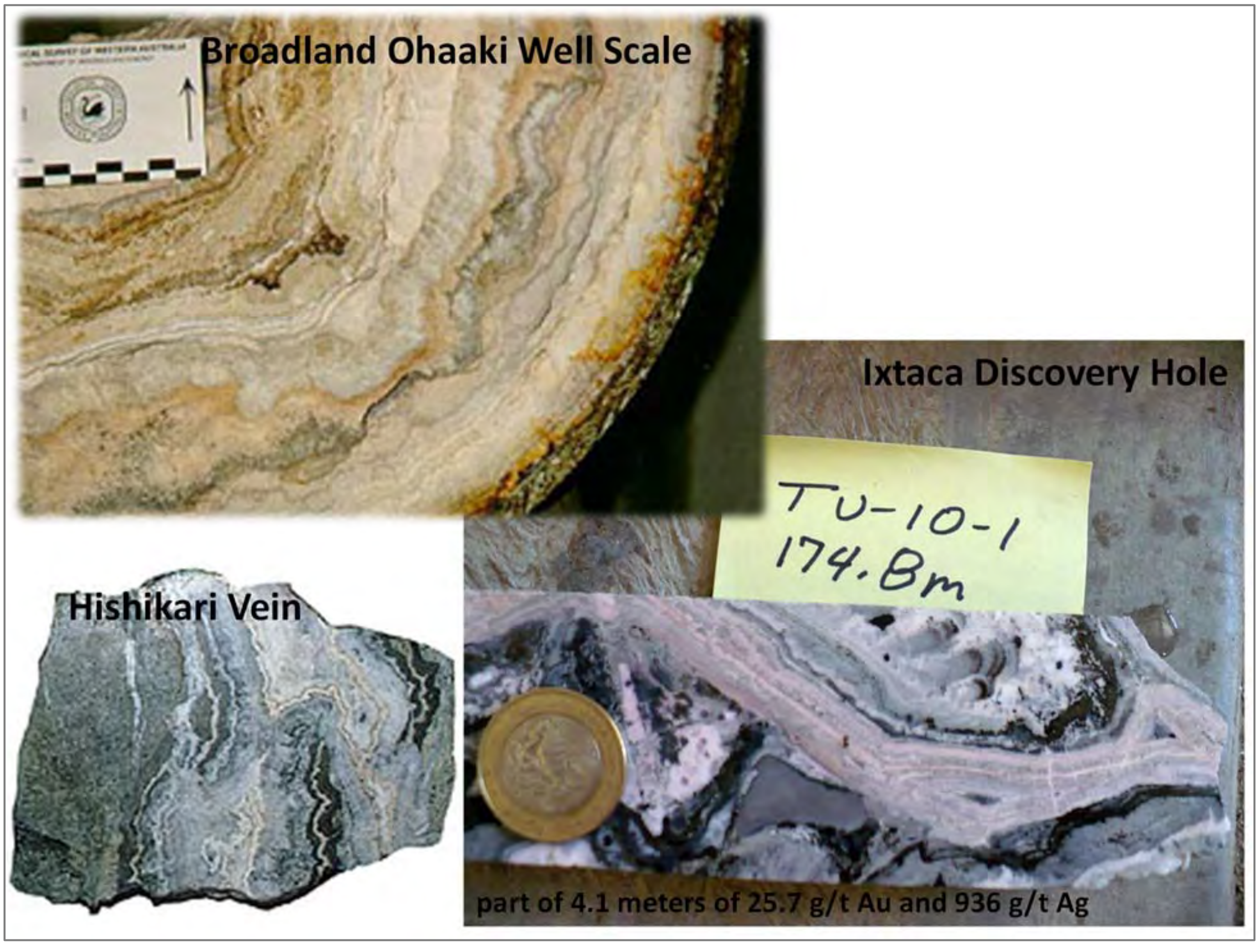



**Figure 6-14** **Photos of Epithernal Veining from Ixtaca, Hishikari Japan and Well Scale from the Active Geothermal System, Broadlands Ohaaki, New Zealand**

**Table 6-1 Classification of Epithermal Deposits**

| | Low-Sulphidation | Intermediate-Sulphidation | High-Sulphidation |
|---|---|---|---|
| **Metal Budget** | Au- Ag, often sulphide poor | Ag - Au +/- Pb - Zn; typically sulphide rich | Cu - Au - Ag; locally sulphide-rich |
| **Host Lithology** | bimodal basalt-rhyolite sequences | andesite-dacite; intrusion centred district | andesite-dacite; intrusion centred district |
| **Tectonic Setting** | rift (extensional) | arc (subduction) | arc |
| **Form and Style of Alteration/ Mineralization** | vein arrays; open space veins dominant; disseminated and replacement mill feed minor stockwork mill feed common; overlying sinter common; bonanza zones common | vein arrays; open space veins dominant; disseminated and replacement mill feed minor; stockwork mill feed common; productive veins may be km-long, up to 800m in vertical extent | veins subordinate, locally dominant; disseminated and replacement mill feed common; stockwork mill feed minor. |
| **Alteration Zoning** | mill feed with quartz-illite-adularia (argillic); barren silicification and propylitic (quartz-chlorite-calcite +/- epidote) zones; vein selvedges are commonly narrow | mill feed with sericite-illite (argillic-sericitic); deep base metal-rich (Pb-Zn +/- Cu) zone common; may be spatially associated with HS and Cu porphyry deposits | mill feed in silicic core (vuggy quartz) flanked by quartz-alunite-kaolinite (advanced argillic); overlying barren lithocap common; Cu-rich zones (enargite) common |
| **Vein Textures** | chalcedony and opal common; laminated colloform-crustiform; breccia; bladed calcite (evidence for boiling) | chalcedony and opal uncommon; laminated colloform-crustiform and massive common; breccias; local carbonate-rich, quartz-poor veins; rhodochrosite common, especially with elevated base metals | chalcedony and opal uncommon; laminated colloform-crustiform veins uncommon; breccia veins; rhodochrosite uncommon |
| **Hydrothermal Fluids** | low salinity, near neutral pH, high gas content ($CO_2$, $H_2S$); mainly meteoric | moderate salinities; near neutral pH | low to high salinities; acidic; strong magmatic component? |
| **Examples** | McLaughlin, CA; Sleeper and Midas, NV; El Penon, Chile; Hishikari, Japan | Arcata Peru; Fresnillo Mexico; Comstock NV; Rosia Montana Romania | Pierina Peru; Summitville CO |

**Altered after Taylor, 2007*

The low- and intermediate-sulphidation epithermal gold-silver deposits are generally characterised by open space fill and quartz-carbonate veining, stockworks and breccias associated with gold and silver often in the form of electrum, argentite and pyrite with lesser and variable amounts of sphalerite, chalcopyrite, galena, rare tetrahedrite and sulphosalt minerals, which form in high-level (epizonal) to near-surface environments.

The epithermal veins form when carbonate minerals and quartz precipitate from a cooling and boiling alkali-chloride fluid. Alkali-chloride geothermal fluids are formed from magmatic gases and convecting groundwater and are near neutral in composition. These fluids convect in the upper crust perhaps over a 10km deep vertical interval and can transport gold, silver and other metals. At roughly 2km depth, these fluids begin to boil, releasing $CO_2$ and $H_2S$ (carbon-dioxide and hydrogen-sulphide). Both these now separated gases form separate fluids, each forming alteration zones with distinct mineralogy (Hedenquist et al., 2000).

Above the water table $H_2S$ condenses in the vadose zone to form a low pH $H_2SO_4$ (hydrogen-sulphate) dominant acid sulphate fluid (Hedenquist and White, 1990). These fluids can result in widespread tabular steam-heated alteration zones dominated by fine grained and friable kaolinite and alunite. Steam-heated waters collect at the water table and create aquifer-controlled strataform blankets of dense silicification known as silica caps (Shoenet al., 1974; Hedenquist et al., 2000). Since gold is not transported by the gases or sulphuric acid, the silica cap and overlying kaolinite alteration is usually devoid of gold and silver (Hedenquist et al. 2000).

Bicarbonate fluids are the result of the condensation of $CO_2$ in meteoric water. These fluids are also barren of gold and silver and generally form carbonate dominated alteration on the margins of the geothermal cell.

As the source alkali chloride fluids boil and cool quartz and carbonate deposit in the fractures along which the fluids are ascending to form banded carbonate-quartz veins. Gold and silver present within the fluid also precipitate in response to the boiling of the fluid. Potassium-feldspar adularia is also a common mineral that deposits in the veins in response to boiling. As carbonate and quartz precipitates individual fractures can be sealed and the boiling fluid must then find another weak feature to continue rising. Gases which accumulate beneath the sealed fracture causes the pressure to increase until the seal is broken. This results in a substantial change in pressure, which propagates catastrophic boiling in turn causing gold, bladed calcite, and amorphous silica to precipitate rapidly. Once the fluids return to equilibrium the quartz crystals again precipitate under passive conditions and seal the vein again until the process recurs. This episodic sealing and fracturing results in the banded textures common in these vein systems.

Mill feed zones are typically localized in structures, but may occur in permeable lithologies. Upward-flaring mill feed zones centred on structurally controlled hydrothermal conduits are typical. Large (bigger than 1m wide and hundreds of metres in strike length) to small veins and stockworks are common with lesser disseminations and replacements. Vein systems can be laterally extensive but mill feed shoots have relatively restricted vertical extent. High-grade ores are commonly found in dilational zones in faults at flexures, splays and in stockworks.

These deposits form in both subaerial, predominantly felsic, volcanic fields in extensional and strike-slip structural regimes and island arc or continental andesitic stratovolcanoes above active subduction zones. Near-surface hydrothermal systems, ranging from hot spring at surface to deeper, structurally and permeability focused fluid flow zones are the sites of mineralization. The mill feed fluids are relatively dilute and cool solutions that are mixtures of magmatic and meteoric fluids. Mineral deposition takes place as the solutions undergo cooling and degassing by fluid mixing, boiling and decompression.

### 6.4.2 The Ixtaca Zone Epithermal System

The epithermal veining at the Ixtaca deposit occurs largely as vein swarms in the host carbonate rocks. Veins also occur in the overlying altered volcanics but the volcanic mineralisation is largely disseminated in nature. Fluid flow is interpreted to have been restricted to fractures in the basement carbonate units, forming veins. In the more permeable volcanic units above fluids appear to have dispersed forming lower grade mineralisation associated with disseminated pyrite ( Figure 6-13).

The bulk of the epithermal veining in the Ixtaca deposit occurs as subparallel branching veins and veinlets and local stockworks called vein swarms (Figure 6-15). This is common for epithermal vein systems that occur in brittle lithologies like the limestone host rock at Ixtaca. Similar vein swarms occur and have been mined in several epithermal systems worldwide including Waihi New Zealand, McLauphlin and Mesquite California (Sillitoe, 1993).

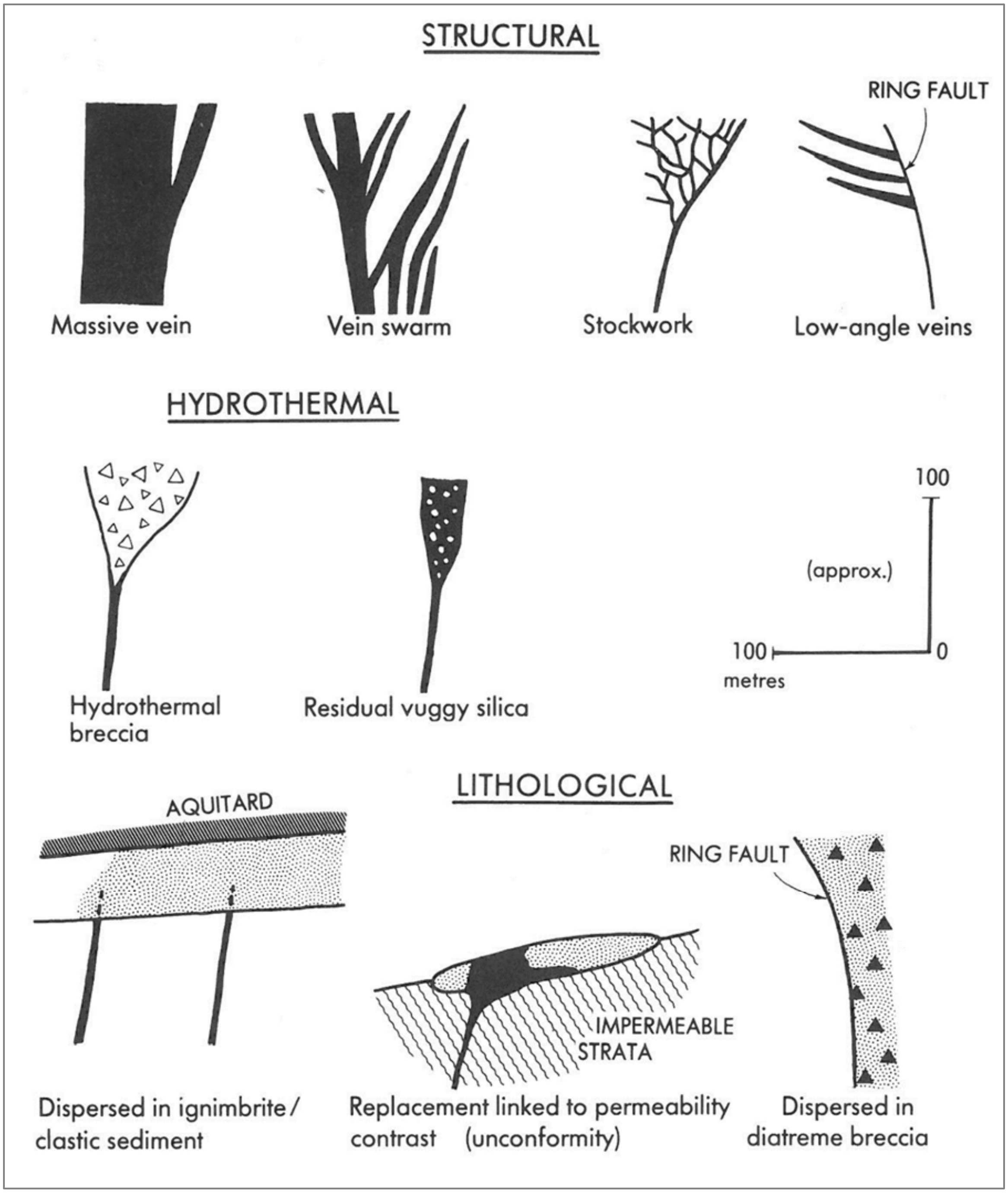



**Figure 6-15** **Selected styles and geometry of epithermal deposits illustrating the structural setting of the limestone hosted veining at Ixtaca, a vein swarm and local stockwork. Taken from Sillitoe (1993).**

### 6.4.3 Porphyry Copper-Gold-Molybdenum and Lead-Zinc Skarn Deposits

In Porphyry Cu-Au-Mo deposit types, stockworks of quartz veinlets, quartz veins, closely spaced fractures, and breccias containing pyrite and chalcopyrite with lesser molybdenite, bornite and magnetite occur in large zones of economically bulk-mineable mineralization in or adjoining porphyritic intrusions and related breccia bodies. Disseminated sulphide minerals are present, generally in subordinate amounts. The mineralization is spatially, temporally and genetically associated with hydrothermal alteration of the host rock intrusions and wall rocks.

These deposit types are commonly found in orogenic belts at convergent plate boundaries, commonly linked to subduction-related magmatism. They also occur in association with emplacement of high-level stocks during extensional tectonism related to strike-slip faulting and back-arc spreading following continent margin accretion (Panteleyev, 1995).

Many Au skarns are related to plutons formed during oceanic plate subduction, and there is a worldwide spatial, temporal and genetic association between porphyry Cu provinces and calcic Au skarns. The Au skarns are divided into two types. Pyroxene-rich Au skarns tend to be hosted by siltstone-dominant packages and form in hydrothermal systems that are sulphur-rich and relatively reduced. Garnet-rich Au skarns tend to be hosted by carbonate-dominant packages and develop in more oxidizing and/or more sulphur-poor hydrothermal systems. The gold is commonly present as micron-sized inclusions in sulphides, or at sulphide grain boundaries. To the naked eye, mill feed is generally indistinguishable from waste rock. Due to the poor correlation between Au and Cu in some Au skarns, the economic potential of a prospect can be overlooked if Cu-sulphide-rich outcrops are preferentially sampled and other sulphide-bearing or sulphide-lean assemblages are ignored (Ray, 1998).

# 7.0 Exploration

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019. Between 2004 and 2017, Almaden's exploration at the Tuligtic Property has included ASTER satellite hydroxyl alteration studies, surface lithology and alteration mapping, rock and soil geochemical sampling, ground magnetics, IP and resistivity, Controlled Source Audio-frequency Magnetotelluric (CSAMT), and Controlled Source Induced Polarization (CSIP) geophysical surveys. The work to date has resulted in the identification of eight anomalous areas: the Ixtaca, SE Clay Alteration, Tano, Ixtaca East, Caleva, Azul West, Azul and Sol zones (Figure 6-3 and Figure 7-2, Figure 7-3). Detailed exploration results for the Tuligtic Property have been disclosed in a previous Technical Report for the Tuligtic Property by Raffle et al. (2013) and are summarized below.

## 7.1 Surface Exploration Work

### 7.1.1 Rock Geochemistry

B Between 2004 and 2017 a total of 654 rock geochemical samples have been collected on the Property over a 6 x 6km area (Figure 7-2). Rock sampling, guided by concurrent soil geochemical surveys, has been concentrated around the Ixtaca Zone and an area extending 4km to the NNE over the copper porphyry target located between the Caleva and Azul zone soil geochemical anomalies (Figure 6-3, Figure 7-2, Figure 7-3).

Rock grab samples collected by Almaden are from both representative and apparently mineralized lithologies in outcrop, talus and transported boulders within creeks throughout the Property. Rock samples ranging from 0.5 to 2.5 kilograms (kg) in weight and are placed in uniquely labelled poly samples bags and their locations are recorded using handheld GPS accurate to plus or minus 5m accuracy.

Of the 654 rock grab samples collected, a total of 53 samples returned assays of greater than 100 parts-per-billion (ppb) gold (Au), and up to 6.14 grams-per-tonne (g/t) Au. A total of 52 rock samples returned assays of greater than 10g/t silver (Ag) and up to 600g/t Ag.

Gold and silver mineralization occurs within the Ixtaca Zone, and is associated with anomalous arsenic, mercury (± antimony). To the northeast of the Ixtaca Zone zinc, copper and locally anomalous gold, silver and lead (± arsenic) values occur in association with calc-silicate skarn and altered intrusive rocks.

Basement carbonate units, altered intrusive, and locally calc-silicate skarn mineralization occur as erosional windows beneath altered and locally mineralised volcanic. Surface mineralization at the Ixtaca Zone occurs as limestone boulders containing quartz vein fragments and high level epithermal alteration within overlying volcanic rocks as well several small outcrops of epithermal veined limestone. Epithermal alteration and mineralization is observed overprinting earlier skarn and porphyry style alteration and mineralization. Numerous small skarn-related showings exist at the north end Project. Near the Caleva soil anomaly, a small (200 x 100m)skarn zone hosts sphalerite, galena and chalcopyrite quartz vein stockwork mineralization along the contact zone between limestone and altered and mineralized intrusive rocks to the east.

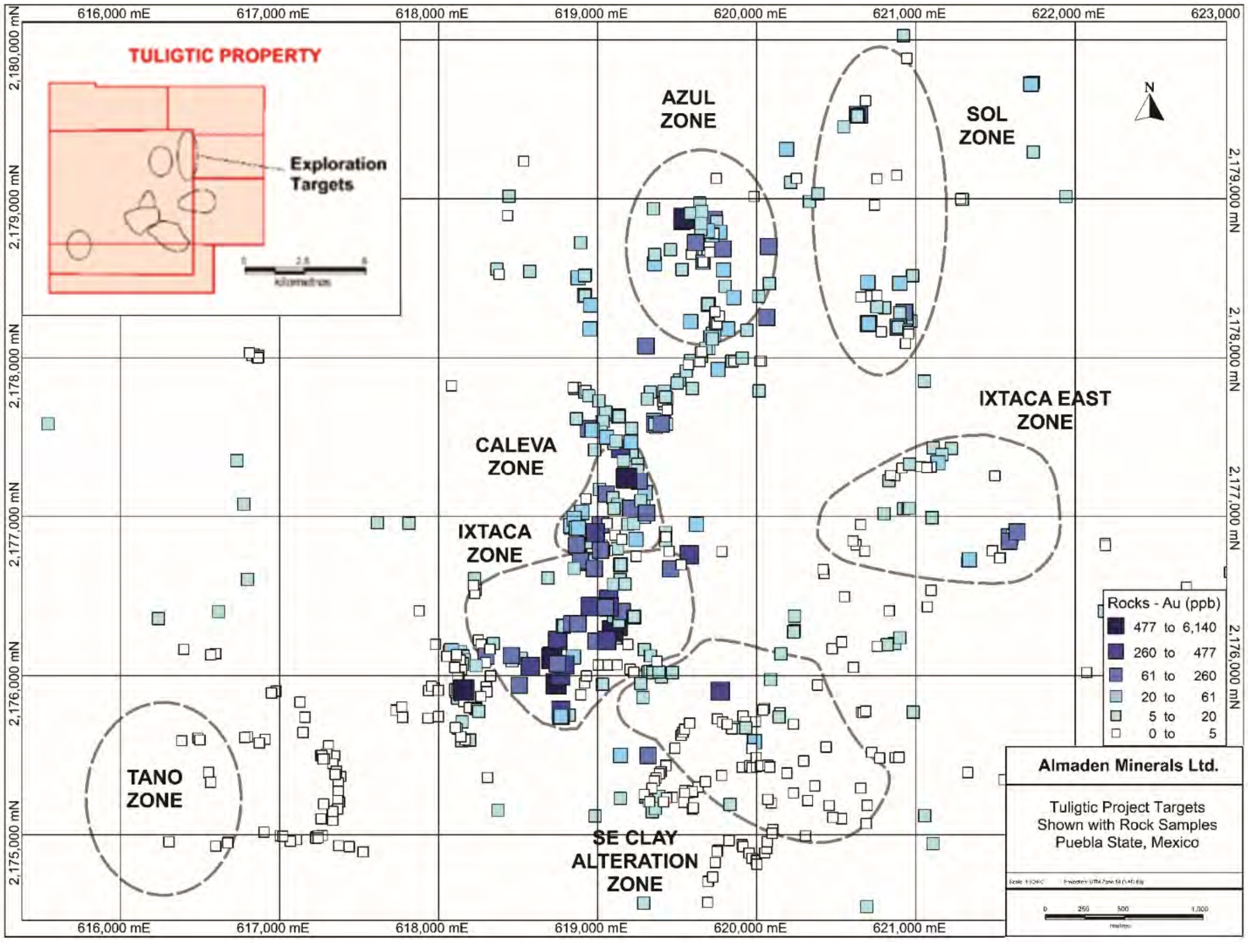



**Figure 7-1 Rock Sample Gold Anomalies and Target Areas**

### 7.1.2 Soil and Stream Sediment Geochemistry

The collection of 4,760 soil samples by Almaden between 2005 and 2011 resulted in the identification of eight anomalous areas: the Ixtaca, SE Clay Alteration Zone, Tano, Ixtaca East, Tano, Caleva, Azul West, Azul and Sol zones (Figure 6-3). During 2013, an additional 1,035 soil samples have been collected to extend soil grid lines to the west and locally infill existing grid lines, for a total of 5,795 soil samples.

Samples have been collected at 50m intervals along a series of 200m spaced east-west oriented lines. Infill lines spaced at 100m have been completed over gold and silver anomalies at the Caleva and Ixtaca East zones, and The Tano Zone roughly 2.5km west of the Ixtaca Zone. Subsequently, detailed 50m x 50m grid sampling of the Ixtaca Zone and select grid infill of the Azul and Sol zones was completed. Soil samples are collected by hand from a small hole dug with a non-metallic pick or hoe. The sample depth is typically 10cm, or at least deep enough to be below the interpreted surficial organic layer. Sample bags are labelled with a unique sample number.

Based on the distribution of soil geochemical anomalies and the mapped geology it is apparent that the locally occurring thin (<2 m) thick overlying and unconsolidated post mineral volcanics and soil deposits obscure rock geochemical anomalies from the underlying epithermal system. Significant and anomalous precious metal in soils occur where this unit has been eroded away and volcanic and carbonate hosted mineralisation occurs at surface. Anomalous thresholds (greater than the $95^{th}$ percentile) for gold and silver are calculated to be 17.1ppb Au and 0.59ppm Ag, respectively. A total of 288 samples contain anomalous Au, including 141 samples with coincident Ag anomalies.

The Ixtaca Zone drainage area produces the largest Au and Ag response within the Tuligtic Property (Figure 7-2, Figure 7-3). Base metals do not correlate significantly with the Ixtaca Zone, and epithermal trace metal suite elements anomalies occur peripherally within altered volcanic rocks.

Roughly 2 km to the southwest at approximately 240 degrees, along strike from the Ixtaca deposit is the Tano zone of high gold and silver in soil where there has been a limited number of exploration holes drilled (highest gold intercept of 1.00 meters of 27.50 g/t gold and 57.7 g/t silver in hole TU-18-541). In the intervening 2 kilometers between the Tano Zone and Ixtaca deposit soils were not significantly anomalous but this is an area covered in post mineral material.

Similarly, along strike at 060 azimuth, roughly 2 km to the northeast the Ixtaca deposit, is the Ixtaca East zone of clay alteration and high gold in soil. Two drainages from this area returned high gold in silt, 700 and 900 ppb respectively.

Base metals correlate well with Au-Ag at the Caleva, Azul, and Sol zones to such an extent they are best termed Cu-Zn (Au-Ag) anomalies. (Figure 6-3, Figure 7-2. Figure 7-3). Significant high level epithermal suite trace element soil anomalies occur from Cerro Caolin (immediately above the Main Ixtaca Zone) to over a kilometer to the southeast in an area of outcropping clay altered volcanic. This anomaly and clay alteration defines the SE Alteration zone.

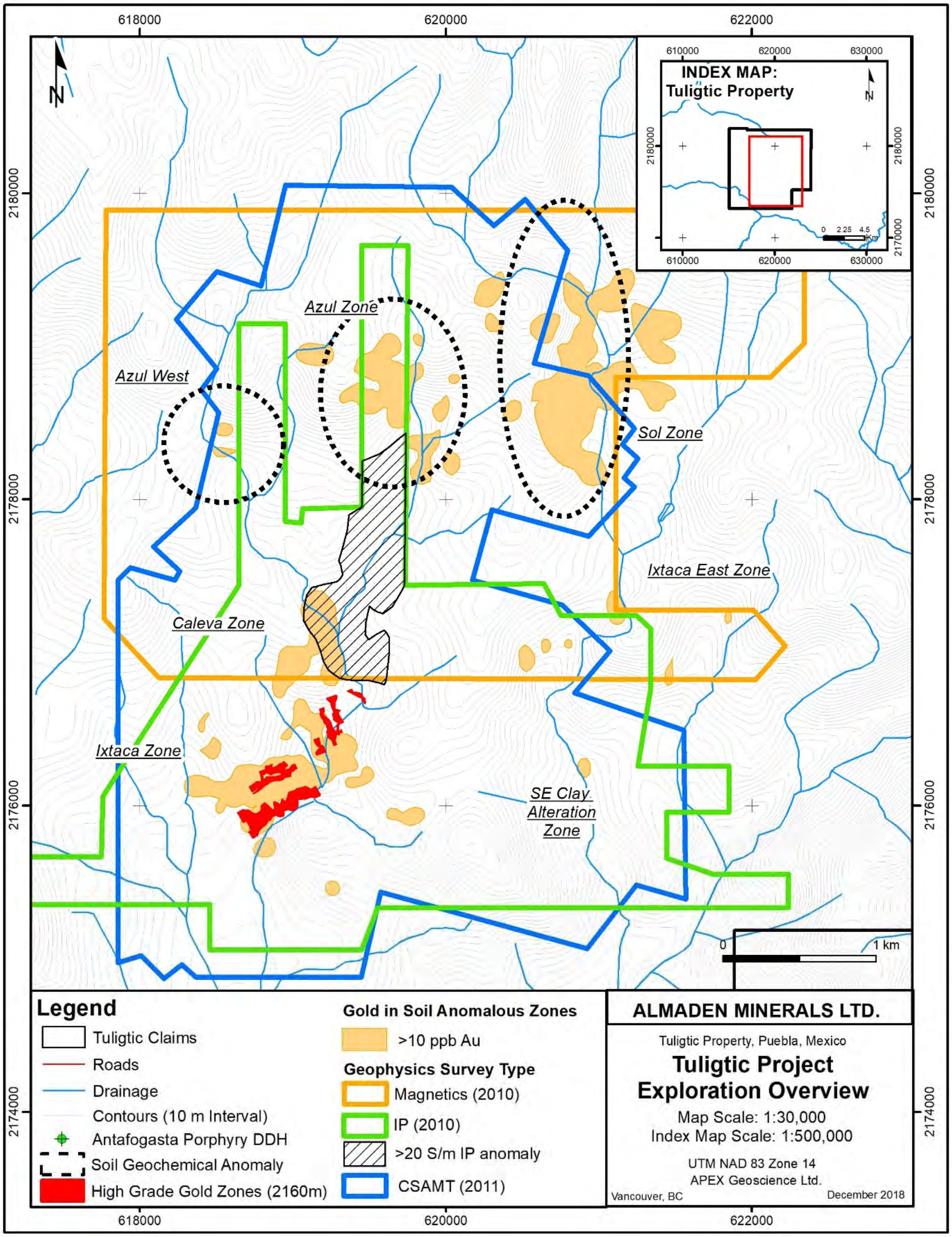



**Figure 7-2 Exploration Overview Showing Gold in Soil Anomalies and Extent of Geophysical Surveys**

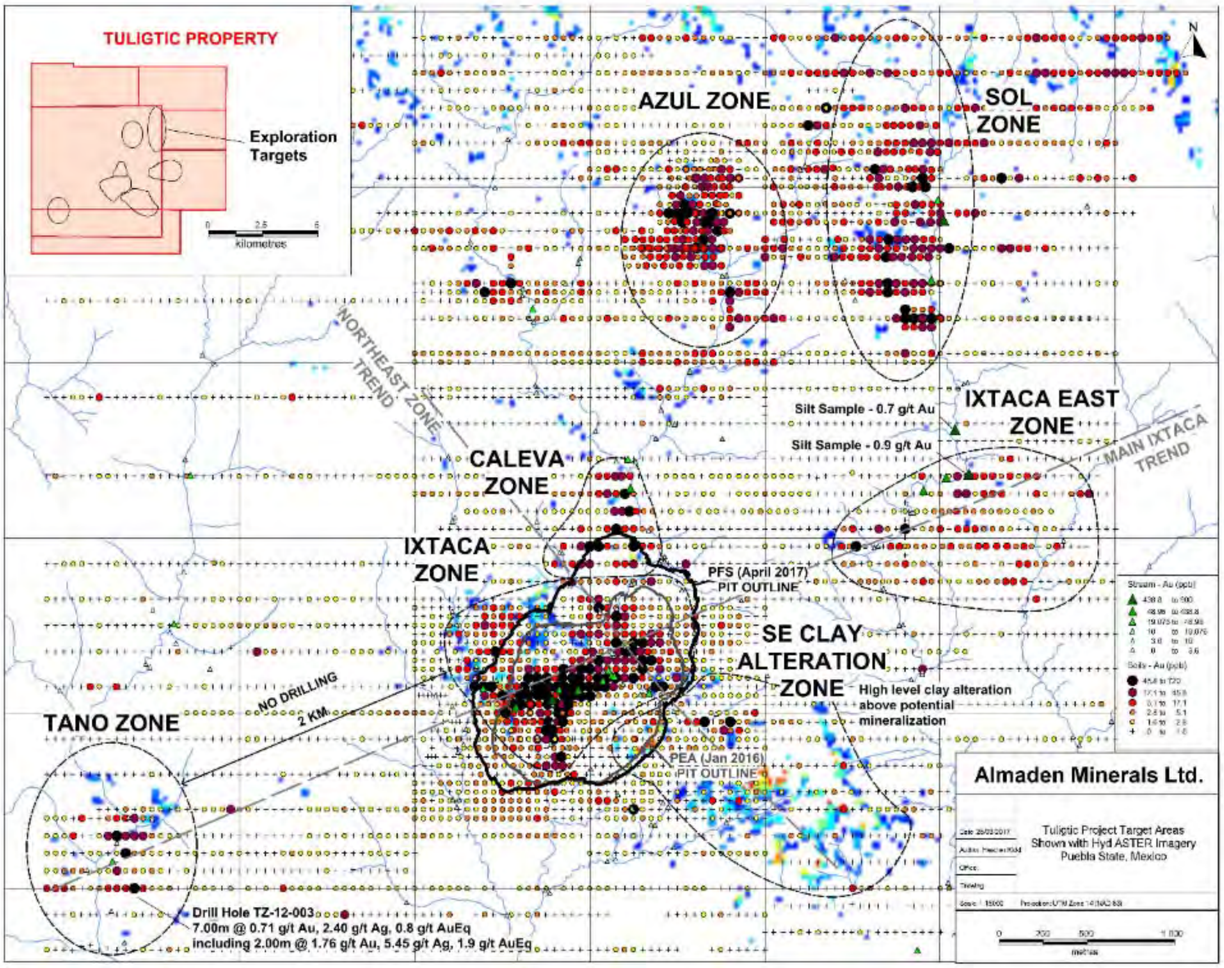



**Figure 7-3 Gold in Soil Anomalies, ASTER Satellite Hydroxyl responses and Target Areas**

### 7.1.3 Ground Geophysics

#### 7.1.3.1 Magnetics

During 2010, Almaden completed an 84 line-km ground magnetic survey over a 4km by 4.5km area covering the copper porphyry target area north of the Ixtaca Zone (Figure 7-2). The survey comprised a series of 200m spaced east-west oriented lines with magnetic readings collected at 12.5m intervals along each line.

The survey identified a broad poorly defined, approximately 100 nano-Tesla (nT) magnetic high anomaly that corresponds in part with mapped altered quartz-monzonite porphyry rocks. Numerous, 30 to 50nT short strike length NNW trending linear magnetic high anomalies parallel the regional structural grain, and the strike of bedding within Upper Tamaulipas formation calcareous rocks suggesting structural and/or lithologic control of magnetic anomalies.

#### 7.1.3.2 **Induced Polarization/Resistivity**

Concurrent with 2010 ground magnetic surveys, Almaden completed 108 line-km of 100m "a" spacing pole-dipole induced polarization (IP) / resistivity geophysical surveys over the project area. The survey employed a series of overlapping east-west and north-south oriented lines spaced at intervals of 100m. Additional N-S lines were surveyed in 2016 between the eastern edge of the Ixtaca zone and the Tano zone totalling 13 line-km.

Resistivity anomalies appear to be controlled largely by the distribution of more resistive basement carbonate lithologies. Resistivity low (conductive) anomalies are common along local topographic high ridges and plateaus where significant thicknesses of more conductive altered volcanic rocks remain. Nevertheless the discovery drillhole TU-10-001, targeted a coincident chargeability and resistivity high interpreted to represent epithermal veining beneath the barren clay alteration of Cerro Caolin. The Main Ixtaca vein zone was intersected where this anomaly occurs. Many similar resistivity and chargeability highs were detected in the IP survey and require drill testing.

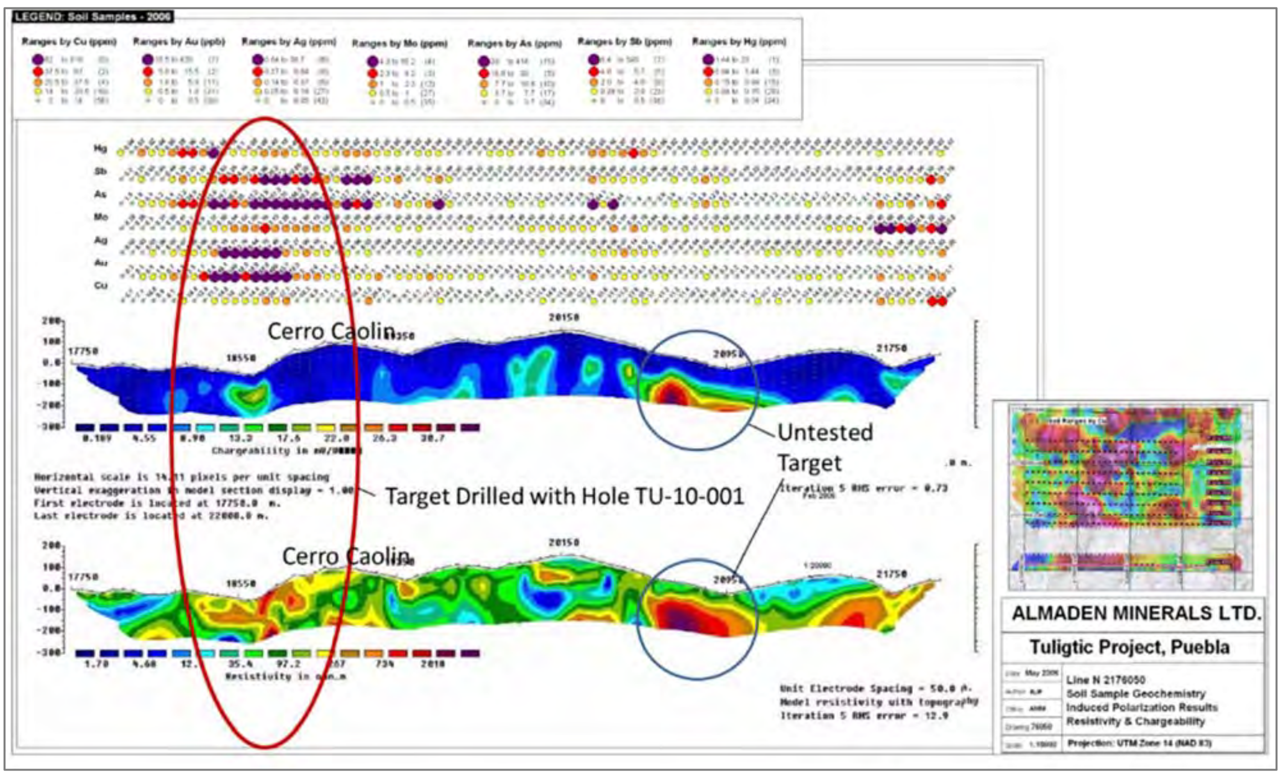



**Figure 7-4** **IP Chargeability and Resistivity Section Showing Soil Results and Targets. The red target was drill tested with hole TU-10-001 and resulted in the Discovery of the Main Ixtaca Vein Swarm Zone**

The survey also defines a 1,000 x 200m north-northwest trending 20 to 30mV/V chargeability anomaly coincident with mapped calc-silicate skarn mineralization and the Caleva Zone soil geochemical anomaly (Figure 7-4). While poorly constrained by a single north-south oriented survey line, the anomaly extends a further 1 km north over the porphyry copper anomaly area. Partial survey coverage of the Ixtaca East

Zone multi-element soil geochemical anomaly defines a 700 x 500m elliptical 7 to 15mV/V chargeability anomaly along its western margin.

#### 7.1.3.3 CSAMT/CSIP

During 2011, Zonge International Inc. on behalf of Almaden completed a Controlled Source Audio-frequency Magnetotelluric (CSAMT) and Controlled Source Induce Polarization (CSIP) geophysical survey at the Tuligtic Property over a 6 by 4km area (Figure 7-2).

The survey totalled 48.5 line-km, including six lines oriented N-S (N16E azimuth, CSAMT and CSIP), and eight perpendicular E-W oriented lines (N104E azimuth, CSAMT only). Survey line spacing varied from 170 to 550m utilizing an array of six 25m dipoles.

2-D (N-S Line) smooth-model resistivity data defines a NW trending resistivity anomaly west of the Ixtaca Main Zone, and an E-W trending resistivity anomaly through the Ixtaca Zone. The NW trending anomaly passes through drill sections 10+200E to 10+400E, and may reflect limestone rocks on the west limb of an east-verging antiform. A similar NW trending conductive anomaly immediately to the east may represent calcareous shale rocks within the core of the antiform. The significance of the E-W trending anomaly is not known given the context of the current geologic model.

2-D (E-W Line) smooth-model resistivity data shows a strong resistivity anomaly associated with the core of the Ixtaca Main Zone, and surface outcropping limestone. To the northeast, a resistivity anomaly coincident with the Chemalaco Zone may reflect complex structural geology patterns and the relatively resistive limestone and Chemalaco Dyke lithologies.

A number of subvertical resistivity and conductivity anomalies are evident in the 1-D and 2-D inversions. These anomalies likely represent structures that could also host veins. Further review of this data is planned in order to better define drill targets based on this survey.

### 7.1.4 Exploration Potential

The Ixtaca deposit occurs within a large zone of high level epithermal alteration hosted by volcanic rocks, the distribution of which is readily defined by ASTER satellite hydroxyl responses (Figure 7-3). The Ixtaca deposit was found in 2010 with hole TU-10-001, which was designed to test a coincident high gold and silver in soil anomaly along with a high chargeability/high resistivity induced polarisation response occurring underneath a portion of the high level epithermal volcanic hosted clay alteration zone (Cerro Caolin). This hole intersected the core of the Main Ixtaca vein swarm. Subsequent drilling since 2010 focussed on developing and upgrading confidence of a resource immediately adjacent to this discovery, as well as holes required for engineering and hydrologic purposes. During this timeframe the Company focussed on this resource and development work which has meant that many of the epithermal targets have not yet been tested by drilling.

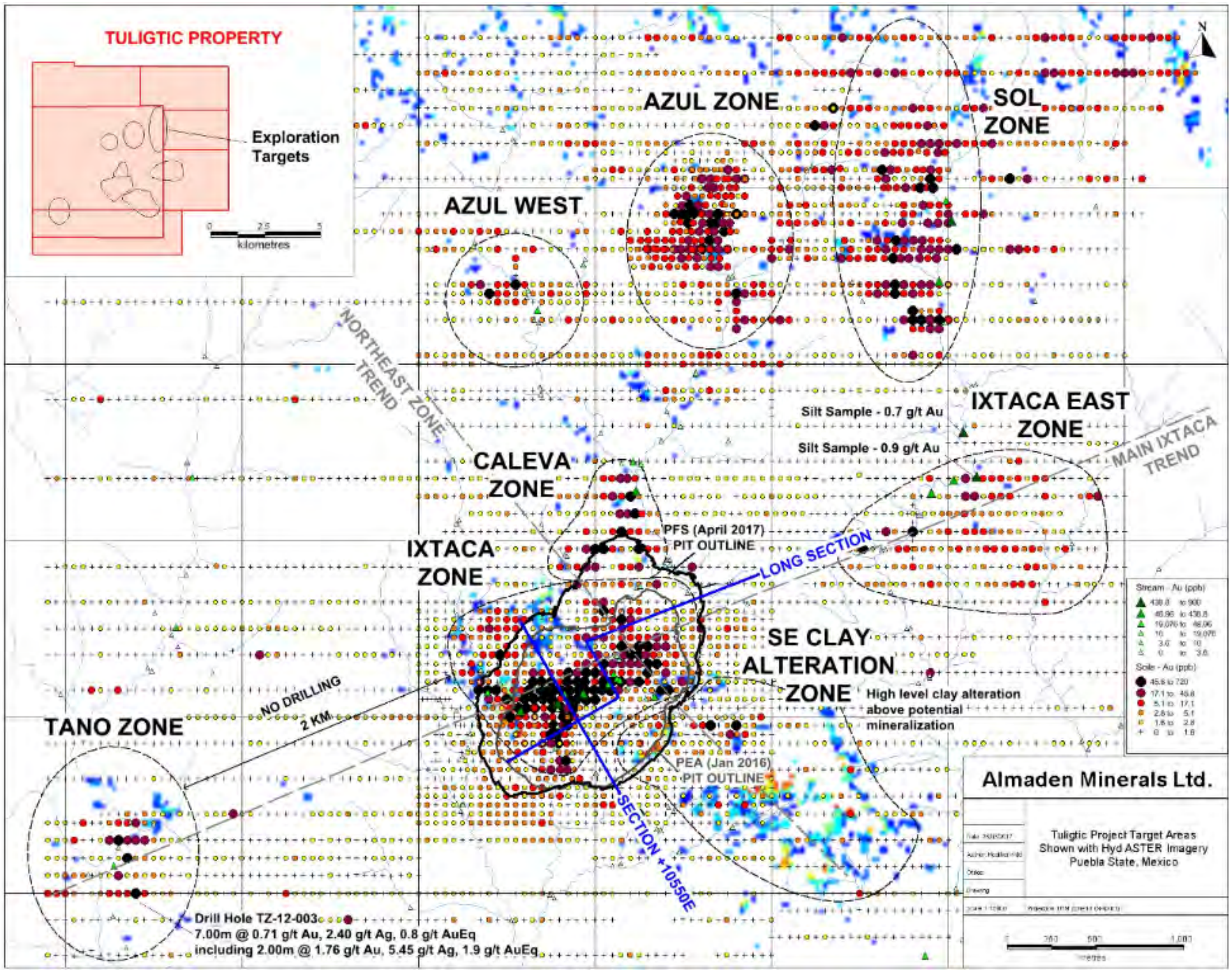



**Figure 7-5 Exploration Targets on the Tuligtic Project**

The known vein zones remain open in several directions. A drill program in 2016 was focussed on testing veins to the north of the Ixtaca North vein swarm and successfully identified several new zones of veining in this direction, suggesting that the potential for further veins to the north exists. To the south additional drilling is required to fully define the extent of the Main Ixtaca vein swarm beyond the known extents of which there is significant alteration at surface in the overlying volcanic. At depth the Chemalaco Zone remains open as it does along strike to the north.

The history of exploration at Cerro Caolin shows that the clay altered volcanics overlie significant epithermal vein deposits in this area. The alteration from Cerro Caolin extends to the south and southeast over a kilometer from Cerro Caolin. This area is highly anomalous in epithermal trace elements and is a high priority drill target for concealed epithermal veins.

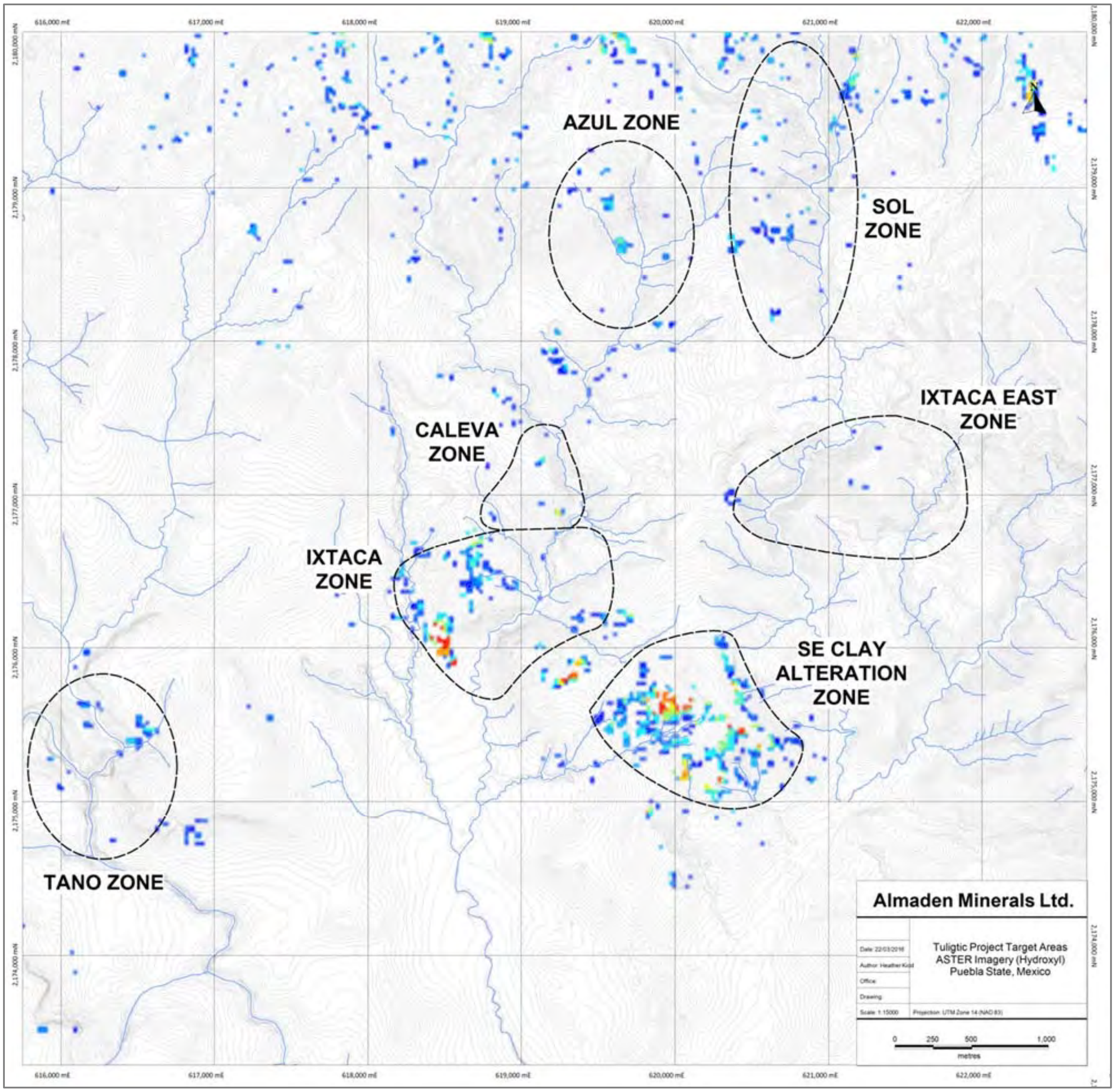
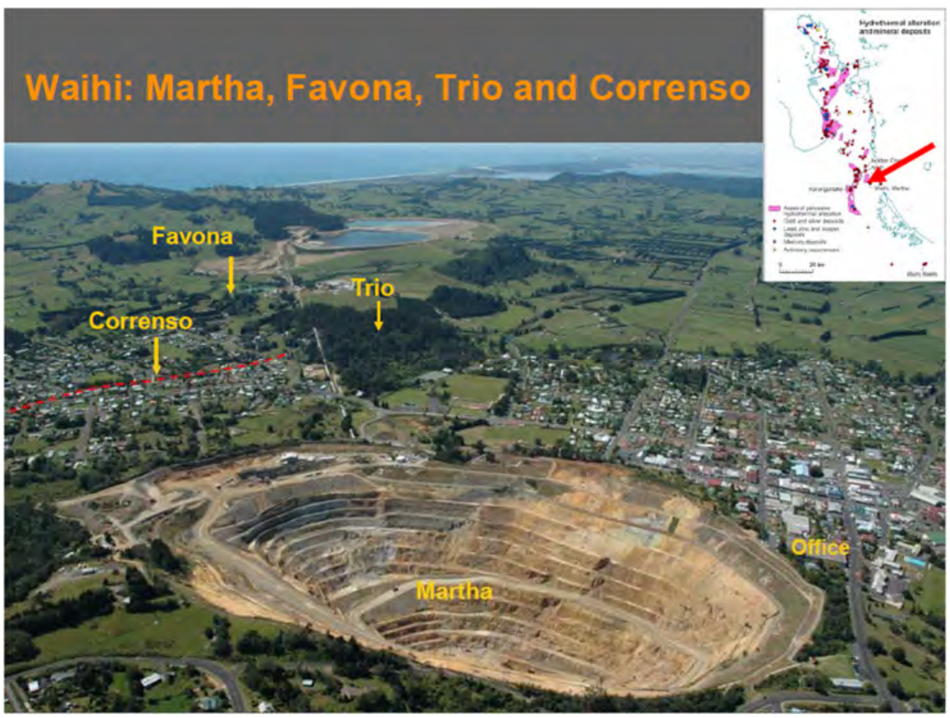



**Figure 7-6 ASTER Satellite Hydroxyl (Clay) responses Outlining Clay Altered Volanics**

To the west and southwest mapping and geochemistry is hampered by the thin layer of unconsolidated post mineral volcanic cover. Nevertheless, gold in soil geochemistry and hydroxyl responses have highlighted the Tano zone, located roughly 2 km along the strike extent of the Ixtaca vein system to the southwest (240/060 Azimuth) in a window of exposure beneath the post mineral cover. While the limited drilling to date at the Tano zone has identified veining and gold silver mineralisation (26.00 meters of 1.93 g/t gold and 3.37 g/t silver including 1.00 meters of 27.50 g/t gold and 57.70 g/t Au in hole TU-18-541) this work clearly indicates that the system persists to the southwest beyond the Ixtaca zone and highlights this approximately 2 km distance as prospective for concealed veins beneath cover (Figure 7-5 and Figure 7-6).

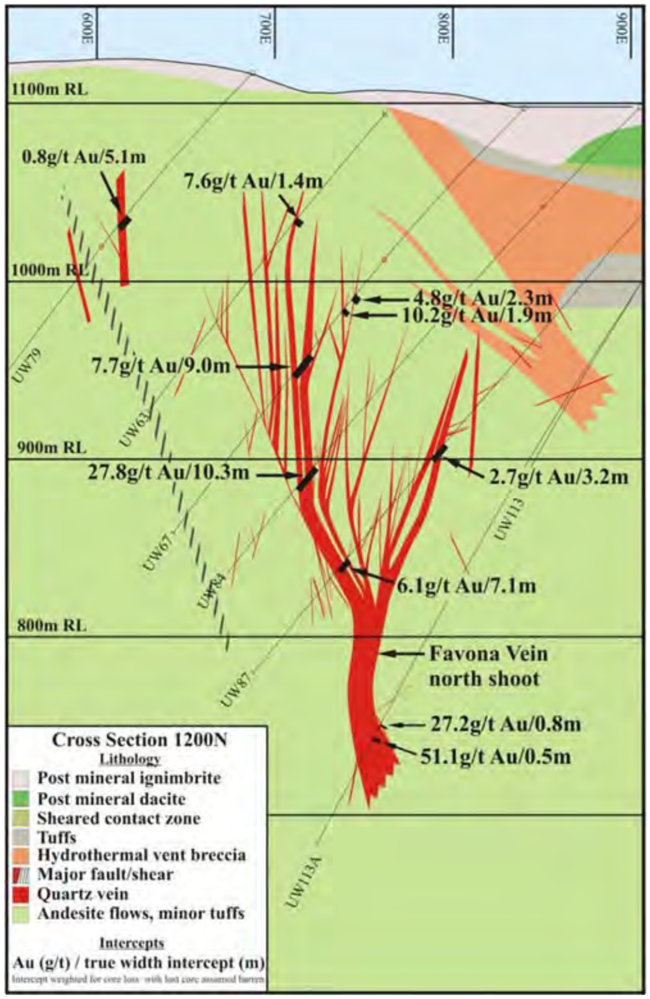
Similarly to the Northeast, roughly 2 km at 060 along strike from the Ixtaca deposit, a zone of alteration and gold in soils has been identified and named the Ixtaca East zone. Significant gold in stream sediments have been returned from drainages of this area (700 and 900 ppb gold respectively) and indicate the potential for the epithermal to extend into this area.

The Ixtaca vein deposit was discovered beneath barren alteration. Much of the property is either covered by this alteration or thin post mineral cover. The Ixtaca vein deposit is an epithermal low sulphidation vein system that manifests itself as vein swarms in the brittle carbonate host rocks and disseminated mineralisation in the more permeable volcanic rocks that overly the carbonates. At the Waihi deposit in New Zealand, an epithermal system that formed under similar geochemical conditions with similar vein textures, new discoveries have been made over more than 100 years of exploration history. Some of the most recent discoveries at Waihi, including the Favona vein system, do not have surface manifestations (Figure 7-7 and Figure 7-8). The clay alteration footprint at Ixtaca clearly indicates the potential for additional concealed veins at Ixtaca.




Source: Christie, T and Barker, M (2015) Exploration for epithermal gold deposits in New Zealand. PACRIM Conference Proceedings, 2015.

**Figure 7-7 Overview Photo of the Waihi Vein Deposit New Zealand. Historic Martha Pit on vein swarm in foreground. Surface projections of the concealed and more recently discovered Favona and Correnso veins also shown.**




Source: Christie, T and Barker, M (2015) Exploration for epithermal gold deposits in New Zealand. PACRIM Conference Proceedings, 2015.

**Figure 7-8 Cross Section of the Favona Vein Swarm and System, Waihi Deposit New Zealand showing the concealed nature of the deposit**

Based on the data gathered to date from the drilling and the Ixtaca deposit, and taken in the context of how epithermal systems manifest worldwide, an exploration model for further exploration has been developed by Almaden and is presented in Figure 7-9.

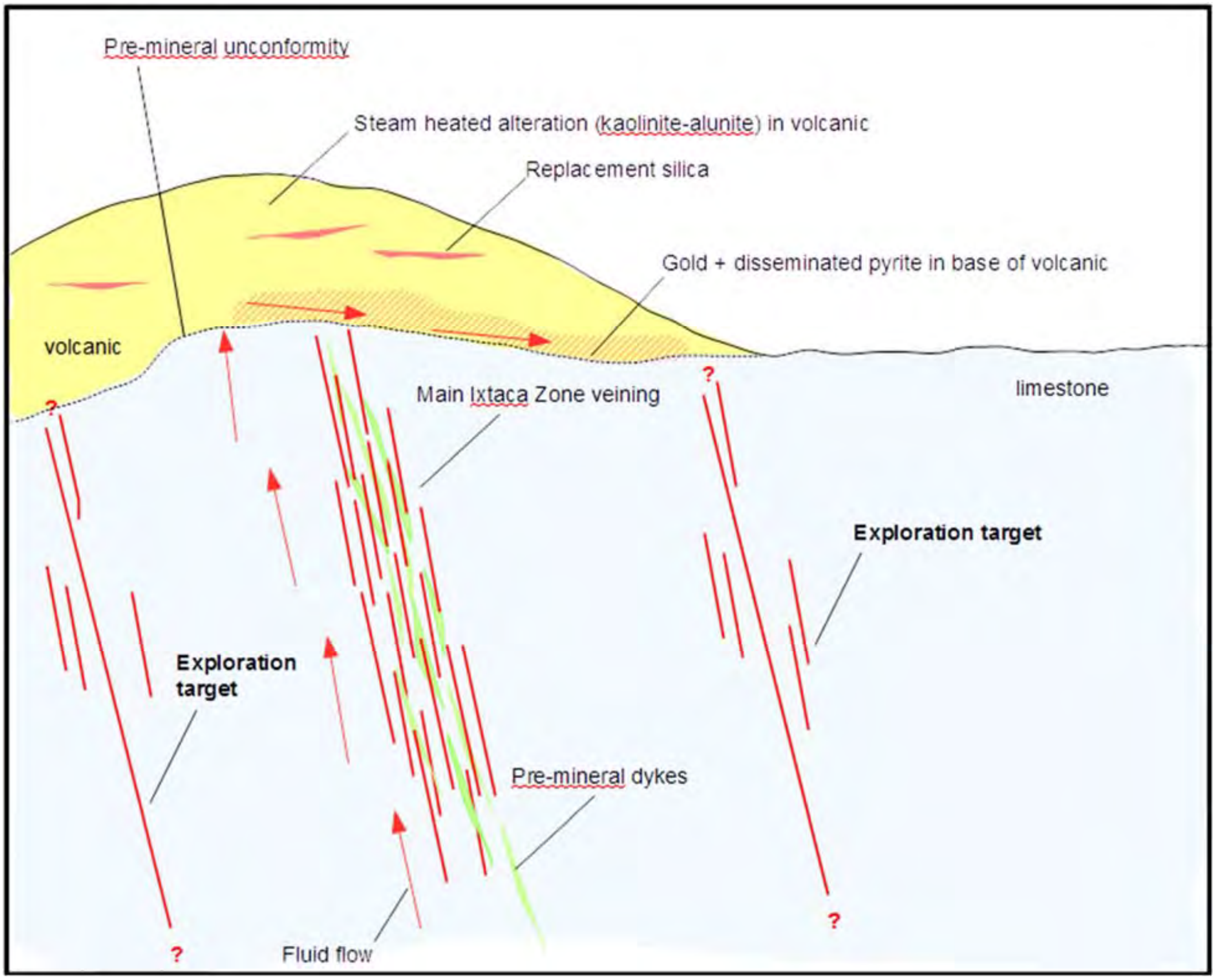



**Figure 7-9 Model for Further Exploration at the Tuligtic Project. From Almaden, Jan 2019**

## 7.2 Drilling

The purpose of the 2018 Technical Report is to provide a technical summary and updated mineral Resource Estimate with respect to the Ixtaca Deposit in relation to diamond drilling completed subsequent to the November 13, 2012 cut-off date of the maiden mineral Resource Estimate (Raffle et al., 2013). Since 2010, a total of 590 diamond drillholes have been drilled at the Tuligtic Property, totalling 192,121 m (not including 54 geotechnical holes) (Figure 7-11). Drilling progress since 2010 is summarized below (Table 7-1).

The Main Ixtaca Zone of mineralization has been defined as a sub-vertical body trending northeast over a 650m strike length (Figure 7-11). The Ixtaca North Zone has been further defined over a 400m strike length as two discrete parallel sub-zones having a true-thickness of 5 to 35m, and spaced 20 to 70m apart (Figure 7-13). The Chemalaco Zone (Figure 7-11, Figure 7-14) is moderate to steeply WSW dipping that has been defined over a 450m strike length with high-grade mineralization intersected to a vertical depth of 600m or approximately 700m down-dip.

**Table 7-1 Tuligtic Property Drilling Summary 2010-2016**

| Year | Holes Drilled (total m) | Main Ixtaca Zone | Ixtaca North Zone | Chemalaco Zone |
|---|---|---|---|---|
| **2010** | 14 (6,465m) | - Discovered as sub-vertical body trending NE defined over 400m strike | | |
| **2011** | 85 (30,644m) | - Defined over 600m strike | - Discovered as parallel sub-vertical zone to Ixtaca Main | |
| **2012*** | 131 (46,237m; *includes 5 holes 1,375m at Tano Zone outside resource area) | - Defined over 650m strike<br>- High-grade mineralization intersected to 300m | - Defined over 400m strike<br>- High-grade mineralization intersected to 300m | - Discovered as a WSW moderate-steeply dipping body, defined over 350m strike, trending approximately N-S<br>- High-grade mineralization intersected to 550m (600m down-dip) |
| **2013**** | 198 (55,467m) | - Tested over 1,000m strike<br>- High-grade mineralization intersected to 300m | - Delineated as two distinct parallel zones<br>- High-grade mineralization intersected to 32m | - Defined over 450m strike as splayed body dipping 55 degrees WSW with overall down-dip 700m<br>- Splayed subzone dips 25-50 degrees, defined over 250m strike, 400m down-dip |
| **2014** | 40 (13,967m; *includes 3 holes 1,359m at Azul Zone | - Metallurgical test holes twinning existing holes | - Exploration holes testing mineralization outside and at depth below PEA pit | - Exploration holes testing mineralization outside and at depth below PEA pit<br>- Metallurgical test holes twinning existing holes |

| Year | Holes Drilled (total m) | Main Ixtaca Zone | Ixtaca North Zone | Chemalaco Zone |
|---|---|---|---|---|
| | outside resource area) | | | |
| **2015** | 12<br>(3,161m) | - Exploration holes testing mineralization outside and at depth below PEA pit<br>- | | - Exploration holes testing mineralization outside and at depth below PEA pit<br>- |
| **2016** | 34<br>(11,004m; *includes 1 hole 490m at Tano Zone outside resource area) | | - Further delineation and expansion of the North Zone | - |
| **2017** | 56<br>(18,756m) | - Further delineation and expansion of the Main Zone | - Further delineation and expansion of the North Zone | - Further delineation and expansion of the Chemalaco Zone |
| **2018** | 20<br>(6420m) | - Further delineation and expansion of the Main Zone | - | - Further delineation and expansion of the Chemalaco Zone |

*All holes drilled up to November 12, 2012 Maiden Mineral Resource Estimate Cut-off
**All holes drilled subsequent to November 12, 2012 Cut-off, and all 2013 drilled holes

In July 2010 Almaden initiated a preliminary diamond drilling program to test epithermal alteration within the Tuligtic Property, resulting in the discovery of the Main Ixtaca Zone. The first hole, TU-10-001, intersected 302.42m of 1.01g/t Au and 48g/t Ag and multiple high grade intervals including 1.67m of 60.7g/t Au and 2,122g/t Ag (Figure 7-10). Almaden drilled 14 holes totalling 6,465m during 2010, defined the Main Ixtaca Zone over a 400m strike length, and initiated drilling along 50m NNW oriented sections. During 2011, Almaden drilled an additional 85 holes totalling 30,644m, which resulted in the discovery of the Ixtaca North Zone and testing of the Main Ixtaca Zone over a 600m strike length on 50m sections. Almaden discovered the Chemalaco Zone in early 2012 and continued drilling of the Ixtaca North and Main Ixtaca zones. Almaden drilled 131 holes totalling 46,237m on the Property from the beginning of 2012 until the November 13, 2012 maiden mineral Resource Estimate cut-off, for a total of 83,346m in 230 drillholes.

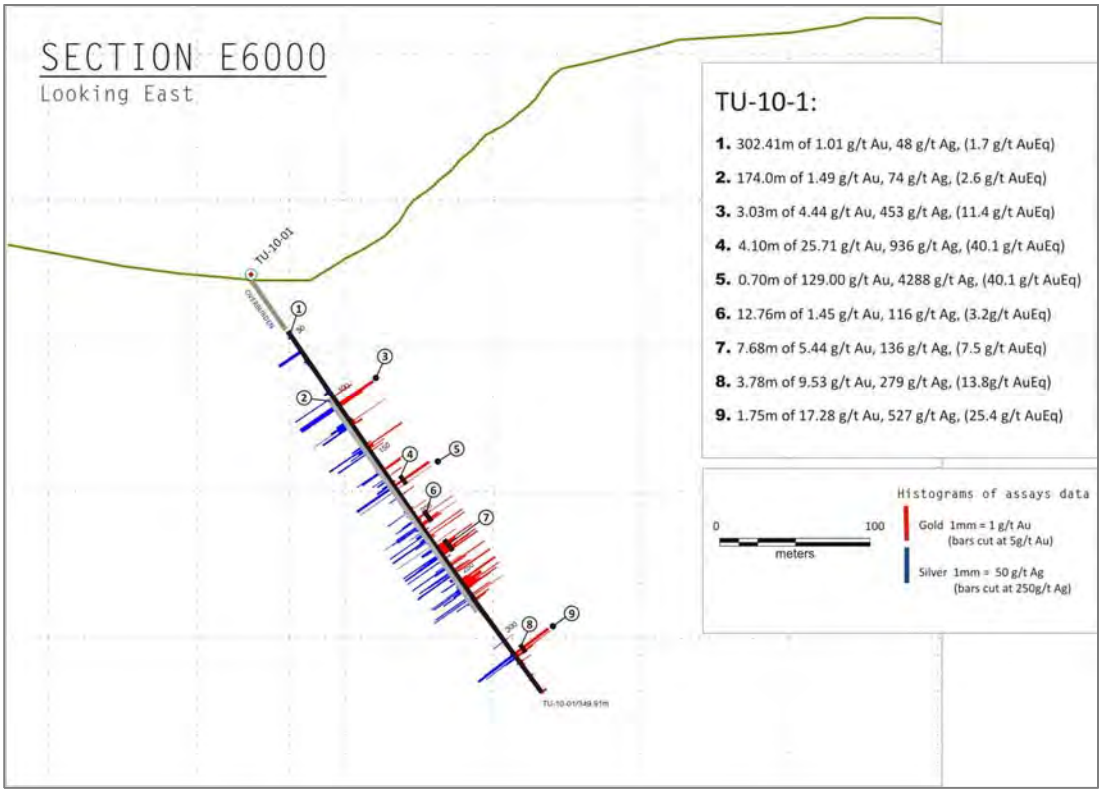



**Figure 7-10 100 Azimuth Section (Looking East) Showing the Assay Results of Discovery hole TU-10-001 which intersected the Main Ixtaca Zone Vein Swarm. From Almaden, Jan 2019**

During 2013 and subsequent to the November 13, 2012 cut-off of the maiden mineral Resource Estimate, Almaden drilled 198 holes totalling 55,467m (428 holes in total up to the end of 2013 comprising the Resource Estimate of Raffle and Giroux, 2014). A total of 79 holes have been drilled at the Main Ixtaca Zone, 40 holes at the Ixtaca North Zone and 79 holes at the Chemalaco Zone. Drilling during 2013 focused on expanding the deposit and upgrading resources previously categorized as Inferred to higher confidence Measured and Indicated categories.

Drilling during 2014 through 2016 comprised 116 additional drill holes totalling 37,969m (including 3 exploration drill holes at the (Casa) Azul Zone and 1 at the Tano Zone; (Figure 7-2). Of the holes drilled within the Ixtaca Deposit during 2014, 2015, and 2016, 31 were geotechnical holes. During 2016 a total of 63 holes totalling 20,352m further delineated and expanded the Main and North Zone mineralization. The remainder were exploration holes testing mineralized zones at depth below the pit described in this report. Drilling at the Casa Azul zone returned intersected porphyritic intrusive and limestone-skarn mineralization returning locally elevated zinc, copper and silver values.

Drilling during 2017 through 2018 comprised 76 additional drill holes totalling 25,176m. Of the holes drilled within the Ixtaca Deposit during 2017 and 2018, 4 were metallurgical holes that twinned existing holes and 11 were geotechnical holes. During 2017 and 2018 a total of 21 additional holes were drilled in the Main Ixtaca zone, 18 in the Ixtaca North zone, and 5 additional holes in the Chemalaco Zone. The remainder were exploration holes drilled at surface in the surrounding areas.

Of the 590 holes to date, approximately 236 holes have been completed on the Main Ixtaca Zone, 169 at the Ixtaca North Zone, and 148 at the Chemalaco Zone (Figure 7-11). The diamond drillholes range from a minimum length of 26.82m to a maximum of 701m, and average 320m. All drilling completed at the Ixtaca Zone has been diamond core of NQ2 size (5.08 cm diameter). Drilling has been performed using four diamond drills owned and operated by Almaden via its wholly owned operating subsidiary Minera Gavilán, S.A. de C.V. The 2010 through 2018 diamond drill programs have been completed under the supervision of Almaden personnel. Drillhole collars have been spotted using a handheld GPS and compass, and subsequently have been surveyed using a differentially corrected GPS. Each of the holes is marked with a small cement cairn inscribed with the drillhole number and drilling direction.

Drillholes have been surveyed down hole using Reflex EZ-Shot or EX-Trac instruments following completion of each hole. Down hole survey measurements have been spaced at 100m intervals during 2010 drilling and have been decreased to 50m intervals in 2011. During 2012 and 2013, select drillholes within all three mineralized zones have been surveyed at 15m intervals. All drilling during 2014 through 2018 were surveyed at 15m intervals. A total of 7,208 drillhole orientation measurements (excluding 590 collar surveys) have been collected for an average down hole spacing of 26.67m. A total of 40 drillholes (12,171m), apart from the collar survey, have not been surveyed downhole; and a total of five drillholes (1,672m) have been surveyed at the end of hole only. Drillholes having no down hole survey have been assumed to have the orientation of the collar. Drillhole data has been plotted in the field and has been inspected. Down hole data returning unrealistic hole orientations have been flagged and removed from the database. Down hole survey summary statistics are provided in Table 7-2, below.

At the rig, drill core is placed in plastic core boxes labeled with the drillhole number, box number, and an arrow to mark the start of the tray and the down hole direction. Wooden core blocks are placed at the end of each core run (usually 3m, or less in broken ground). Throughout the day and at the end of each shift drill core is transported to Almaden's Santa Maria core logging, sampling and warehouse facility.

**Table 7-2 Tuligtic Property Down Hole Survey Statistics**

| | Number of Drillholes | Metres |
|---|---|---|
| **Number of Down Hole Surveys** | 7,208 | 192,121 |
| **Average Survey Spacing (not including casing)** | 590 | 26.67 |
| **Drillholes (No Down Hole Survey)** | 40 (6.7%) | 12,171 |
| **Drillholes (End Of Hole Survey Only)** | 5 (0.8%) | 1,672 |
| **Drillholes (15m Survey Spacing)** | 294 (49.8%) | 91,044 |
| **Drillholes (50m Survey Spacing)** | 151 (25.6%) | 52,968 |
| **Drillholes (100m Survey Spacing)** | 24 (%) | 9,089 |

Geotechnical logging is comprised of measurements of total core recovery per-run, RQD (the total length of pieces of core greater than twice the core width divided by the length of the interval, times 100), core photography (before and after cutting), hardness testing and measurements of bulk density using the weight in air-weight in water method.

Drill core is logged based on lithology, and the presence of epithermal alteration and mineralization. All strongly altered or epithermal-mineralized intervals of core are sampled. Almaden employs a maximum sample length of 2 to 3m in unmineralized lithologies, and a maximum sample length of 1m in mineralized lithologies . During the years 2010 and 2011 Almaden employed a minimum sample length of 20cm. The minimum sample length was increased to 50cm from 2012 onwards to ensure the availability of sufficient material for replicate analysis. Geological changes in the core such as major alteration or mineralization intensity (including large discrete veins), or lithology are used as sample breaks.

The Upper Tamaulipas formation, the dykes that crosscut it and the upper Coyoltepec volcanic subunit are the main host rocks to the epithermal vein system at Ixtaca. In the Main and Ixtaca North zones veining strikes dominantly ENE-WNW (060 degrees) parallel to a major dyke trend and at a very high angle to the N to NNW bedding and fold structures within the limestones. The veins of the Chemalaco Zone are hosted by the shaley carbonate units (black shale) and strike to the NNW, dipping to the SSW. In the footwall to Chemalaco Zone a parallel dyke has been identified which is altered and mineralized. The Chemalaco Zone and the dyke are interpreted to strike parallel to bedding and to core an antiform comprised of shale.

### 7.2.1 Main Ixtaca and Ixtaca North Zones

The Main Ixtaca and Ixtaca North zones have a strike length of approximately 650m and have been drilled at 25 and 50m section spacing. The vast majority of holes have been drilled at an azimuth of 150 or 330 degrees and at dips between 45 and 60 degrees from horizontal although several holes were drilled with a 100 Azimuth early in the program. Infill drilling at 25m sections has also been completed over the majority of the Ixtaca North Zone and in the central area of the Main Ixtaca Zone. Diamond drilling has intersected high-grade mineralization within the Main Ixtaca and Ixtaca North vein zones to depths of 200 to 300m vertically from surface. High-grade zones occur within a broader zone of mineralization extending laterally (NNW-SSE) over 1000m and to a vertical depth of 600m below surface (Table 7-3 and Figure 7-12).

The epithermal vein system at the Main Ixtaca and Ixtaca North zones is roughly associated with two parallel ENE (060 degrees) trending, subvertical to steeply north dipping dyke zones. The dykes predate mineralization and trend at a high angle to the N to NNW bedding and fold structures within the limestone.

At the Main Ixtaca Zone, a series of dykes ranging from less than 2m to over 20m true width occur within an approximately 100m wide zone (Figure 7-12, Figure 7-13). Wider dykes often correlate within individual drill sections, where they are inferred to pinch or splay. The broader dyke zone itself is relatable between sections, although individual dykes are typically not continuous between sections. The dyke zone hosting the Ixtaca North Zone is narrower, comprising a steeply north-dipping zone of two or three discrete dykes ranging from 5 to 20m in width. Epithermal vein mineralization occurs both within the dykes and sedimentary host rocks, with the highest grades often occurring within or proximal to the dykes. Vein density decreases outward to the north and south from the dyke zones resulting in the formation of two high-grade vein swarms. The dykes are often intensely altered and are interpreted to control the distribution of the epithermal vein system at Ixtaca to the extent that they may have provided a conduit for ascending hydrothermal fluids, and an important rheological contrast resulting in vein formation within and along the margins individual dykes, and laterally within the adjacent limestone. On surface, the Main Ixtaca and Ixtaca North zones are separated by a steep sided ENE trending valley (Figure 7-12, Figure 7-13).

The lateral (WSW-ENE) extent of the epithermal vein system is controlled by N to NNW bedding and fold structures in basement rocks of the limestone unit. Drilling indicates Main Ixtaca and Ixtaca North zone mineralization is bound within an ENE-verging asymmetric synform. The synform is cored by a structurally thickened sequence of limestone that grades laterally and at depth through calcareous siltstone and grainstone transition units, into dark grey to laminated calcareous shale at depth. Based on increased vein density, including the presence of broad alteration zones and networks of intersecting epithermal veins, the relatively brittle limestone is a preferential host to Main Ixtaca and Ixtaca North vein swarms.

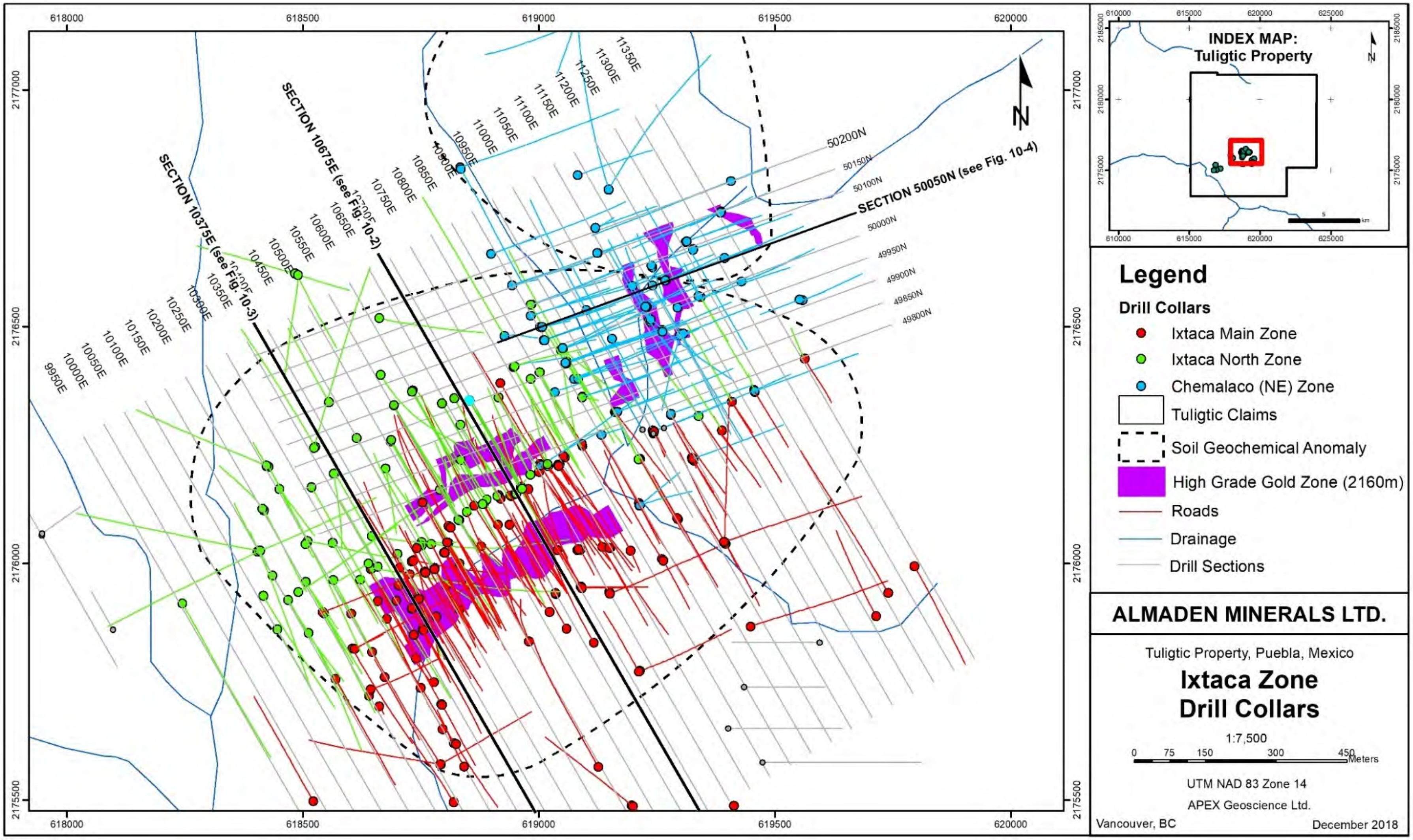



**Figure 7-11 Drillhole Locations**

**Table 7-3 Section 10+675E Significant Drill Intercepts (Main Ixtaca and Ixtaca North Zones)**

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq*(g/t) |
|---|---|---|---|---|---|---|
| TU-12-120 | 260.9 | 290.9 | 30 | 0.74 | 96.7 | 2.6 |
| including | 260.9 | 266.1 | 5.2 | 2.78 | 437 | 11.3 |
| TU-12-124 | 116.5 | 301.5 | 185 | 1 | 60.5 | 2.2 |
| including | 167.5 | 181.4 | 13.9 | 6.04 | 179.7 | 9.5 |
| TU-12-127 | 155.95 | 186 | 30.05 | 0.7 | 56.7 | 1.8 |
| including | 174 | 186 | 12 | 1.05 | 105.7 | 3.1 |
| TU-12-127 | 210 | 233.5 | 23.5 | 1.02 | 20.2 | 1.4 |
| including | 213.9 | 218.3 | 4.4 | 3.92 | 86 | 5.6 |
| TU-12-127 | 243 | 285.6 | 42.6 | 0.57 | 10.8 | 0.8 |
| TU-12-127 | 297 | 314 | 17 | 0.38 | 8.7 | 0.5 |
| TU-12-132 | 64.5 | 204.2 | 139.7 | 0.22 | 18 | 0.6 |
| including | 137 | 166.6 | 29.6 | 0.35 | 27.8 | 0.9 |
| including | 148.25 | 153.3 | 5.05 | 1.16 | 79 | 2.7 |
| including | 174.4 | 204.2 | 29.8 | 0.33 | 34.1 | 1 |
| TU-12-136 | 63.1 | 123.6 | 60.5 | 0.84 | 48.9 | 1.8 |
| including | 82.2 | 93 | 10.8 | 1.1 | 85.2 | 2.8 |
| including | 98 | 110.5 | 12.5 | 1.84 | 98.5 | 3.8 |
| TU-13-324 | 32.92 | 62 | 29.08 | 1.31 | 16.5 | 1.6 |
| including | 42.5 | 57.75 | 15.25 | 2.1 | 23.7 | 2.6 |
| including | 43 | 45.25 | 2.25 | 1.71 | 72 | 3.1 |
| TU-13-324 | 113.5 | 128 | 14.5 | 0.25 | 47 | 1.2 |
| including | 120 | 121 | 1 | 0.59 | 117.5 | 2.9 |
| including | 125 | 128 | 3 | 0.79 | 155 | 3.8 |
| TU-13-324 | 154 | 174 | 20 | 0.08 | 29.1 | 0.6 |
| including | 160 | 161 | 1 | 0.42 | 167 | 3.7 |
| including | 167.5 | 172 | 4.5 | 0.07 | 53.4 | 1.1 |
| TU-13-325 | 128.5 | 136.5 | 8 | 0.58 | 132.2 | 3.2 |
| TU-13-325 | 190 | 236.5 | 46.5 | 1.06 | 53.1 | 2.1 |
| including | 193.4 | 216 | 22.6 | 1.72 | 97.2 | 3.6 |
| including | 194 | 195.2 | 1.2 | 2.05 | 147 | 4.9 |
| including | 203.9 | 205 | 1.1 | 3.97 | 175 | 7.4 |
| including | 210.5 | 216 | 5.5 | 4.4 | 240.8 | 9.1 |
| TU-13-388 | 199 | 229.5 | 30.5 | 0.67 | 23.9 | 1.1 |
| TU-13-388 | 337.5 | 346.5 | 9 | 1.35 | 287.5 | 6.9 |
| including | 339.25 | 340.35 | 1.1 | 6.54 | 1982.7 | 45.2 |
| TU-13-388 | 363.5 | 416 | 52.5 | 0.58 | 50.3 | 1.6 |
| including | 363.5 | 378.4 | 14.9 | 0.74 | 87 | 2.4 |
| including | 372 | 378.4 | 6.4 | 1.19 | 138.9 | 3.9 |
| including | 390 | 403.9 | 13.9 | 1.11 | 82.9 | 2.7 |
| including | 398.6 | 401.1 | 2.5 | 1.78 | 173 | 5.1 |
| TU-17-504 | 65.20 | 71.00 | 5.80 | 0.31 | 1.6 | 0.3 |
| TU-17-504 | 80.00 | 89.00 | 9.00 | 0.30 | 0.7 | 0.3 |
| TU-17-504 | 108.00 | 182.50 | 74.50 | 0.66 | 45.1 | 1.6 |
| including | 108.00 | 122.50 | 14.50 | 1.02 | 20.4 | 1.4 |

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq*(g/t) |
|---|---|---|---|---|---|---|
| including | 130.00 | 149.00 | 19.00 | 1.19 | 121.2 | 3.6 |
| including | 164.70 | 168.45 | 3.75 | 1.23 | 95.5 | 3.1 |
| TU-17-504 | 227.40 | 291.70 | 64.30 | 0.79 | 74.4 | 2.3 |
| including | 232.65 | 236.10 | 3.45 | 1.58 | 97.4 | 3.5 |
| including | 258.50 | 269.00 | 10.50 | 3.54 | 306.9 | 9.7 |
| TU-17-504 | 306.50 | 353.35 | 46.85 | 0.49 | 68.6 | 1.9 |
| including | 319.30 | 320.00 | 0.70 | 22.30 | 2600.0 | 74.3 |
| TU-17-504 | 372.50 | 383.45 | 10.95 | 0.64 | 19.3 | 1.0 |
| TU-17-504 | 417.70 | 427.80 | 10.10 | 0.74 | 19.0 | 1.1 |
| TU-17-508 | 51.60 | 74.30 | 22.70 | 0.44 | 0.8 | 0.5 |
| including | 54.60 | 60.60 | 6.00 | 1.13 | 1.6 | 1.2 |
| TU-17-508 | 97.50 | 143.50 | 46.00 | 0.74 | 26.2 | 1.3 |
| including | 101.50 | 129.00 | 27.50 | 1.02 | 38.6 | 1.8 |
| including | 123.50 | 125.50 | 2.00 | 3.39 | 385.0 | 11.1 |
| TU-17-508 | 170.00 | 182.30 | 12.30 | 0.24 | 23.2 | 0.7 |
| TU-17-508 | 230.40 | 232.80 | 2.40 | 0.73 | 126.7 | 3.3 |
| TU-17-508 | 259.00 | 276.00 | 17.00 | 0.85 | 91.1 | 2.7 |
| including | 263.30 | 276.00 | 12.70 | 1.03 | 98.6 | 3.0 |
| including | 263.30 | 268.60 | 5.30 | 2.00 | 204.8 | 6.1 |
| TU-17-508 | 372.60 | 373.80 | 1.20 | 0.61 | 87.5 | 2.4 |
| TU-17-508 | 399.50 | 411.00 | 11.50 | 0.47 | 15.8 | 0.8 |
| TU-17-508 | 435.10 | 440.00 | 4.90 | 0.45 | 9.4 | 0.6 |
| TU-17-508 | 451.40 | 467.80 | 16.40 | 2.25 | 25.3 | 2.8 |
| including | 452.00 | 455.70 | 3.70 | 8.67 | 95.9 | 10.6 |
| TU-17-520 | 64.00 | 73.00 | 9.00 | 0.50 | 1.7 | 0.5 |
| including | 64.00 | 68.00 | 4.00 | 0.75 | 1.9 | 0.8 |
| TU-17-520 | 108.60 | 129.00 | 20.40 | 0.89 | 11.1 | 1.1 |
| including | 116.50 | 126.00 | 9.50 | 1.65 | 19.5 | 2.0 |
| including | 117.50 | 124.50 | 7.00 | 2.07 | 22.4 | 2.5 |
| including | 122.50 | 124.50 | 2.00 | 4.33 | 39.2 | 5.1 |
| TU-17-520 | 142.00 | 150.60 | 8.60 | 0.13 | 6.3 | 0.3 |
| TU-17-521 | 65.50 | 73.50 | 8.00 | 0.66 | 0.7 | 0.7 |
| including | 67.50 | 71.50 | 4.00 | 0.98 | 1.4 | 1.0 |
| TU-17-521 | 108.00 | 124.50 | 16.50 | 0.56 | 9.8 | 0.8 |
| including | 120.50 | 124.50 | 4.00 | 1.02 | 21.6 | 1.5 |
| TU-17-521 | 148.00 | 151.00 | 3.00 | 0.45 | 22.9 | 0.9 |
| TU-17-521 | 155.00 | 155.75 | 0.75 | 3.93 | 227.0 | 8.5 |
| TU-17-521 | 184.50 | 195.10 | 10.60 | 1.35 | 132.8 | 4.0 |
| including | 184.50 | 190.80 | 6.30 | 1.92 | 205.8 | 6.0 |
| including | 185.60 | 186.20 | 0.60 | 4.37 | 769.0 | 19.8 |
| including | 188.30 | 188.90 | 0.60 | 11.40 | 1100.0 | 33.4 |
| TU-17-522 | 69.60 | 80.00 | 10.40 | 0.63 | 1.3 | 0.7 |
| including | 73.00 | 77.00 | 4.00 | 1.05 | 2.4 | 1.1 |
| TU-17-522 | 98.00 | 148.50 | 50.50 | 0.73 | 11.4 | 1.0 |
| including | 117.50 | 128.00 | 10.50 | 2.45 | 24.4 | 2.9 |

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq*(g/t) |
|---|---|---|---|---|---|---|
| **TU-17-522** | 196.60 | 200.56 | 3.96 | 0.06 | 7.8 | **0.2** |
| **TU-17-524** | 61.25 | 71.50 | 10.25 | 0.31 | 0.7 | **0.3** |
| **including** | 64.00 | 67.00 | 3.00 | 0.53 | 1.0 | **0.6** |
| **TU-17-524** | 115.00 | 128.15 | 13.15 | 0.70 | 8.3 | **0.9** |
| **including** | 123.00 | 127.00 | 4.00 | 1.31 | 18.9 | **1.7** |
| **TU-17-525** | 47.50 | 52.45 | 4.95 | 0.42 | 0.2 | **0.4** |
| **TU-17-525** | 90.50 | 122.50 | 32.00 | 0.82 | 25.0 | **1.3** |
| **including** | 98.00 | 107.35 | 9.35 | 2.01 | 42.9 | **2.9** |
| **including** | 101.00 | 106.00 | 5.00 | 2.75 | 53.2 | **3.8** |
| **TU-17-525** | 146.95 | 150.00 | 3.05 | 2.19 | 104.9 | **4.3** |
| **TU-17-525** | 164.80 | 169.50 | 4.70 | 0.76 | 56.5 | **1.9** |
| **including** | 167.10 | 168.45 | 1.35 | 2.09 | 149.8 | **5.1** |
| **TU-17-525** | 178.55 | 180.10 | 1.55 | 0.11 | 10.8 | **0.3** |
| **TU-17-526** | 45.50 | 50.50 | 5.00 | 0.27 | 0.2 | **0.3** |
| **TU-17-526** | 96.00 | 110.70 | 14.70 | 0.91 | 26.6 | **1.4** |
| **TU-17-526** | 156.45 | 158.95 | 2.50 | 0.29 | 26.5 | **0.8** |
| **TU-17-526** | 169.25 | 170.40 | 1.15 | 0.56 | 57.5 | **1.7** |
| **TU-17-526** | 183.00 | 190.90 | 7.90 | 0.11 | 6.7 | **0.2** |
| **TU-17-528** | 107.20 | 117.45 | 10.25 | 1.16 | 25.6 | **1.7** |
| **including** | 111.40 | 115.40 | 4.00 | 1.35 | 39.8 | **2.1** |
| **TU-17-528** | 125.50 | 127.50 | 2.00 | 1.21 | 375.8 | **8.7** |
| **TU-17-528** | 187.90 | 189.50 | 1.60 | 0.08 | 16.5 | **0.4** |

**Gold Equivalent based on a price of $1,250/ounce gold and $18/ounce silver**

**Table 7-4 Section 10+375E Significant Drill intercepts (Main Ixtaca Zone)**

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq* (g/t) |
|---|---|---|---|---|---|---|
| **TU-11-065** | 26.00 | 126.80 | 100.80 | 0.58 | 46.2 | **1.5** |
| **including** | 26.00 | 74.78 | 48.78 | 0.95 | 77.0 | **2.5** |
| **including** | 43.60 | 68.00 | 24.40 | 1.67 | 134.4 | **4.4** |
| **including** | 49.80 | 59.80 | 10.00 | 3.05 | 198.8 | **7.0** |
| **TU-11-067** | 24.30 | 145.00 | 120.70 | 1.02 | 72.6 | **2.5** |
| **including** | 36.50 | 136.80 | 100.30 | 1.20 | 85.0 | **2.9** |
| **including** | 54.90 | 96.30 | 41.40 | 1.91 | 144.1 | **4.8** |
| **including** | 63.55 | 85.50 | 21.95 | 2.75 | 210.1 | **7.0** |
| **including** | 65.60 | 80.85 | 15.25 | 3.26 | 253.4 | **8.3** |
| **including** | 107.20 | 116.95 | 9.75 | 2.54 | 112.6 | **4.8** |
| **including** | 125.55 | 127.43 | 1.88 | 2.51 | 242.2 | **7.3** |
| **TU-12-202** | 26.50 | 66.50 | 40.00 | 0.35 | 1.4 | **0.4** |
| **including** | 26.50 | 38.00 | 11.50 | 0.78 | 0.5 | **0.8** |
| **TU-12-202** | 137.10 | 172.50 | 35.40 | 0.62 | 12.3 | **0.9** |
| **including** | 139.10 | 145.10 | 6.00 | 2.57 | 35.4 | **3.3** |
| **TU-12-202** | 249.30 | 260.80 | 11.50 | 0.10 | 16.7 | **0.4** |
| **TU-12-211** | 31.20 | 187.85 | 156.65 | 0.59 | 28.6 | **1.2** |
| **including** | 70.70 | 84.50 | 13.80 | 0.97 | 82.9 | **2.6** |
| **including** | 97.80 | 105.65 | 7.85 | 1.07 | 59.4 | **2.3** |
| **including** | 129.85 | 142.40 | 12.55 | 1.38 | 53.3 | **2.4** |
| **including** | 172.85 | 183.85 | 11.00 | 0.91 | 56.7 | **2.0** |
| **TU-13-389** | 21.34 | 95.50 | 74.16 | 1.02 | 50.9 | **2.0** |
| **including** | 47.00 | 71.00 | 24.00 | 1.52 | 60.6 | **2.7** |
| **including** | 51.50 | 69.00 | 17.50 | 1.92 | 64.4 | **3.2** |
| **including** | 88.60 | 95.50 | 6.90 | 2.54 | 139.9 | **5.3** |
| **TU-13-389** | 104.00 | 106.80 | 2.80 | 2.86 | 169.3 | **6.2** |
| **TU-13-391** | 16.00 | 126.00 | 110.00 | 0.62 | 42.0 | **1.5** |
| **including** | 48.16 | 89.50 | 41.34 | 1.16 | 76.2 | **2.7** |
| **including** | 48.16 | 59.30 | 11.14 | 1.79 | 110.9 | **4.0** |
| **including** | 71.80 | 84.50 | 12.70 | 1.40 | 106.4 | **3.5** |
| **including** | 71.80 | 74.50 | 2.70 | 3.06 | 230.3 | **7.7** |
| **TU-13-393** | 27.43 | 141.80 | 114.37 | 0.92 | 53.7 | **2.0** |
| **including** | 54.50 | 81.50 | 27.00 | 1.03 | 76.0 | **2.6** |
| **including** | 56.00 | 62.20 | 6.20 | 2.21 | 150.5 | **5.2** |
| **including** | 89.95 | 124.70 | 34.75 | 1.67 | 70.4 | **3.1** |
| **including** | 100.30 | 104.00 | 3.70 | 2.08 | 89.0 | **3.9** |
| **including** | 110.40 | 118.30 | 7.90 | 4.42 | 158.7 | **7.6** |

**Gold Equivalent based on a price of $1,250/ounce gold and $18/ounce silver*

Mineralized limestone, shale and the cross-cutting dykes are unconformably overlain by bedded crystal tuff, which is also mineralized. Mineralization within tuff rocks overlying the Ixtaca Zone occurs as broad zones of alteration and disseminated sulphides having relatively few veins. High-grade zones of mineralization are locally present within the tuff vertically above the Main Ixtaca and Ixtaca North vein systems and dykes. The high-grade zones transition laterally into low grade mineralization, which together form a broad tabular zone of mineralization at the base of the tuff unit.

### 7.2.2 Chemalaco Zone

The Chemalaco Zone (also known as the Northeast Extension) of the Ixtaca deposit has an approximate strike length of 450m oriented roughly north-south (340 azimuth) and has been drilled via a series of ENE (070 degrees) oriented sections spaced at intervals of 25 to 50m, and near-surface oblique NNW-SSE oriented drillholes (Figure 7-11). The Chemalaco Zone dips moderately-steeply at 55 degrees WSW. High grade mineralization having a true-width ranging from less than 30 and up to 60m has been intersected beneath approximately 30m of tuff to a vertical depth of 550m, or approximately 700m down-dip. An additional sub-parallel zone has been defined underneath the Chemalaco having a true-width ranging from 5 to 40m and dipping 25 to 50 degrees to the WSW, resulting in a splayed zone extending from near-surface to a vertical depth of 250m. The sub-parallel zone has an approximate down-dip length up to 400m over a 250m strike length (Table 7-5,Figure 7-14).

The Chemalaco Zone vein zone lies northeast of the Main Ixtaca Zone and occurs within the hinge zone of a shale cored antiform. Near surface, along the apex of the antiform, a zone of structurally thinned, brecciated, and mineralized limestone is unconformably overlain by mineralized tuff rocks (Figure 10-4). At a vertical depth of 80m below surface, high-grade shale-hosted mineralization dips moderately-steeply at 25 to 55 degrees WSW sub-parallel to the interpreted axial plane of the antiform. The footwall of the high-grade zone is marked by a distinct 20 to 30m true-thickness felsic porphyry dyke (Chemalaco Dyke), which is also mineralized. The Chemalaco Dyke has been intersected in multiple drillholes ranging from 250 to 550m vertically below surface, and its lower contact currently marks the base of Chemalaco Zone mineralization.

The Chemalaco Zone remains open to depth and a long strike to the north. The system also remains open to the east as the limit of veining has not been defined across strike in this direction.

**Table 7-5 Section 50+050N Significant Drill intercepts (Chemalaco Zone)**

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq* (g/t) |
|---|---|---|---|---|---|---|
| **TU-12-190** | 85.00 | 89.00 | 4.00 | 0.25 | 0.5 | **0.3** |
| **TU-12-190** | 100.00 | 112.00 | 12.00 | 0.17 | 1.9 | **0.2** |
| **TU-12-190** | 259.00 | 272.90 | 13.90 | 0.17 | 12.3 | **0.4** |
| **TU-12-190** | 278.85 | 321.00 | 42.15 | 1.06 | 47.4 | **2.0** |
| **including** | 293.50 | 300.50 | 7.00 | 1.34 | 72.0 | **2.7** |
| **including** | 306.00 | 317.80 | 11.80 | 1.67 | 71.7 | **3.1** |
| **including** | 310.00 | 314.00 | 4.00 | 2.45 | 116.4 | **4.7** |
| **TU-12-190** | 377.90 | 386.00 | 8.10 | 0.24 | 2.8 | **0.3** |
| **TU-12-194** | 83.50 | 87.50 | 4.00 | 0.46 | 2.8 | **0.5** |
| **TU-12-194** | 112.60 | 124.00 | 11.40 | 0.22 | 4.4 | **0.3** |
| **TU-12-194** | 272.50 | 279.50 | 7.00 | 0.15 | 40.9 | **0.9** |
| **TU-12-194** | 294.50 | 300.00 | 5.50 | 0.14 | 81.1 | **1.7** |
| **TU-12-194** | 313.00 | 371.80 | 58.80 | 1.04 | 19.4 | **1.4** |
| **including** | 317.60 | 347.00 | 29.40 | 1.63 | 23.9 | **2.1** |
| **TU-12-199** | 66.00 | 70.00 | 4.00 | 0.26 | 2.4 | **0.3** |
| **TU-12-199** | 91.00 | 93.80 | 2.80 | 0.19 | 3.0 | **0.2** |
| **TU-12-199** | 344.20 | 424.00 | 79.80 | 0.84 | 20.6 | **1.2** |
| **including** | 365.70 | 385.70 | 20.00 | 1.19 | 25.6 | **1.7** |
| **including** | 396.50 | 402.50 | 6.00 | 1.43 | 16.0 | **1.7** |
| **including** | 408.30 | 423.40 | 15.10 | 1.48 | 37.6 | **2.2** |
| **including** | 414.30 | 416.10 | 1.80 | 4.90 | 175.5 | **8.3** |
| **TU-12-205** | 81.00 | 132.00 | 51.00 | 0.51 | 6.0 | **0.6** |
| **including** | 101.50 | 106.00 | 4.50 | 3.41 | 6.1 | **3.5** |
| **TU-12-205** | 254.50 | 293.50 | 39.00 | 0.61 | 88.8 | **2.3** |
| **including** | 255.50 | 281.20 | 25.70 | 0.86 | 127.8 | **3.3** |
| **including** | 256.00 | 272.40 | 16.40 | 1.08 | 164.8 | **4.3** |
| **including** | 256.00 | 265.00 | 9.00 | 1.57 | 244.5 | **6.3** |
| **TU-12-205** | 312.00 | 319.00 | 7.00 | 0.19 | 207.2 | **4.2** |
| **TU-13-265** | 488.40 | 531.80 | 43.40 | 0.50 | 9.2 | **0.7** |
| **including** | 500.60 | 507.20 | 6.60 | 2.15 | 11.6 | **2.4** |
| **including** | 504.20 | 507.20 | 3.00 | 3.36 | 17.1 | **3.7** |
| **TU-13-265** | 539.00 | 545.00 | 6.00 | 0.07 | 22.2 | **0.5** |
| **TU-13-265** | 550.30 | 558.00 | 7.70 | 0.07 | 28.1 | **0.6** |
| **TU-13-268** | 41.30 | 56.25 | 14.95 | 0.05 | 11.5 | **0.3** |
| **TU-13-268** | 61.25 | 120.50 | 59.25 | 0.11 | 41.1 | **0.9** |
| **including** | 74.90 | 79.75 | 4.85 | 0.25 | 126.9 | **2.7** |
| **including** | 103.00 | 106.00 | 3.00 | 0.23 | 81.2 | **1.8** |
| **TU-13-268** | 133.00 | 138.00 | 5.00 | 0.03 | 22.3 | **0.5** |
| **TU-13-268** | 151.50 | 208.00 | 56.50 | 0.36 | 42.0 | **1.2** |
| **including** | 166.00 | 178.50 | 12.50 | 0.56 | 91.4 | **2.3** |
| **including** | 166.00 | 167.50 | 1.50 | 0.74 | 223.7 | **5.1** |
| **including** | 192.00 | 199.50 | 7.50 | 0.75 | 51.6 | **1.8** |
| **TU-13-268** | 222.75 | 239.00 | 16.25 | 0.08 | 14.6 | **0.4** |
| **TU-13-272** | 48.00 | 138.50 | 90.50 | 0.20 | 31.4 | **0.8** |

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq* (g/t) |
|---|---|---|---|---|---|---|
| **including** | 66.05 | 70.20 | 4.15 | 0.44 | 49.5 | **1.4** |
| **including** | 77.50 | 84.80 | 7.30 | 0.29 | 71.1 | **1.7** |
| **including** | 112.75 | 119.75 | 7.00 | 0.43 | 40.1 | **1.2** |
| **including** | 129.00 | 138.50 | 9.50 | 0.41 | 114.0 | **2.6** |
| **TU-13-272** | 146.00 | 161.00 | 15.00 | 0.22 | 47.1 | **1.1** |
| **including** | 147.00 | 148.50 | 1.50 | 0.65 | 252.7 | **5.6** |
| **TU-13-272** | 187.00 | 193.50 | 6.50 | 0.11 | 11.5 | **0.3** |
| **TU-13-272** | 220.00 | 231.00 | 11.00 | 0.14 | 9.5 | **0.3** |
| **TU-13-275** | 68.50 | 84.00 | 15.50 | 0.15 | 10.6 | **0.4** |
| **TU-13-275** | 105.00 | 112.00 | 7.00 | 0.11 | 15.8 | **0.4** |
| **TU-13-275** | 120.00 | 134.50 | 14.50 | 0.18 | 6.2 | **0.3** |
| **TU-13-275** | 149.00 | 227.00 | 78.00 | 0.39 | 23.8 | **0.9** |
| **including** | 164.50 | 193.50 | 29.00 | 0.43 | 43.3 | **1.3** |
| **TU-13-275** | 254.00 | 258.00 | 4.00 | 0.01 | 13.5 | **0.3** |
| **TU-13-287** | 106.00 | 131.00 | 25.00 | 0.11 | 15.2 | **0.4** |
| **including** | 122.00 | 125.00 | 3.00 | 0.30 | 50.3 | **1.3** |
| **TU-13-287** | 156.50 | 182.00 | 25.50 | 0.66 | 102.3 | **2.7** |
| **including** | 168.00 | 170.08 | 2.08 | 4.35 | 975.0 | **23.3** |
| **TU-13-289** | 134.00 | 153.00 | 19.00 | 0.22 | 48.4 | **1.2** |
| **including** | 144.50 | 151.80 | 7.30 | 0.40 | 82.8 | **2.0** |
| **TU-13-289** | 160.00 | 188.00 | 28.00 | 0.21 | 10.8 | **0.4** |
| **TU-14-419** | 52.00 | 122.50 | 70.50 | 0.17 | 33.7 | **0.8** |
| **including** | 92.25 | 115.50 | 23.25 | 0.27 | 64.9 | **1.6** |
| **including** | 110.00 | 115.50 | 5.50 | 0.34 | 114.4 | **2.6** |
| **TU-14-419** | 131.00 | 168.00 | 37.00 | 0.37 | 70.4 | **1.8** |
| **including** | 161.75 | 165.00 | 3.25 | 2.50 | 420.8 | **10.9** |
| **TU-14-419** | 189.00 | 194.00 | 5.00 | 0.20 | 39.1 | **1.0** |
| **TU-14-420** | 52.40 | 102.00 | 49.60 | 0.27 | 21.1 | **0.7** |
| **including** | 81.00 | 89.50 | 8.50 | 0.85 | 54.1 | **1.9** |
| **TU-14-420** | 114.00 | 186.00 | 72.00 | 0.25 | 22.1 | **0.7** |
| **including** | 212.00 | 223.00 | 11.00 | 0.14 | 12.2 | **0.4** |
| **TU-18-535** | 49.50 | 71.50 | 22.00 | 0.31 | 1.9 | **0.4** |
| **including** | 59.40 | 61.50 | 2.10 | 0.57 | 3.2 | **0.6** |
| **TU-18-535** | 240.00 | 242.00 | 2.00 | 0.19 | 16.2 | **0.5** |
| **TU-18-535** | 432.75 | 524.60 | 91.85 | 0.49 | 11.1 | **0.7** |
| **including** | 447.25 | 452.60 | 5.35 | 0.69 | 23.5 | **1.2** |
| **including** | 457.60 | 478.35 | 20.75 | 0.77 | 19.5 | **1.2** |
| **including** | 459.70 | 464.70 | 5.00 | 0.96 | 29.7 | **1.6** |
| **including** | 470.30 | 477.75 | 7.45 | 1.12 | 19.3 | **1.5** |
| **including** | 514.10 | 524.60 | 10.50 | 1.34 | 9.4 | **1.5** |
| **including** | 514.10 | 516.50 | 2.40 | 2.26 | 12.5 | **2.5** |
| **TU-18-537** | 83.90 | 133.50 | 49.60 | 0.35 | 6.2 | **0.5** |
| **including** | 90.00 | 102.50 | 12.50 | 0.67 | 6.9 | **0.8** |
| **TU-18-537** | 234.50 | 241.00 | 6.50 | 0.14 | 24.5 | **0.6** |
| **including** | 238.00 | 239.80 | 1.80 | 0.29 | 54.6 | **1.4** |
| **TU-18-537** | 253.00 | 279.90 | 26.90 | 0.93 | 111.6 | **3.2** |

| Hole ID | From (m) | To (m) | Interval (m) | Gold (g/t) | Silver (g/t) | AuEq* (g/t) |
|---|---|---|---|---|---|---|
| **including** | 256.00 | 257.30 | 1.30 | 2.03 | 210.9 | **6.3** |
| **including** | 260.35 | 262.85 | 2.50 | 2.02 | 173.9 | **5.5** |
| **including** | 267.40 | 276.90 | 9.50 | 1.51 | 198.1 | **5.5** |
| | | | | | | |

**Gold Equivalent based on a price of $1,250/ounce gold and $18/ounce silver*

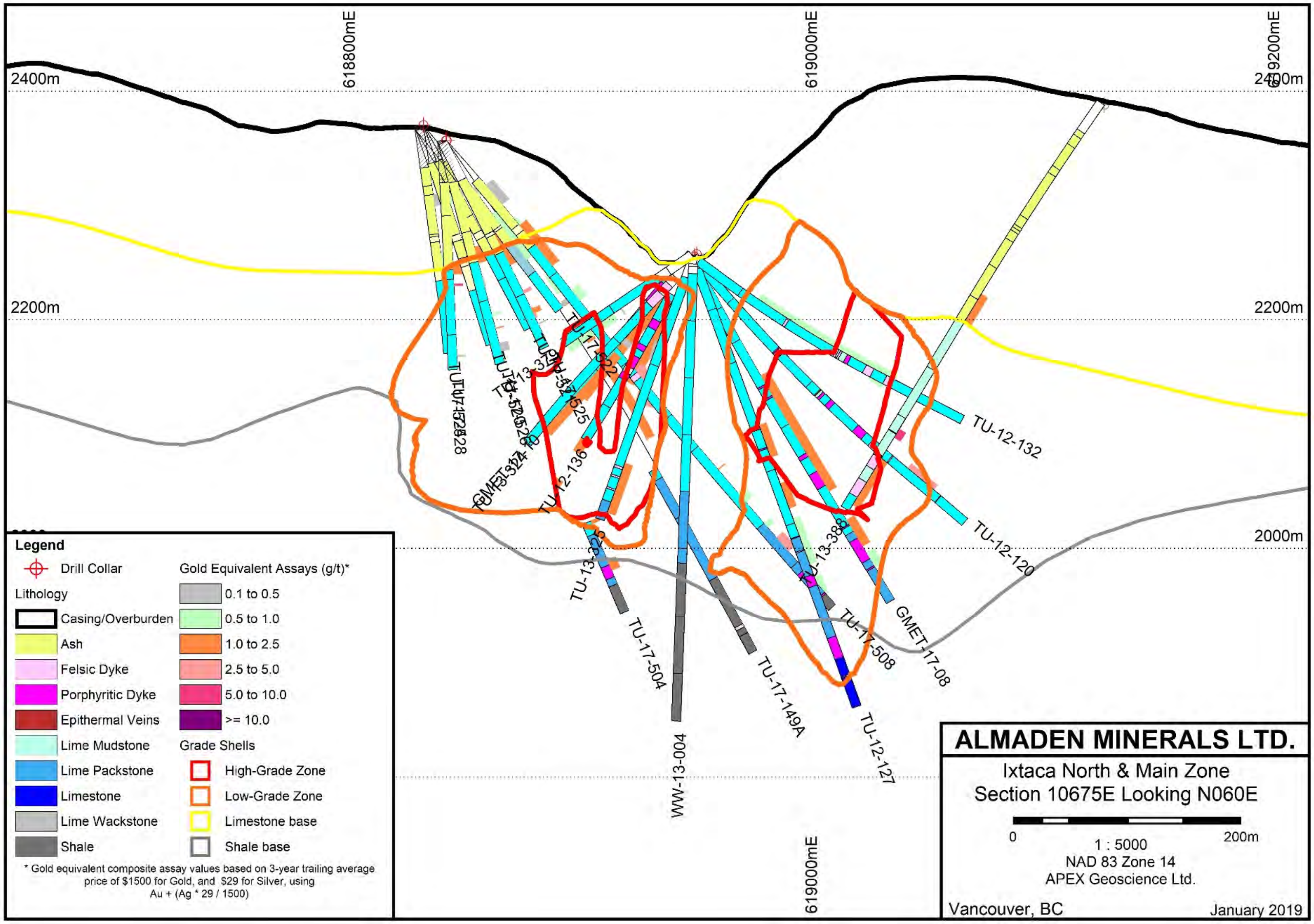



**Figure 7-12** **Section 10+675E through the Ixtaca Main and North Zones**

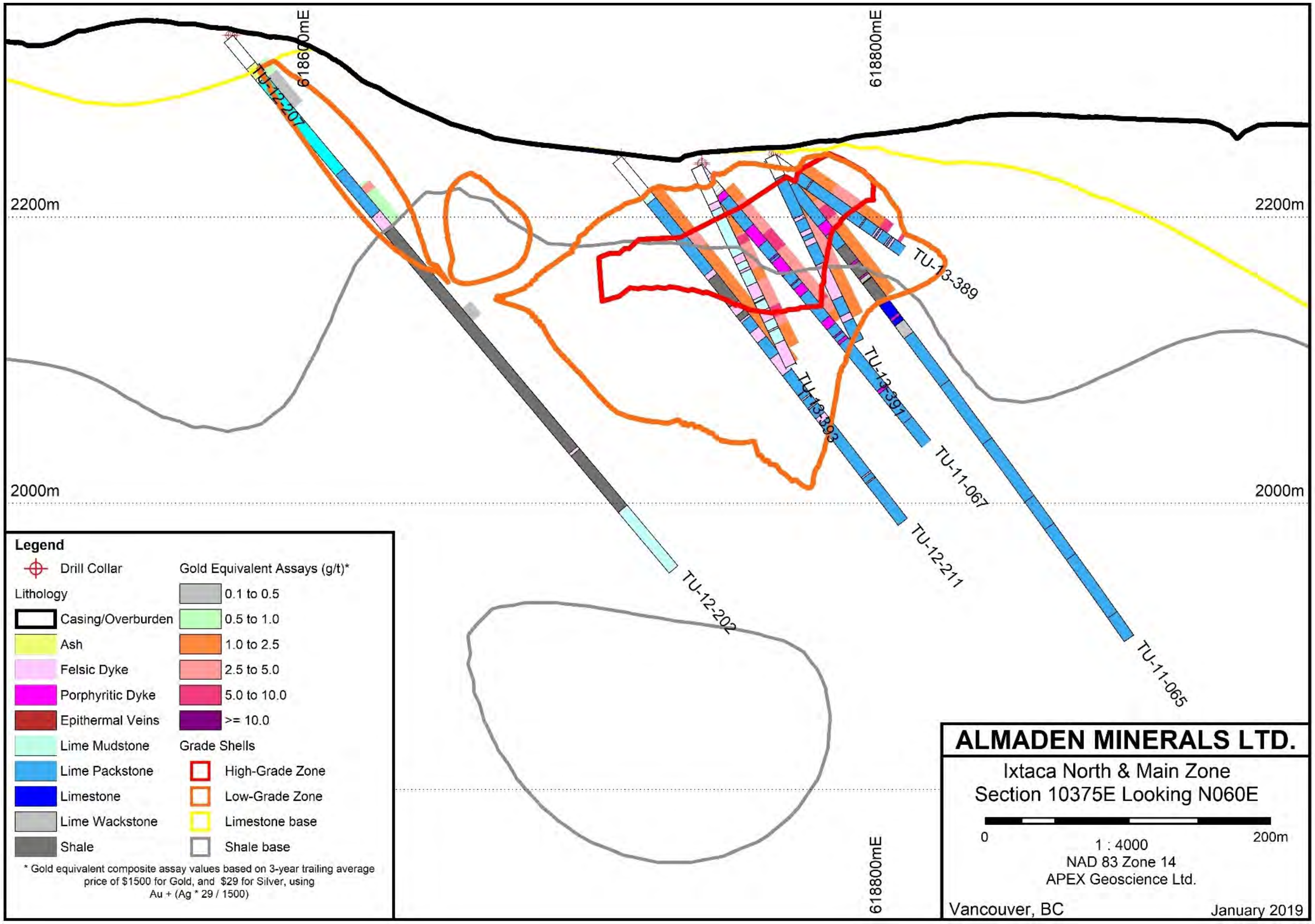



**Figure 7-13 Section 10+375E through the Ixtaca Main Zone**

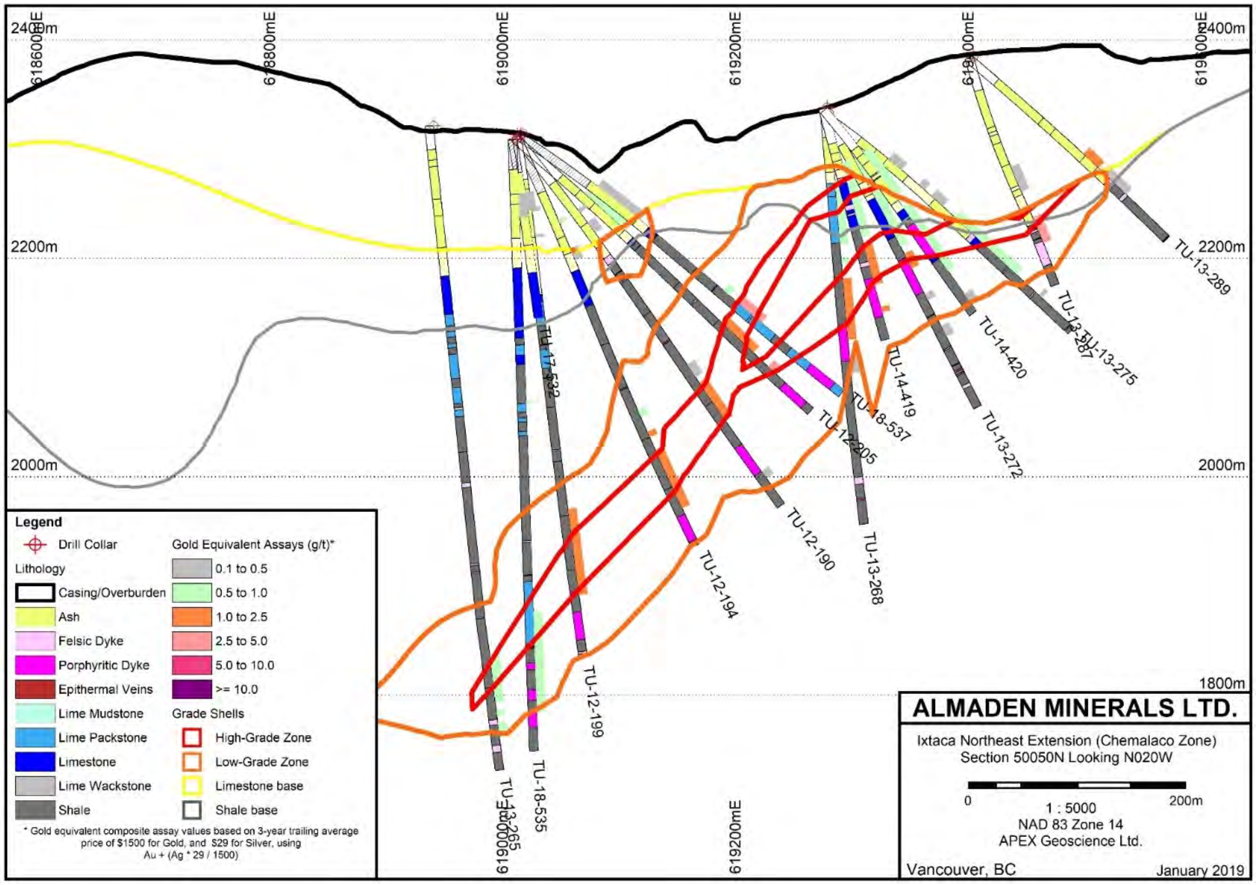



**Figure 7-14 Section 50+050N through the Chemalaco Zone**

## 7.3 Hydrogeology

### 7.3.1 Meteorology

Site-specific climate data collection began in 2013, using an automated climate station established by KP downstream of the then proposed tailings management facility (TMF), at an elevation of approximately 2250 m. This station, which is called the Ixtaca Climate station, is currently operating and collects data of air temperature, humidity, solar and net radiation, wind speed and direction, precipitation, and atmospheric pressure.

In 2015, two additional automated precipitation stations were added, both of which consist of a tipping bucket rain gauge and a data logger. The Almeya station is located upstream of the TMF at an approximate elevation of 2615 m, and the Bodega station is located downstream of the proposed Project area at an approximate elevation of 2250 m. In 2018, an additional tipping bucket rain gage was added at the Puente station located in the upper portion of the watershed containing the open pit. Also in 2018, telemetry systems were added to the site monitoring program to enable desktop access of remote data.

Summary data from the Ixtaca Climate station includes a mean annual temperature of approximately 14°C, with mean monthly temperatures ranging from a low of approximately 12°C to 13°C in

December/January to a high of approximately 16°C to 17°C in April/May/June. Other metrics from the station include (Knight Piésold, 2017):

- Relative humidity measurements indicate that the climate is reasonably dry, particularly in the winter months, with an annual average of approximately 70%.
- Over an approximate three-year period, the maximum wind speed was 14.9 m/s, and monthly average wind speeds ranged from 2 m/s to 3 m/s.
- The predominant wind directions were north and north-west.
- Solar radiation is typically greatest in April and least in October, and ranges from approximately 5.9 kWh/m² to 3.4 kWh/m².
- The mean annual lake evaporation is estimated to be approximately 714 mm, with monthly mean values ranging from approximately 46 mm in December/January to 74 mm in May.
- The long-term mean annual precipitation is estimated to be 720 mm, and occurs entirely as rainfall.
- The wet season is from May to October, when 84% of annual rainfall is expected to occur, on average. The wettest month is typically June.
- Rainfall on site, particularly during the wet season, tends to arrive in short duration, high intensity bursts.
- Barometric pressure is relatively uniform year round at approximately 102.6 kPa.

Additionally, climate data are available from Government of Mexico regional meteorological stations; several of which are located within 35km of the Project, each with over 25 years of daily data on precipitation, evaporation, and minimum and maximum temperatures. The Ixtaca Climate station data were compared to the regional stations and found to have similar data trends.

### 7.3.2 Surface Hydrology

The local climate along with size, vegetation cover, and soil and rock types of each drainage basin all contribute to the runoff response of Project area watersheds. Typical of many areas in Mexico, the Project experiences rainfall primarily as short duration, high-intensity storm events during the wet season (May to October). This type of precipitation distribution combined with the steep topography and poorly draining soils results in a rapid runoff response with correspondingly high peak flows of short duration. The distinct dry and wet climatic seasons in the region result in intermittent and episodic streamflows in the wet season and little to no flow during the dry season. The Project area streams are above the water table and constant baseflow is not observed; however, interflow/ temporary baseflow is observed as flows decrease from low to little or no flow through the dry season.

Five streamflow monitoring stations were installed at the Project in 2014 and were enhanced in 2017 following complications with high sediment loads and were further updated in late 2018. Continuous streamflow records for streams in the Project area are currently being collected. Data collected to date include the following (Knight Piésold, 2017):

- The mean annual runoff is estimated to range from 58 mm (1.8 l/s/km2) to 87 mm (2.8 l/s/km2).
- Streams in the area follow an episodic/ephemeral hydrologic regime, and the annual hydrographs mimic the patterns of annual precipitation, with the highest flows typically occurring during the wet

season of May to October and the lowest flows occurring during the dry season of November to April.
- The stage records for the Project site stream gauges exhibit the 'flashy nature' of streams in the area, with water levels rising and falling very rapidly in response to short duration high-intensity rainstorms.
- Return period peak discharge values at the Project were calculated to range between 2 m3/s for a 2-year return period, up to 77 m3/s for a 500-year return period.
- Flows typically fall to very low levels during the dry season, and some creeks go completely dry for short and extended periods each year.
- Low flows are typically higher at the Project area in northern upland sites than in southern lowland sites.

#### 7.3.3 **Surface Water Quality**

Surface water quality sampling sites were established to target background and pre-mining (baseline) water quality upstream and downstream of the project facilities. Thirteen surface water monitoring locations were sampled as conditions allowed from 2009 to 2016 (KP, 2017a) and in 2018 by SRK (SRK, 2018). The surface water quality monitoring locations are shown on Figure 20-1. Sample collection has been intermittent depending on flow conditions. Upstream sites in the El Tecolote and Coxalenteme catchments had sufficient flow to sample surface water quality year-round but the monitoring sites in the lower reaches of these catchments were frequently reported as dry outside of the rainy season (KP, 2017a). Flow conditions were always sufficient to collect water quality samples from the monitoring locations farther downstream in the Rio Apulco and Rio Los Lobos and only occasionally reported as dry in the Rio Los Ameles. During the most recent sampling event in April 2018, only four of the 13 surface water monitoring stations had adequate water for sampling (Apulco, Hotel, Puente, and Sector Riego). After the April 2018 site visit it was recommended the removal of four monitoring stations (Tuligtic 1, Tuligtic 2, El Protrero, and RLA 100E).

Water within the project area is generally classified as neutral to slightly basic, hard to very hard and well-buffered, with variable turbidity and total suspended solids (KP, 2017a). Turbidity and TSS exceed the relevant water quality standards at some sites. Metal concentrations were generally highest toward the end of the wet season, in September and October, and conclusions regarding concentrations at most sites during the drier season cannot be made as samples were not typically collected due to insufficient flow.

When compared with the water quality standards of Ley Federal de Derechos (aquatic life), NOM-127-DW (drinking water standards), and NOM-001 (discharge standards for irrigation and aquatic life), the baseline surface water quality exceeds numerous standards. The most frequent aquatic life guideline exceedances were reported for total suspended solids, ammonia, dissolved and total aluminum, dissolved and total barium, and total iron. Concentrations of these parameters exceeded the standard in most samples collected from most sites. Total lead and zinc also exceeded the standard in samples collected from most sites; however, standard exceedances were less frequent (i.e. less than half of the total number of samples). Parameters that exceeded the standard sporadically or at only one or two sites include total beryllium, chromium, copper, mercury, molybdenum, and silver, and dissolved iron, molybdenum, and zinc.

Parameters that exceeded irrigation standards in at least one sample collected from most sites include TSS, total aluminum, total iron, and total manganese. Fluoride, sulphate, and dissolved manganese concentrations also exceeded the standard in at least one sample; however, exceedances were limited to one or two sites. Exceedances of the drinking water standard (NOM-127-DW) were frequently reported for pH, turbidity, ammonia, nitrite, dissolved and total aluminum and iron, and total barium, manganese, and sodium. Parameters that exceeded the drinking water standard less frequently include sulphate, dissolved manganese, and total cadmium and chromium.

Elevated baseline concentrations of metals and other parameters are common in areas close to mineral deposits (e.g., the El Tecolote and Coxalenteme catchments), or in large river systems that carry high total suspended solids (e.g., the Río Apulco/Río Los Ameles).

The site locations are illustrated on Figure 7-15.

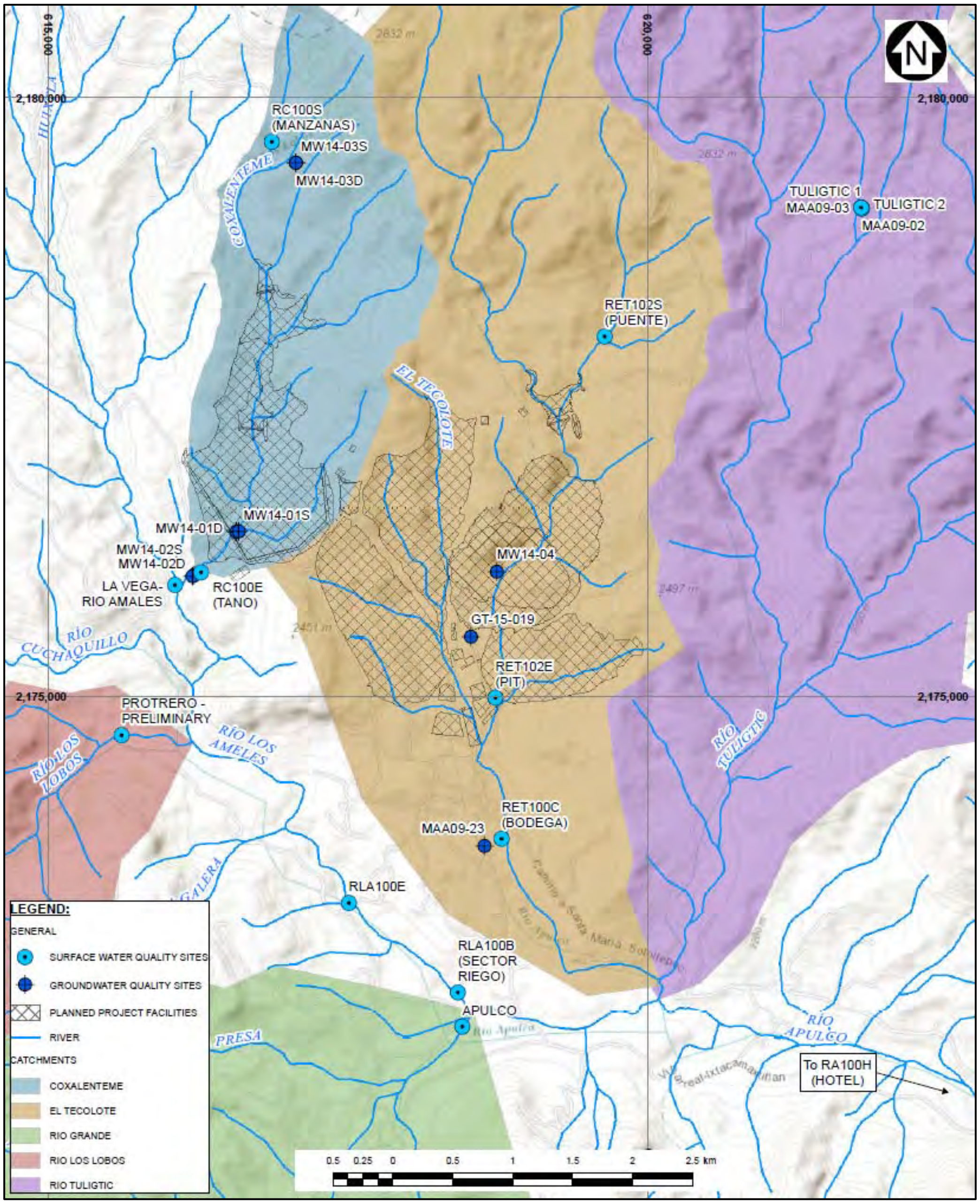



**Figure 7-15 Surface and Ground Water Quality Sampling Sites. Source: Knight Piesold, March 2017**

Upstream sites in the El Tecolote and Coxalenteme catchments had sufficient flow to sample surface water quality year-round but the monitoring sites in the lower reaches of these catchments were frequently reported as dry outside of the rainy season. Flow conditions were always sufficient to collect water quality samples from the monitoring locations further downstream in the Rio Apulco and Rio Los Lobos and only occasionally reported as dry in the Rio Los Ameles.

Ion concentrations generally decreased from upstream to downstream and were higher in the Coxalenteme and El Tecolote catchments than at sites outside of the project area. Water within the project area is generally classified as neutral to slightly basic, hard to very hard and well-buffered, with variable turbidity and total suspended solids (TSS). Turbidity and TSS increased from upstream to downstream within the Coxalenteme and El Tecolote catchments and exceeded the relevant water quality standards at some sites. Total and dissolved concentrations of some metals (aluminum, copper, chromium iron, and lead) increased from upstream to downstream in the El Tecolote catchment and in the Coxalenteme catchment. Metal concentrations were generally highest toward the end of the wet season, in September and October.

Analytical results were compared with the water quality standards included in the following: Ley Federal de Derechos (LFD) and Norma Oficial Mexicana (NOM; NOM-127-DW (drinking water standards) and NOM-001 (discharge standards for irrigation and aquatic life)). The standards were selected based on the potential local uses, which include: Aquatic Life (NOM 001 Aq and LFD-Aq), Irrigation (NOM-001-Irrigation and LFD-Irrigation), and Drinking Water (NOM-127-DW).

#### 7.3.4 **Groundwater**

Previous studies of the groundwater, including monitoring well constructions, hydraulic testing, water-quality testing, and environmental background and pre-mining (baseline)studies were conducted by Hidrogeologos Consultores (2013) and Knight Piésold (2014, 2017a, 2017b, and 2017c).

For the Ixtaca Technical Report Summary, a field data collection program for hydrogeologic characterization and developed a 3D numerical model of groundwater flow beneath the Ixtaca Project area. Field activities consisted of packer isolated interval testing (packer testing); monitoring well construction, development, and testing of newly installed and existing wells; and water level monitoring. A report (SRK, 2018) documents the field work and groundwater modeling. The study evaluates pre-mining, mining, and post-mining hydrogeological conditions and predicts dewatering requirements, and potential environmental impacts.

The proposed Project facilities lie in two catchment areas, which are tributaries of the Río Los Ameles/Río Apulco river system: Coxalenteme and El Tecolote. Streams in the area follow an episodic/ephemeral hydrologic regime (Knight Piésold, 2017b). The annual hydrographs mimic the pattern of annual precipitation, with the highest flows typically occurring during the wet season of May to October and the lowest flows occurring during the dry season of November to April.

Water use in the project area consists of domestic use of springs occurring in the catchment above the project area. Springs and seeps within the project area were mapped and characterized by AML personnel. Additional springs and seeps within the region mapped by outside sources were provided by AML. These data along with water levels within the project area were combined to evaluate and understand groundwater gradients, to evaluate potential variability in hydraulic conductivity, and to further refine the conceptual groundwater model.

The 2018 field program consisted of drilling four core holes, packer testing, monitoring well installation, hydraulic testing of existing and newly installed wells, and water level monitoring. A summary of prior testing, instrumentation, and well construction information for the Ixtaca Project was compiled from multiple volumes of historic reports, figures, and appendices. Based on the review, 58 existing water level monitoring, testing, and installation points were identified within the project boundary.

Water level elevations range from 49.5 mbgs and 2,554 meters above measured sea level (mamsl) in the high country north of the project area to 30.5 mbgs and 2,540 mamsl in the low country south of the pit area. Generally, groundwater flow follows topography, with a steep downward gradient from north to south near the project. Two areas do not follow the general pattern, including an area underlain by undifferentiated ash units west of the proposed pit, and the lowland area south of the proposed pit. Both exhibit relatively flat-water tables.

Hydraulic testing during the 2018 field program was done using packers to isolate test intervals in the newly drilled core holes before well construction. Additional testing was performed in accessible existing and newly-installed monitoring wells. Testing included slug tests, constant-rate injection tests, and constant-head injection tests. Lower permeability intervals were tested using stepped-pressure, or Lugeon methods. A total of 44 tests were performed during the 2018 field program (21 packer and 23 wells tested). An additional 203 packer and well tests were performed during previous field campaigns between 2012 and 2017. Short-term hydraulic testing revealed a wide range of hydraulic conductivity values within the various hydrogeologic units of the project area. After careful review of the historic data, it was decided not to use the information in developing the 3D numerical groundwater model. However, in the future these data may be useful in mitigating uncertainties or in identifying areas requiring additional characterization.

The conceptual model of groundwater flow at Ixtaca includes the following components:

- The long-term mean annual precipitation is estimated to be 720 mm and occurs entirely as rainfall. The wettest month is typically June. The mean annual evapotranspiration is estimated to be approximately 714 mm, with monthly mean values ranging from 46 mm in December to 74 mm in May.
- Groundwater recharges from precipitation and generally flows from topographically high areas (highland with elevation of about 3,000 mamsl in the north to topographically low areas in the south (the lowest elevation is 2,150 mamsl at the Rio Apulco River south of the proposed pit).
- The recharge from precipitation in the highlands is estimated to be 72 mm/a or 10% of precipitation. The recharge in the lowlands is estimated to be about 14.4 mm/a or 2% of precipitation. These recharge rates, and their distribution based on topography were obtained during the process of model calibration to measured water levels.
- Rio Grande and Rio Apulco are primary rivers near the project and groundwater discharges into them and their tributaries. Flows in these rivers decrease significantly during dry months. Additional rivers in the region that are typically ephemeral include Rio Loa Ameles, Rio Los Lobos, and Rio Tuligitic.
- Hydrogeologic units in the project area include:
    - Volcaniclastics – The volcaniclastic unit shows localized sub-layers of fine ash, coarse ash, breccia, and lapilli tuff. Permeability of the volcaniclastics varies depending on the degree of consolidation and fracturing. Volcaniclastic materials associated with hydrothermal alteration are typically more competent and more prone to fracturing, which increases the permeability.
    - Limestone and Shale – The sedimentary units are typically of low permeability, but hydraulic conductivity increases locally along fold axes and near the intrusive contact.

  - Intrusions/Dikes – The intrusive bodies are expected to have low permeability, except at the contacts with host rocks. Fracturing and permeability locally increases in the sedimentary host rocks near intrusions.
  - Structure – The limited testing conducted across faults during drilling did not identify structures with increased permeability or faults acting as major barriers to groundwater flow.
  - Additional to bedrock water-bearing zones, saturated overburden is present within the project area. The overburden is generally thin (less than 1 m) but reaches up to 7 m thick in river valleys. Zones of alluvium, colluvium, ash-tuff, and/or an agglomeration of all may be up to 100 m thick based on drilling information south of the proposed pit location.
- Measured hydraulic conductivity values vary over a wide range, from 0.00003 m/d to 9 m/d (by more than five orders of magnitude as described in Section 3) and do not allow definition of hydrogeological units based on lithological signature. Available testing data indicates that the measured hydraulic parameters show a trend of hydraulic conductivity decreasing with depth. Based on the analyses, three major hydrogeological units were defined:
  - Shallow bedrock (upper 50 m) with intermediate hydraulic conductivity;
  - Intermediate bedrock (depth from 50 to 300 m) with low hydraulic conductivity; and
  - Deep bedrock (depth below 300 m) with very low hydraulic conductivity.
- Water level elevations throughout the project area exhibit a steep hydraulic gradient, with levels ranging from 2,540 mamsl in the highlands north of the project to 2,154 mamsl just south of the pit over approximately 4.5 km. This generally indicates the presence of low hydraulic conductivity rocks. Flat water level gradients were observed in the ash west of the proposed pit at 2,350 mamsl and the area south of the proposed pit extending to the Rio Apulco at 2,150 mamsl. These flat groundwater gradients support the assumption that these areas exhibit elevated hydraulic conductivity.

A numerical groundwater model for the Ixtaca Project was developed using the MODFLOW-SURFACT finite-difference code (Hydrogeologic, 1996; Harbaugh and McDonald, 1996) and the Groundwater Vistas v.7 interface developed by Environmental Simulations, Inc. (Rumbaugh and Rumbaugh, 2017). The groundwater model domain covers approximately 157 square kilometers ($km^2$) within the vicinity of the proposed open pit mine. The northern, western and eastern model boundaries primarily follow topographic divides and/or are parallel to regional groundwater flow and are thus assumed to be 'no flow' boundaries. The southern boundary is defined by the Apulco River.

Twelve model zones were created considering the low and high hydraulic conductivity values established from historic aquifer testing data. Each model zone has specific values for horizontal (Kh) and vertical (Kz) hydraulic conductivity (K), specific storage (Ss) and specific yield (Sy). Storage parameters are based on literature and on experience from projects with similar conditions.

The creeks and springs in the model area are represented by 'drain cells'. The Apulco River is assumed to flow for most of the year. Within the model area it is therefore represented using model 'river cells'. The mine plan for the open pit was dated 6 August 2018 and consists of annual pit layouts that span an 11-year period. They were processed into drain cells with the location and head representing the elevation of the pit for each time period. The model simulates transient filling of the pits using the LAK2 package for MODFLOW-SURFACT (Council 1997). Lake cells were assigned based on the ultimate pit-shell excavations and planned backfill, as provided by Ixtaca (2018).

Head distribution in a steady state calibration depends on recharge, hydraulic conductivity values (K), sources, sinks and boundary conditions. In the case of the Ixtaca model, the valid K values from short-term tests are considered good qualitative indicators of the properties of the rocks. However, because of the limited number of valid tests and the concentrated coverage (within the proposed pit extents) of the 2018 tests, the numerical model does not rely on K values for calibration. Instead, water level elevations from the existing monitoring wells are used. The short-term tests are used qualitatively to adjust the numerical groundwater model where needed. The calibration objective was reached when an acceptable correlation was obtained between the observed and simulated water levels and hydraulic gradient. Twenty-six of the 34 target water levels over the model area were calibrated to within 3 m of observed, and 4 of the remaining 8 were within 4 m of observed.

No long-term hydraulic test data suitable for transient calibration are available for the Ixtaca site. Consequently, a transient calibration was obtained using water level fluctuations in response to seasonal recharge. Recharge factors were calculated over a 3-year period and the resultant fluctuations in groundwater levels compared to water level observations. In the author's opinion, the groundwater model reproduces hydrogeological conditions prior to the mining and reasonably calibrated to the measured water levels, and the model can be used for predictive simulations.

Predicted passive groundwater inflows to the proposed pit range between 19 L/s (1,618 $m^3$/d) and 34 L/s (2,974 $m^3$/d). Changes in simulated average pit inflows over time will occur in response to the mine pit elevation, the extent of the mine pit area, and the drawing down of the local water table over time through release of groundwater storage. The maximum inflows are reached in year 2 (34 L/s when the open pit is rapidly excavated within the most permeable upper bedrock) and the final pit inflow in year 11 is 20 L/s. Actual pit groundwater inflows are likely to be sporadic, with higher inflows related to the intersection of preferential groundwater flow paths (such as fractures) during mining. Based on the predictive results, the groundwater inflow into the pit could be handled passively (by in-pit sumps) without any active dewatering by perimeter wells or pit wall horizontal holes.

Additional inflow from direct precipitation to the pit (less evaporation) is estimated to be 29 L/s (2,517 $m^3$/d) under average long-term conditions. Thus, direct precipitation to the pit will likely form the largest component of water to be pumped from the pit sumps during mining. It is assumed that up-gradient/ catchment runoff will be diverted around the pit during mining to the extent possible.

Groundwater flow near the open pit is predicted to be radially inward from all directions. The predicted change in the long-term water table from pre-mining water levels reaches a maximum of 200 m within the pit. The 1-m drawdown zone extends 1 km north of the pit, 2 km west of the pit, 1.5 km east of the pit and 3 km south of the site, thus just reaching the banks of the Apulco River. In response to the lowered groundwater levels around the pit during mining, groundwater baseflow to the creeks and springs in the catchment are predicted to decrease by 9% (from 5,937 $m^3$/d to 5,420 $m^3$/d; 69 L/s to 63 L/s) compared to pre-mining conditions. In addition, net groundwater baseflow to the Apulco River decreases from an average of 8 L/s (710 $m^3$/d) to a net groundwater contribution of 0 L/s during the 11 years of mining.

The model predicts that a pit lake will form after mining, and the pit lake will exhibit both spillover and flow-through characteristics. The pit lake will reach 90% of full recovery within 90 to 100 years. After 113 years, the pit lake elevation reaches the maximum possible stage (2,230 mamsl) before surface spillover commences at a rate of 15 L/s down-gradient (south) of the pit. Groundwater seepage will be only inwards for the first 40 years following the end of mining; thereafter, there will also be groundwater outflows, with equilibrium conditions being 7 L/s inflow and 6 L/s outflow to groundwater.

There are varying levels of uncertainty associated with model parameters, and sensitivity analysis was undertaken to evaluate the implications of these uncertainties. The sensitivity analysis results indicate that the model is most sensitive to increases in the specific yield. The results have a medium sensitivity to hydraulic conductivities. Doubling the hydraulic conductivity of the hydrogeological units increases the average dewatering rate by 21%, with the range being between 25 L/s and 35 L/s; Doubling the specific yield and specific storage increases the average dewatering rate by 42%, with the range being between 27 L/s and 46 L/s. Sensitivity analysis indicates that the post-mining simulation results are most sensitive to precipitation parameters, where alterations by 25% decrease/increase start of surface spillover by 25 years and flow rates increase/decrease by 7 L/s.

#### 7.3.5 **Groundwater Quality**

To provide background and pre-mining (baseline)groundwater data for the project, seven groundwater monitoring wells were installed in 2014 (KP, 2015). About a year later geotechnical borehole GT-15-019 was converted to a monitoring well. The groundwater quality monitoring program includes both upgradient and downgradient groundwater wells. Monitoring well locations are shown on Figure 7-15.

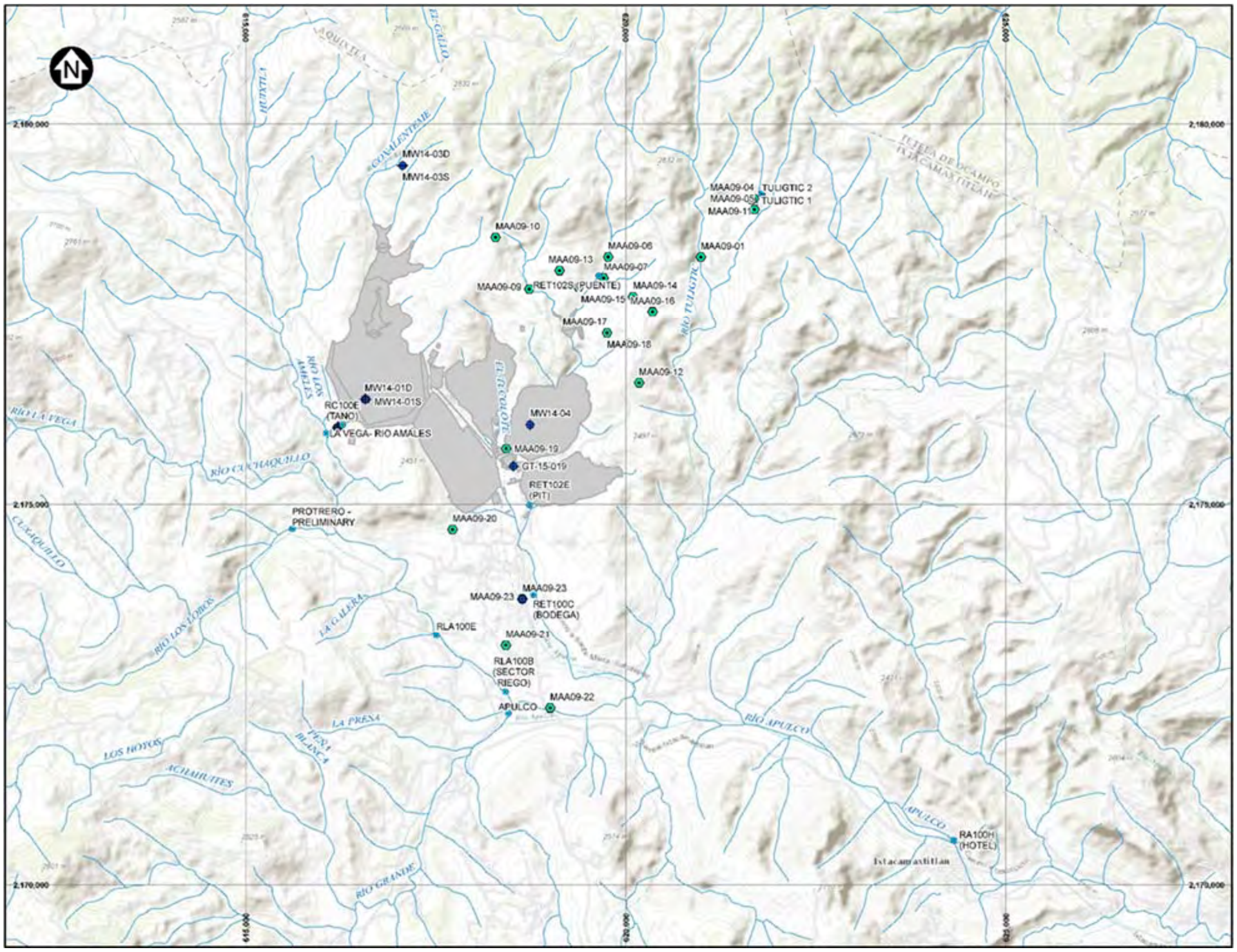



**Figure 7-16 Locations of Ground Water Quality Sampling Sites (from KP, 2017b)**

Three dominant groundwater types have been identified in the Project area (KP, 2017b): (1) calcium-sulphate, (2) calcium-bicarbonate, and (3) sodium-bicarbonate. A few locations have intermediate water types, specifically with respect to the dominance of carbonate or sulphate. Water types are not well correlated to specific lithological units but are likely influenced by their position within the watershed, localized geochemical enrichment, localized mineral enrichment, and residence time of the groundwater in the vicinity of each of the monitoring wells. Groundwater in the project area is generally characterized as neutral to slightly basic pH, alkaline with strong buffering capacity and varied hardness.

When compared with the water quality standards of Ley Federal de Derechos (aquatic life), NOM-127-DW (drinking water standards), and NOM-001 (discharge standards for irrigation and aquatic life), the baseline groundwater quality exceeds numerous standards. Samples collected from monitoring wells in the upper Rio Coxalenteme and the Rio El Tecolote areas exceed the NOM-127-SSA1-1994 Drinking Water Standard for hardness. Concentrations above standard are also noted for total dissolved solids, fluoride, arsenic, iron, manganese, and molybdenum (KP, 2017b).

## 7.4 Geomechanical

A geomechanical investigation program was completed on site for the Project from February 12, 2018 to April 27, 2018. Drilling commenced on February 12, 2018 and was completed on April 23, 2018. The program was designed to characterize geomechanical conditions in support of the development of the FS pit design. The slope angle recommendations contained in this report may be used for final design and mine planning, subject to completion of the recommendations contained in Section 23.3.3 of this report. It has been noted that all large earthwork and open pit projects at a final design level will be modified and changed based on slope monitoring, observed conditions, and recommendations of professional engineers engaged on the project.

Four major geomechanical domains have been identified in the project. The rock slopes are composed of limestone and shale and an ash tuff volcanic domain that controls the stability of the upper 50 to 250 meters (m) of the ground. The volcanic ash tuff domain is a very weak rock unit that has engineering properties similar to stiff soils. It is weak and easily erodible. A fourth domain of dikes was identified but is not a significant percentage of the final wall rock slopes. In the author's opinion, the quality and quantity of core hole data and rock mass characterization is sufficient for a FS study.

### 7.4.1 **Ash Tuff and Upper Volcanics**

Rock quality designation (RQD) values of the volcanic domain are in the 0 to 20 range. Even though larger piece lengths were observed the rock hardness was less than R2 (weak rock with strengths less than 5 MPa) not meeting the RQD criteria. The rock mass rating (RMR76) ranges from 30 to 50, which indicates a weak and poor to fair quality rock mass.

When the ash tuff cuts are exposed they will be subjected to the deformation, erosion, and failure mechanisms because of their low strength. Even though the ash tuff slope cuts have been designed to meet the minimum slope acceptance criteria at a factor of safety of 1.3, some local slope failure mechanisms might occur that are not addressed by global or inter-ramp stability analysis. These failure mechanisms include gullying, piping, and erosion. These mechanisms will be exacerbated by precipitation onto exposed slopes that have not been vegetated or covered by erosion control. Berm and bench surfaces should be graded at 2° to 3° to assist drainage off benches.

### 7.4.2 **Rock Units (Limestone, Shale, Dikes)**

The rock units consist of limestone, shale, and dikes. Structural features (discontinuities) encountered during this field investigation consisted of joints, lithological contacts, veins, dikes, foliation, faults, shear zones, and fractures in these three domains.

The limestone domain is characterized as moderately strong rock with UCS values ranging from 10 to 40 megapascals (MPa). RQD values in the limestone range from 60 to 100. The limestone is moderately jointed and has a rock mass rating ranging from 50 to 70 indicating a good rock mass.

The shale domain is a weak rock mass with UCS values ranging from 5 to 20 MPa. The shale unit is a highly foliated and weak rock mass and has a varying foliation dipping between 40° to 50° at a dip direction of 250°. RQD values in the shale range from 50 to 100 and the rock mass rating ranges from 40 to 65, which indicates a fair to good quality rock mass. The bulk of the final wall will be controlled by the rock mass properties of the shale domain.

The intrusive dikes have not been differentiated in the geotechnical model as they will be governed by the strength of the shale or limestone rock mass. The dikes are characterized as strong with UCS values ranging from 50 to 70 MPa and have a RMR76 of 55 to 80 indicating the dikes are a strong and good rock mass where present.

# 8.0 Sample Preparation, Analyses and Security

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 8.1 Sample Preparation and Analyses

### 8.1.1 Rock Grab and Soil Geochemical Samples

Rock grab and soil geochemical samples have been transported by Almaden field personnel to the Santa Maria core facility where they are placed in into sealed plastic twine (rice) sacks, sealed using single plastic cable ties. Custody of samples is handed over to ALS Minerals (ALS) at the Santa Maria core facility. ALS sends its own trucks to the Project to transport samples to its sample preparation facility in Guadalajara or Zacatecas, Mexico. Prepared sample pulps are then forwarded by ALS personnel to the ALS North Vancouver, British Columbia laboratory for analysis.

ALS is an International Standards Organization (ISO) 9001:2008 and ISO 17025-2005 certified geochemical analysis and assaying laboratory. ALS is independent of Almaden and the authors.

ALS reported nothing unusual with respect to the shipments, once received, so there isno reason to believe that the security of the samples has been compromised.

At the ALS Zacatecas and Guadalajara sample preparation facilities, rock grab samples are dried prior to preparation and then crushed to 10 mesh (70% minimum pass) using a jaw crusher. The samples are then split using a riffle splitter, and sample splits are further crushed to pass 200 mesh (85% minimum pass) using a ring mill pulverizer (ALS PREP-31 procedure). Soil samples are dried and sieved to 80mesh.

Rock grab samples are subject to gold determination via a 50 gram (g) fire-assay (FA) fusion utilizing atomic absorption spectroscopy (AA) finish with a lower detection limit of 0.005ppm Au (5 ppb) and upper limit of 10ppm Au (ALS method Au-AA24). A 50 gram (g) prepared sample is fused with a mixture of lead oxide, sodium carbonate, borax, silica and other reagents as required, inquarted with 6mg of gold-free silver and then cupelled to yield a precious metal bead. The bead is digested in 0.5ml dilute nitric acid and 0.5ml concentrated hydrochloric acid. The digested solution is cooled, diluted to a total volume of 4ml with de-mineralized water, and analyzed by atomic absorption spectroscopy against matrix-matched standards.

Soil samples are subject to gold determination via digestion of a 50g prepared sample in a mixture of 3 parts hydrochloric acid and 1 part nitric acid (aqua regia; ALS method Au-ST44). Dissolved gold is then determined by inductively coupled plasma mass spectrometry (ICP-MS). Samples are analyzed by 48-element (ICP-MS), with a 4 acid digestion (ALS method ME-MS61).

Silver, base metal and pathfinder elements for rock samples are analyzed by 33-element inductively coupled plasma atomic emission spectroscopy (ICP-AES), with a 4-acid digestion (ALS method ME-ICP61). A 0.25g prepared sample is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by ICP-AES. For rock samples only, following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples meeting this criterion are then analyzed by inductively coupled plasma mass spectrometry (ICP-MS, ALS method ME-MS61). Results are corrected for spectral inter-element interferences. Four acid digestions are able to dissolve most minerals; however, depending on the sample matrix, not all elements are quantitatively extracted.

#### 8.1.2 Almaden Drill Core

All strongly altered or epithermal-mineralized intervals of core have been sampled. Almaden employs a maximum sample length of 2 to 3m in unmineralized lithologies, and a maximum sample length of 1m in mineralized lithologies. During the years 2010 and 2011 Almaden employed a minimum sample length of 20cm. The minimum sample length was increased to 50cm from 2012 onwards to ensure the availability of sufficient material for replicate analysis. Sampling always begins at least five samples above the start of mineralization. Geological changes in the core such as major alteration or mineralization intensity (including large discrete veins), or lithology are used as sample breaks.

Drill core is half-sawn using industry standard gasoline engine-powered diamond core saws, with fresh water cooled blades and “core cradles” to ensure a straight cut. For each sample, the core logging geologist marks a cut line down the centre of the core designed to produce two halves of equal proportions of mineralization. This is accomplished by marking the cut line down the long axis of ellipses described by the intersection of the veins with the core circumference.

Areas of very soft rock (e.g. fault gouge), are cut with a machete using the side of the core channel to ensure a straight cut. Areas of very broken core (pieces <1cm) are sampled using spoons. In all cases, the right hand side of the core (looking down the hole) is sampled. After cutting, half the core is placed in a new plastic sample bag and half is placed back in the core box. Between each sample, the core saw and sampling areas are washed to ensure no contamination between samples. Field duplicate, blank and analytical standards are added into the sample sequence as they are being cut.

Sample numbers are written on the outside of the sample bags twice and the numbered tag is placed inside the bag with the half core. Sample bags are sealed using single plastic cable-ties. Sample numbers are checked against the numbers on the core box and the sample book.

Drill core samples collected by the Almaden are placed into plastic twine (rice) sacks, sealed using single plastic cable ties. ALS sends its own trucks to the Project to take custody of the samples at the Santa Maria core facility and transport them to its sample preparation facility in Guadalajara or Zacatecas, Mexico. Prepared sample pulps are then forwarded by ALS personnel to the ALS North Vancouver, British Columbia laboratory for analysis.

The samples are dried prior to preparation and then crushed to 10mesh (70% minimum pass) using a jaw crusher. The samples are then split using a riffle splitter, and sample splits are further crushed to pass 200mesh (85% minimum pass) using a ring mill pulverizer (ALS PREP-31 procedure).

Drill core samples are subject to gold determination via a 50 gram (g) AA finish FA fusion with a lower detection limit of 0.005ppm Au (5ppb) and upper limit of 10ppm Au (ALS method Au-AA24). A 50g prepared sample is fused with a flux mixture, inquarted with 6mg of gold-free silver and then cupelled to yield a precious metal bead. The bead is digested in 0.5ml dilute nitric acid and 0.5ml concentrated hydrochloric acid. The digested solution is cooled, diluted to a total volume of 4ml with de-mineralized water, and analyzed by atomic absorption spectroscopy against matrix-matched standards.

Over limit gold values (>10ppm Au) are subject to gravimetric analysis, whereby a 50g prepared sample is fused with a mixture of lead oxide, sodium carbonate, borax, silica and other reagents in order to produce a lead button. The lead button containing the precious metals is cupelled to remove the lead. The remaining gold and silver bead is parted in dilute nitric acid, annealed and weighed as gold (ALS method Au-GRA22).

Silver, base metal and pathfinder elements for drill core samples have been analyzed by 33- element ICP-AES, with a 4-acid digestion, a lower detection limit of 0.5ppm Ag and upper detection limit of 100ppm Ag (ALS method ME-ICP61). A 0.25g prepared sample is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by ICP-AES (ALS method ME-ICP61). Four acid digestions are able to dissolve most minerals; however, depending on the sample matrix, not all elements are quantitatively extracted.

Over limit silver values (>100ppm Ag) have been subject to 4-acid digestion ICP-AES analysis with an upper limit of 1,500ppm Ag (ALS method ME-OG62). A prepared sample is digested with nitric, perchloric, hydrofluoric, and hydrochloric acids, and then evaporated to incipient dryness. Hydrochloric acid and de-ionized water is added for further digestion, and the sample is heated for an additional allotted time. The sample is cooled and transferred to a 100ml volumetric flask. The resulting solution is diluted to volume with de-ionized water, homogenized and the solution is analyzed by ICP-AES. Ultra-high grade silver values (>1,500ppm Ag) are subject to gravimetric analysis with an upper detection limit of 10,000ppm Ag (Ag-GRA22).

### 8.1.3 Independent Consultant's Drill Core

The collected drill core samples were placed into sealed plastic bags and transported by the consultant to ALS North Vancouver, British Columbia laboratory for gold FA and ICP-MS analysis. The consultant did not have control over the samples at all times during transport; however the consultant has no reason to believe that the security of the samples has been compromised.

The samples are dried prior to preparation and then crushed to 10mesh (70% minimum pass) using a jaw crusher. The samples are then split using a riffle splitter, and sample splits are further crushed to pass 200mesh (85% minimum pass) using a ring mill pulverizer (ALS PREP-31 procedure).

Drill core samples collected by the independent consultant, have been subject to gold determination via a 50 gram (g) AA finish FA fusion with a lower detection limit of 0.005ppm Au (5ppb) and upper limit of 10ppm Au (ALS method Au-AA24). A 50g prepared sample is fused with a flux mixture, inquarted with 6mg of gold-free silver and then cupelled to yield a precious metal bead. The bead is digested in 0.5mL dilute nitric acid and 0.5mL concentrated hydrochloric acid. The digested solution is cooled, diluted to a total volume of 4mL with de-mineralized water, and analyzed by atomic absorption spectroscopy against matrix-matched standards.

Silver, base metal and pathfinder elements for rock and soil samples are analyzed by 33-element inductively coupled plasma atomic emission spectroscopy (ICP-AES), with a 4-acid digestion. A 0.25g prepared sample is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by ICP-AES. Four acid digestions are able to dissolve most minerals; however, depending on the sample matrix, not all elements are quantitatively extracted.

Over limit silver values (>100ppm Ag) are subject to 4-acid digestion, ICP-AES analysis with an upper limit of 1,500ppm Ag (ALS method ME-OG62). A prepared sample is digested with nitric, perchloric, hydrofluoric, and hydrochloric acids, and then evaporated to incipient dryness. Hydrochloric acid and de-ionized water is added for further digestion, and the sample is heated for an additional allotted time. The sample is cooled and transferred to a 100ml volumetric flask. The resulting solution is diluted to volume with de-ionized water, homogenized and the solution is analyzed by ICP-AES.

## 8.2 Quality Assurance / Quality Control Procedures

For the Tuligtic rock grab sample and soil geochemical programs, Almaden relies on external quality assurance and quality control (QA/QC) measures employed by ALS. QA/QC measures at ALS include routine screen tests to verify crushing efficiency, sample preparation duplicates (every 50 samples), and analytical quality controls (blanks, standards, and duplicates). QC samples are inserted with each analytical run, with the minimum number of QC samples dependant on the rack size specific to the chosen analytical method. Results for quality control samples that fall beyond the established limits are automatically red-flagged for serious failures and yellow-flagged for borderline results. Every batch of samples is subject to a dual approval and review process, both by the individual analyst and the Department Manager, before final approval and certification. The author has no reason to believe that there are any issues or problems with the preparation or analyzing procedures utilized by ALS.

Drill core samples are subject to Almaden's internal QA/QC program that includes the insertion of analytical standard, blank and duplicate samples into the sample stream. A total of 15 QA/QC samples are present in every 100 samples sent to the laboratory.

QA/QC sample results are reviewed following receipt of each analytical batch. QA/QC samples falling outside established limits are flagged and subject to review and possibly re-analysis, along with the 10 preceding and succeeding samples (prior to August 7, 2012, a total of five samples preceding and five samples succeeding the reviewable QA/QC sample have been re-analyzed). Where the re-analyses fall within acceptable QA/QC limits the values are added to the drill core assay database. Summary results of Almaden's internal QA/QC procedures are presented below.

In the independent consultant's opinion, Almaden's QA/QC procedures are reasonable for this type of deposit and the current level of exploration. A total of 16,351 QA/QC analytical standard, blank and duplicate samples have been submitted for analysis. Based on the results of the QA/QC sampling summarized below, the analytical data is considered to be accurate; the analytical sampling is considered to be representative of the drill sample, and the analytical data to be free from contamination. The analytical data is suitable for inclusion into a mineral Resource Estimate.

### 8.2.1 Analytical Standards

A total of 28 different analytical standards have been used on the Project. Since November 13, 2012 and drillhole TU-12-221 (the end of the Maiden Resource Estimate cut-off), 17 different analytical standards have been used and are the basis for the section herein. Please refer to the 2013 Almaden NI 43-101 (Raffle et al. 2013) report for a detailed discussion of the previously used standards.

Each standard has an accepted gold and silver concentration as well as known “between laboratory” standard deviations, or expected variability, associated with each standard. The standards include seven multi-element gold-silver standards with accepted values ranging from 0.472 to 4.23g/t Au, and 4.2 to 152.0g/t Ag. One analytical standard for every 20 samples (5%) is inserted into the sample stream at the ‘05’, ‘25’, ‘45’, ‘65’ and ‘85’ positions. QA/QC summary charts showing gold and silver values for each analytical standard in addition to the accepted value, the second, and third “between laboratory” standard deviation are shown in Figure 8-1 below.

Between 2010 and 2013 Almaden employed two separate criteria by which standards have been assigned “pass” or “reviewable” status.

Up to drillhole TU-12-130 a reviewable standard had been defined as any standard occurring within a reported mineralized interval returning greater than three (3) standard deviations (3SD) above the accepted value for gold or silver. Beginning with drillhole TU-12-131, a reviewable standard is now defined as any standard occurring anywhere in a drillhole returning >3SD above or below the accepted value for gold or silver. In addition, two standards analyzed consecutively returning values >2SD above or below the accepted value for the same element (gold or silver) are classified as reviewable.

All standard samples returning gold or silver values outside the established criteria are reviewed. A decision to conduct reanalysis of samples surrounding the reviewable standard is based on whether the standard returned a value above or below the accepted value (low, or slightly high >3SD values are allowed after data review) or if it occurred within a reported interval (>3SD values are allowed outside of reported intervals) Prior to August 7, 2012, when a reviewable standard has been recognized the five preceding and five succeeding samples, in addition to the standard have been subject to review and possibly re-analysis. After August 7, 2012 when a reviewable standard is recognized, the ten preceding and ten succeeding samples, in addition to the standard is subject to review and possibly re-analysis. The results of re-analysis are then compared to the original analysis. Provided that no significant systematic increase or decrease in gold and silver values is noted and the re-analyzed standard returned values within the expected limits, the QA/QC concern is considered resolved and the re-analyzed standard value and surrounding reanalyzed samples are added to the drillhole database.

A total of 11,153 analytical standards have been inserted into the sample stream of 139,042 assays for gold and silver for the 590 drillholes. Of the 11,153 standards, a total of 2,356 have been subject to review criteria in place up to drillhole TU-12-130. Of the remaining 4,490 samples subject to the current review criteria (TU-12-131 and later), 1,708 samples have been included in the maiden mineral Resource Estimate up to hole TU-12-221 (Raffle et al., 2013). QA/QC results with respect to the remaining 3,219 standards are reported herein (TU-12-222 and later).

Of the 3,876 QA/QC samples inserted into the sample stream since November 13, 2012, a total of 255 (6.6%) have been initially reviewable as a result of two consecutive standards returning >2SD from the accepted value, or a single standard returning >3SD from the accepted value for gold or silver. These standards have been re-analysed and all but 29 passed the repeat analysis (Figure 8-1). Of the remaining fourteen (14) re-analysis failures occurring within reported mineralized intervals, seven (7) returned <3SD below the accepted value for Au, four (4) >3SD above the accepted value for Ag, and two (2) >3SD above the accepted value for Au. One (1) additional standard failed as the result of being mislabelled and was later corrected in the database. One (1) other standard failed, but material was not available for re-analysis.

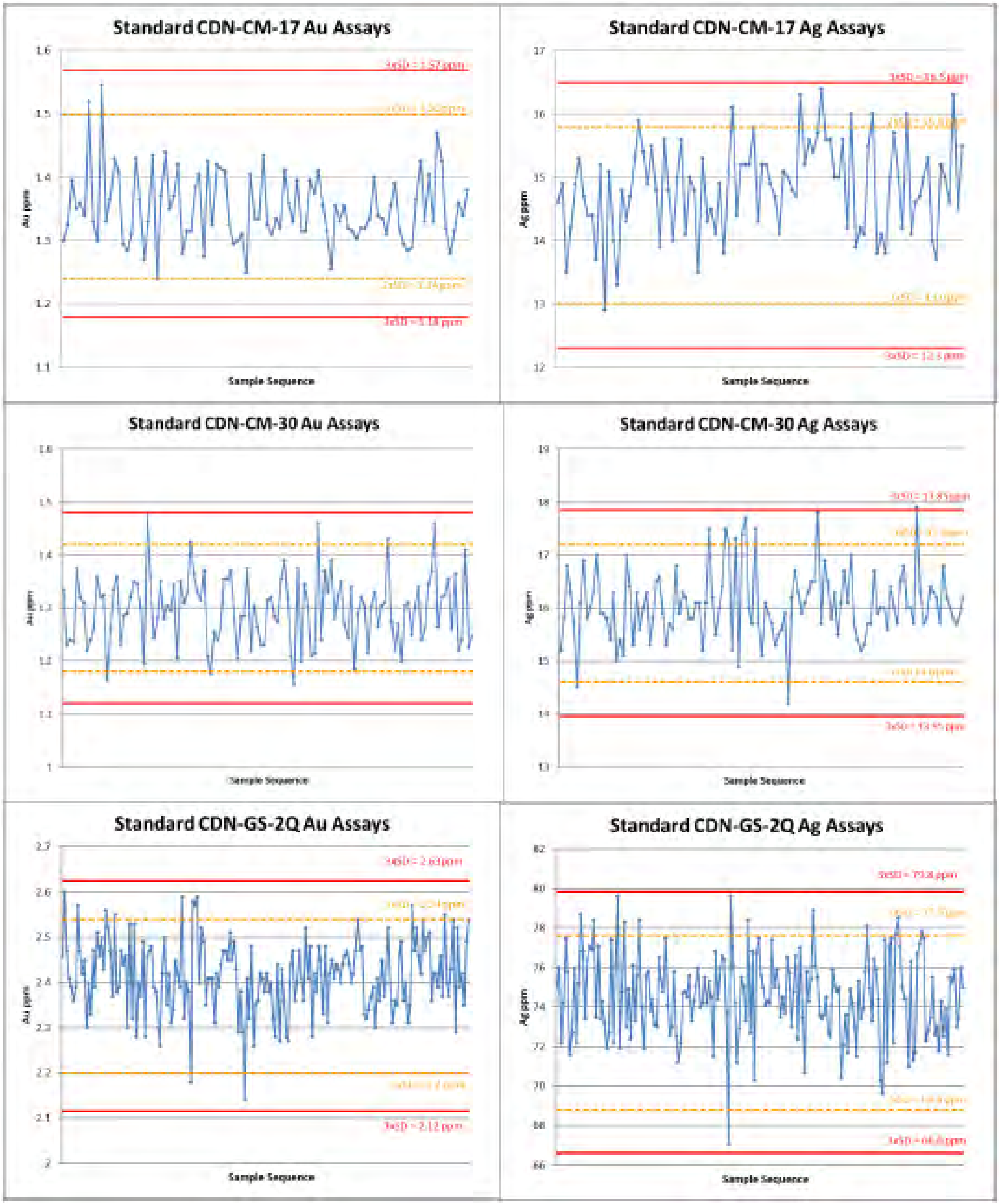



**Figure 8-1 QA/QC Analytical Standards**

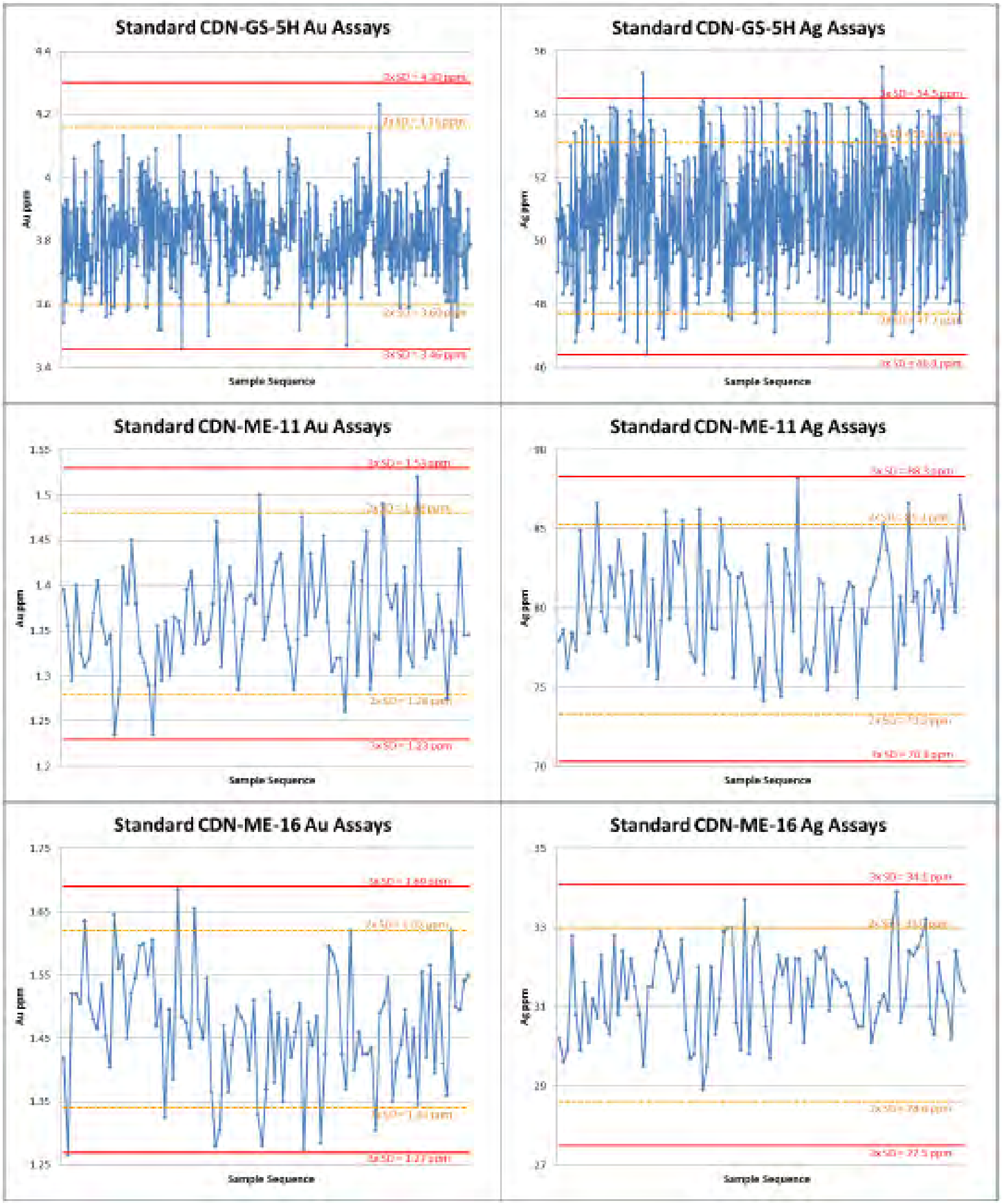



**Figure 8-1 QA/QC Analytical Standards cont…**

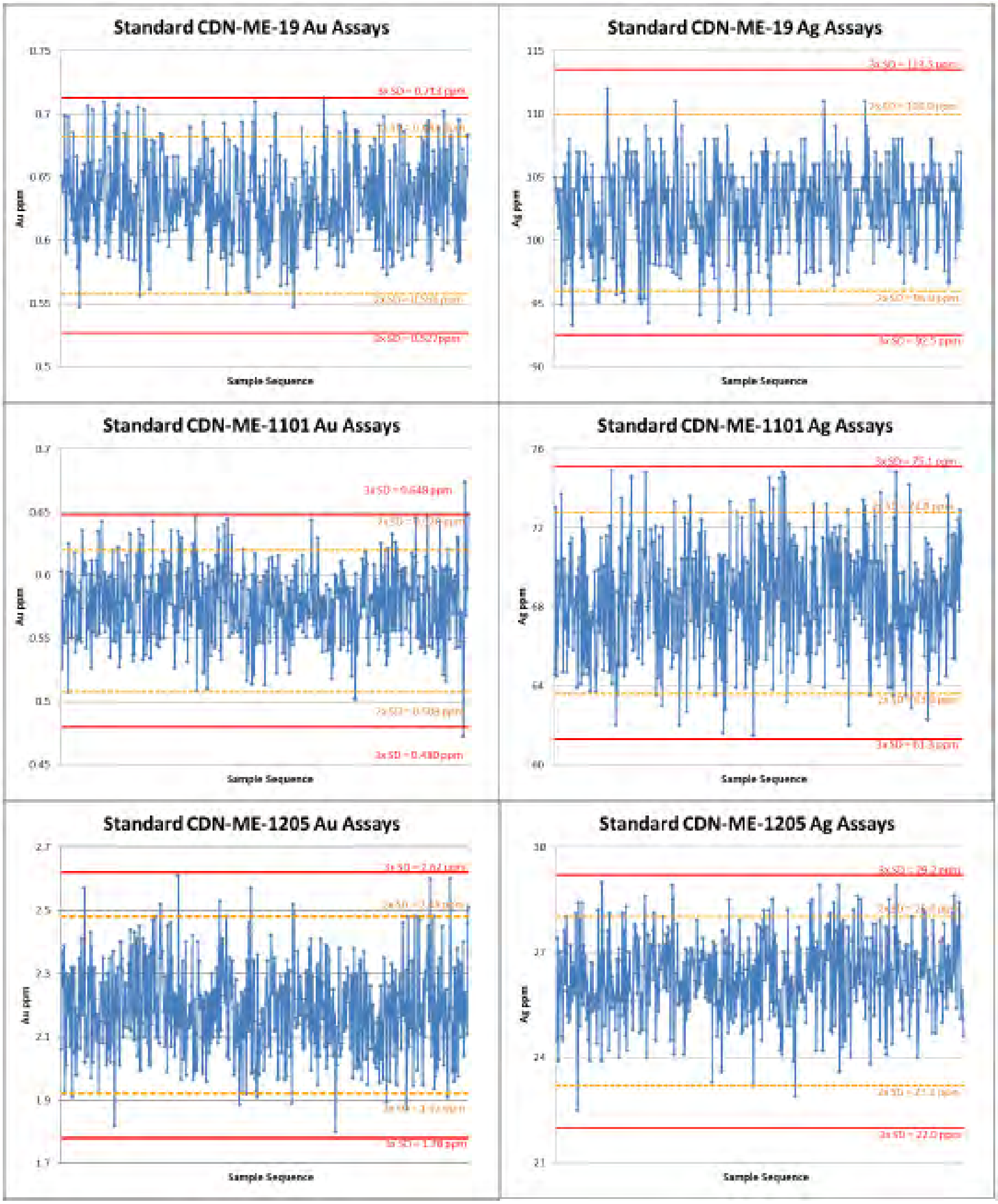



**Figure 8-1 QA/QC Analytical Standards cont…**

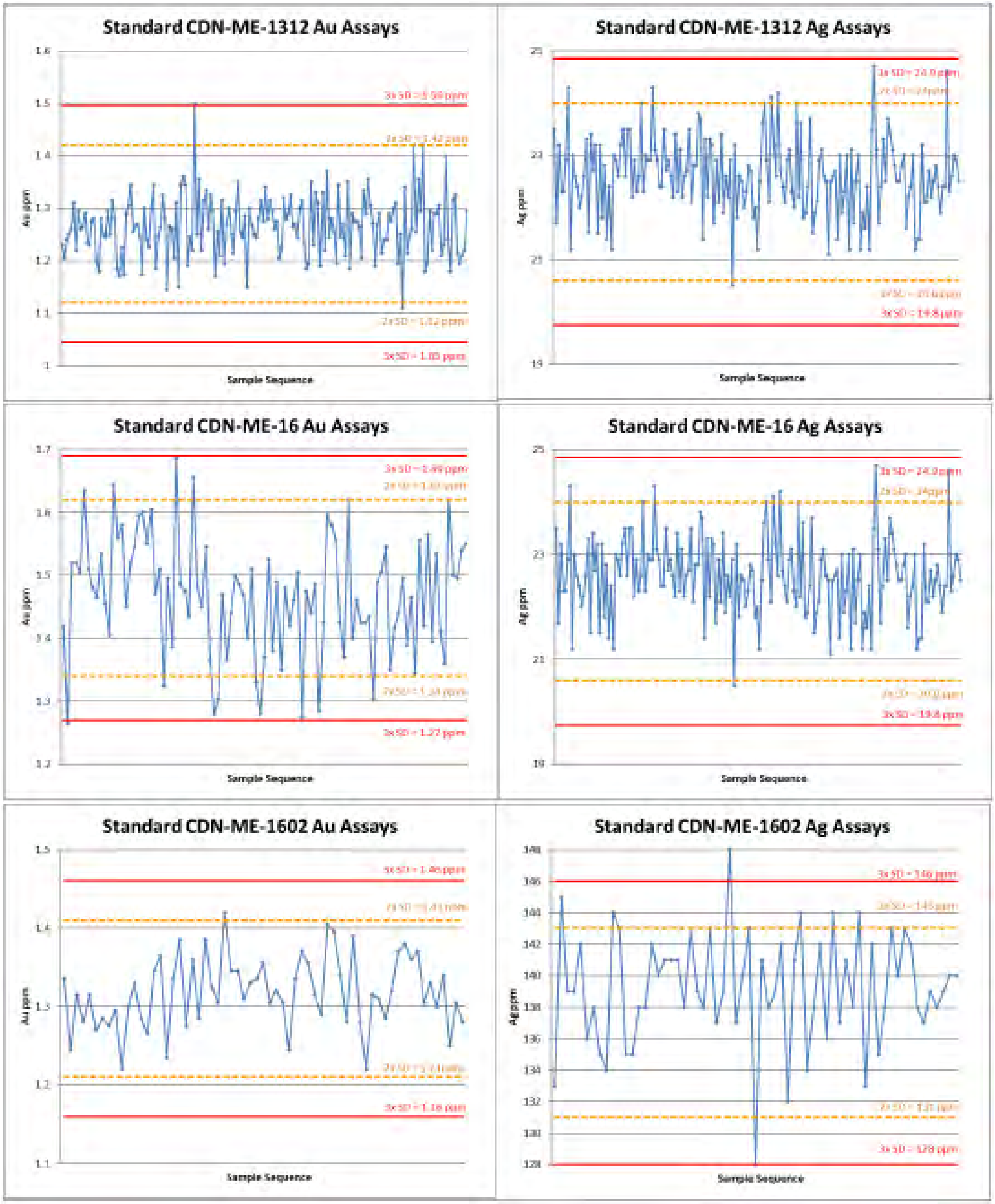



**Figure 8-1 QA/QC Analytical Standards cont…**

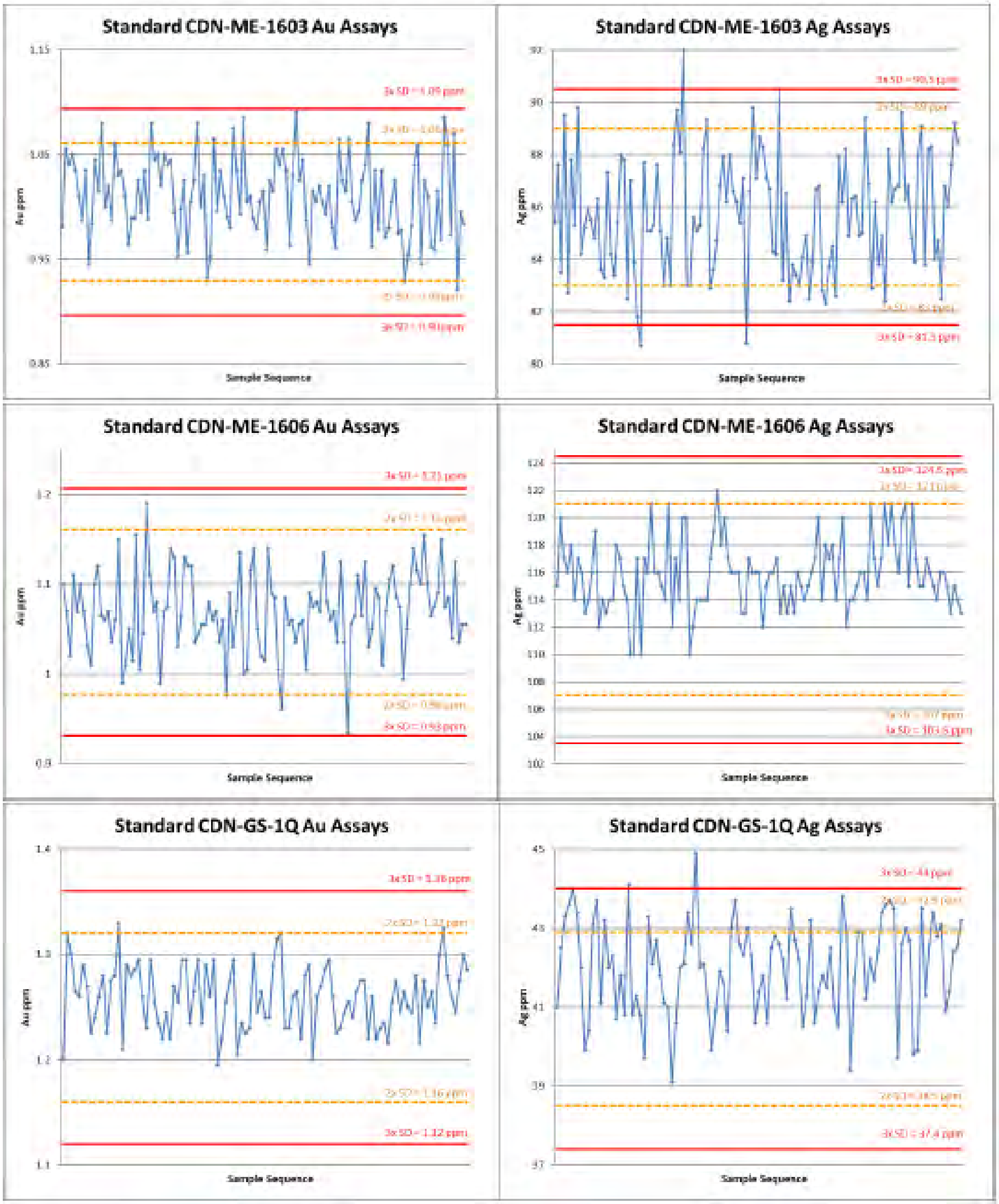



**Figure 8-1 QA/QC Analytical Standards cont…**

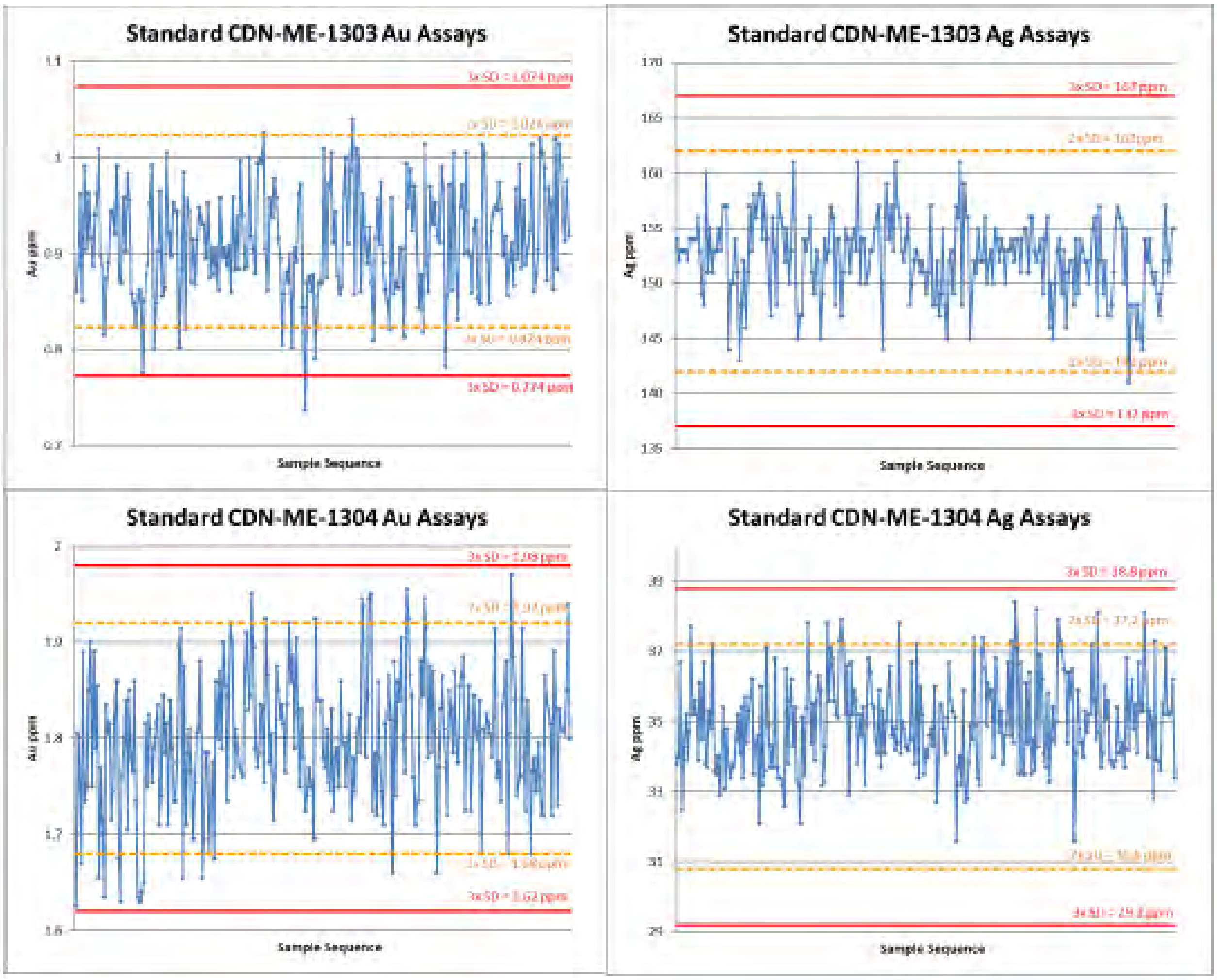



**Figure 8-1 QA/QC Analytical Standards**

### 8.2.2 Blanks

Local limestone gravel is used for coarse "blank" samples to monitor potential contamination during the sample preparation procedure. One blank for every 20 samples (5%) is inserted into the sample stream at the '10', '30', '50', '70', and '90' positions. Blank samples returning values of greater than 50ppb Au and/or 5ppm Ag are flagged for review.

Prior to August 7, 2012, reviewable blank samples occurring outside a reported mineralized intercept have not been subject to re-analysis. In the event that a blank returned has values above the accepted limits for gold or silver (prior to August 7, 2012), the blank and five samples on either side have been re-analyzed. To provide additional confidence, on August 7, 2012, Almaden increased the number of samples re-analyzed to ten samples on either side of the blank in question. The results of re-analysis are then compared to the original analysis. Provided that no significant systematic increase or decrease in gold and silver values is noted and the re-analyzed blank does not return values above the accepted limits; the QA/QC concern is considered resolved and the re-analyzed blank value and surrounding reanalyzed samples are added to the drillhole database.

Of the 3,842 blank samples analyzed since November 13, 2012, a total of 30 blanks have returned assays greater than the accepted values of 50ppb Au and 5ppm Ag. Of these, 22 blanks have returned greater than 50ppb Au, and eight blanks returned greater than 5ppm Ag. These blanks occurred within mineralized intervals, and as such have been re-assayed. When re-assayed, all blanks except one sample returned values below the accepted values for Au and Ag (Figure 8-2). The single remaining failed blank sample immediately follows a high grade sample that returned an assay of 5,310ppm Ag and in this case it is reasonable that a certain amount of carryover occurred.

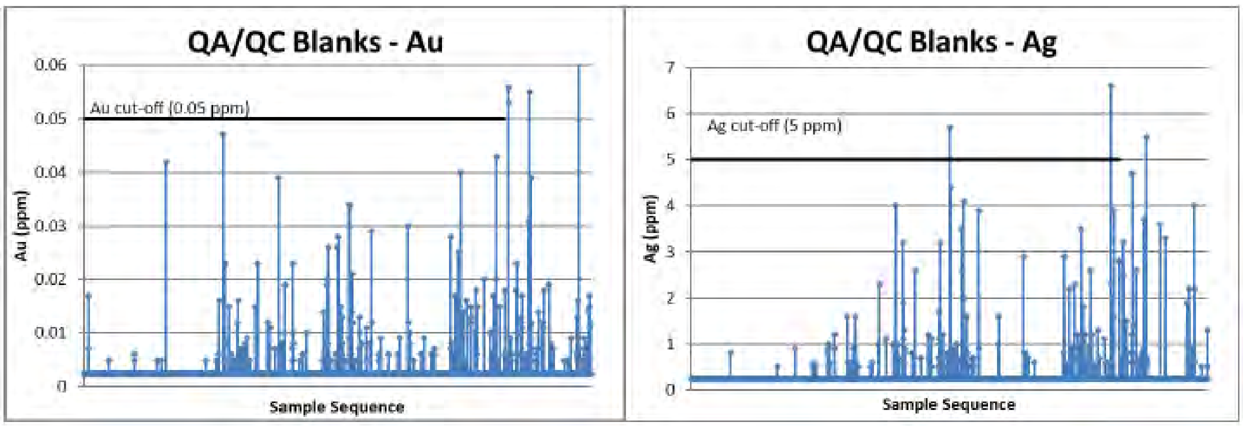



**Figure 8-2** **QA/QC Blanks**

### 8.2.3 **Duplicates**

Quartered-core duplicate samples are collected to assess the overall repeatability of individual analytical values. One core duplicate for every 20 samples (5%) is inserted into the sample stream at the '15', '35', '55', '75', and '95' positions. A total of 3,789 quarter-core duplicates have been inserted into the sample stream beginning with drillhole TU-12-222.

As part of their internal QA/QC program, ALS completes routine re-analysis of prep (coarse reject) and pulp duplicates to monitor precision. ALS analyzed a total of 1,271 prep duplicates for gold, and 1,315 for silver. A total of 3,048 pulp duplicates have been analyzed for gold and 2,414 for silver.

Charts showing original versus duplicate quarter-core, prep, and pulp duplicate values for gold and silver show a significant and progressive increase in sample repeatability (Figure 8-3). Increased repeatability is expected as the level of duplicate sample homogenization increases from low (quarter-core) to moderate (prep) and high (pulp). The data indicates a high level of repeatability for both prep (coarse reject) and pulp duplicates. This is interpreted to indicate a low "nugget" effect with respect to Ixtaca gold and silver analyses. Excluding primary geologic heterogeneity (quarter-core), the data show a homogenous distribution of gold and silver values within Ixtaca drill core.

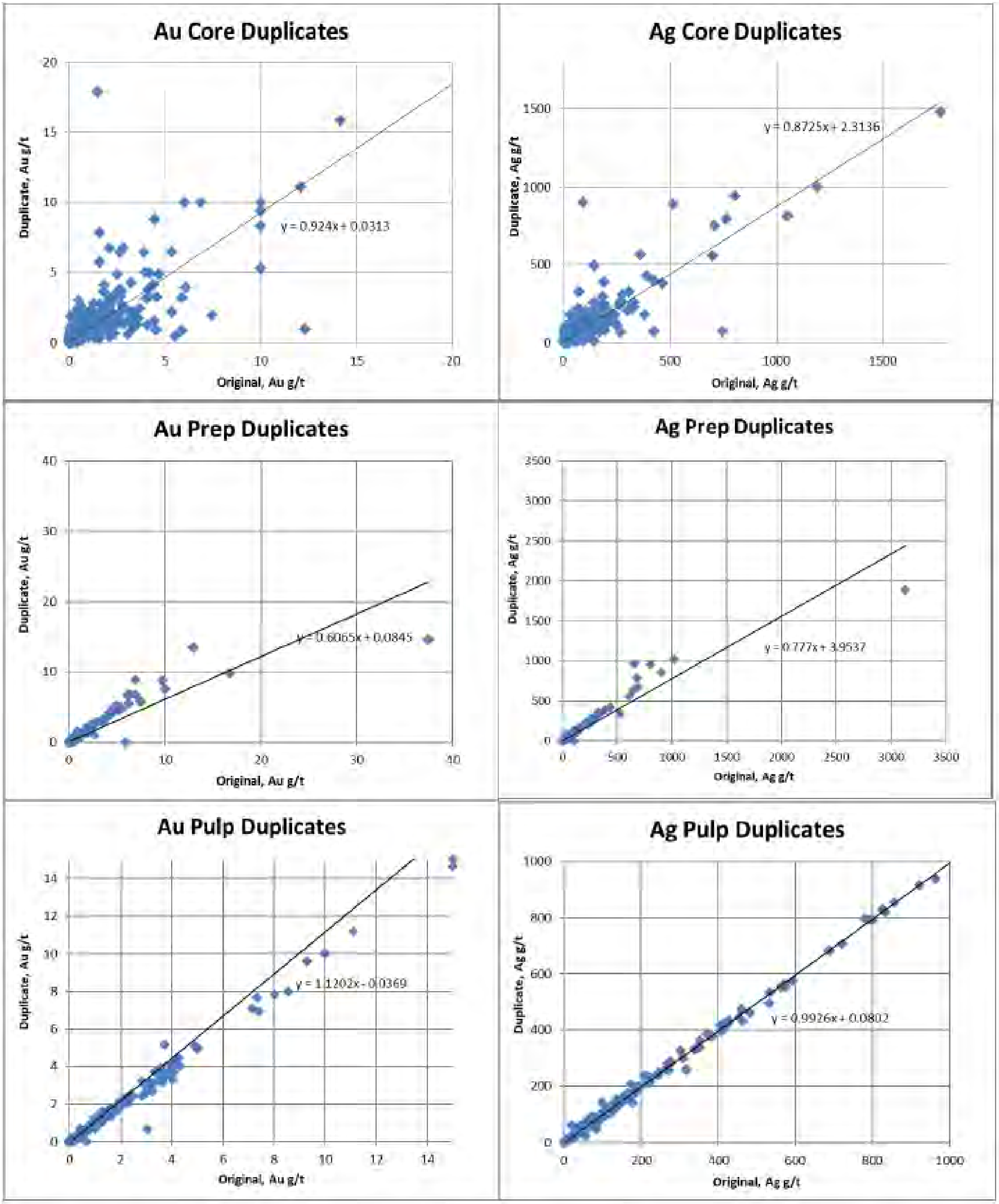



**Figure 8-3 QA/QC Duplicates**

# 9.0 Data Verification

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 9.1 Independent Audit of Almaden Drillhole Database

Between August 23 and September 26, 2012 and subsequently January 2 and January 21, 2014 an independent audit of Almaden's drillhole database was conducted. The audit included systematic checks of database values for drill collar coordinate, downhole survey, and drill core, analytical standard, duplicate, and blank sample assays against the original field survey files and laboratory certificates. In addition, APEX conducted a review of the Almaden QA/QC database, summary results of which is presented within Section 11.2 above.

### 9.1.1 Collar Coordinate and Downhole Survey Databases

A total of 39 diamond drillhole collar locations were confirmed following site visits to the Tuligtic Property on October 18, 2011; September 23, 2012; November 20, 2013; and September 12, 2019. In addition, Almaden has provided APEX with copies of all original down hole survey field records.

Despite no collar discrepancies being recorded by the author in the field, a review of the drill database reveals a number of elevation discrepancies between the Almaden differential GPS measured collar coordinates and the high-resolution satellite ortho-photogrammetric derived Ixtaca Project DEM topographic base. Elevation differences between differential GPS and the DEM range from plus 9 metres to negative 7 m. Approximately 70% of the drill hole elevations vary less than plus or minus 4 m from the DEM estimated elevation. The author observed instances within the drill collar database where a single hole drilled at the same drill pad location varied in elevation in comparison to others drilled during different years. These single holes also appear to vary more in comparison to the DEM estimated elevation, suggesting discrepancies may be derived from satellite configuration errors.

As a result of the observed discrepancies, Almaden commissioned an independent company Skytactic who provided a report on September 8, 2018 after surveying 32 collar locations across the deposit. Skytactic measured minor easting (average 7 cm) and northing (average 40 cm) differences between Almaden and Skytactic differential GPS determined collar locations. Elevation checks by Skytactic agreed more closely with DEM surface, and resulted in the removal of observed single hole variances. The Skytactic data further reinforce the interpretation that the observed single hole collar elevation "spikes" are due to satellite configuration errors.

As a result of the Skytactic report, all drillhole collars were draped onto the high-resolution DEM by Almaden to establish a consistent elevation model across the entire deposit, which created some discrepancies between the original and current data. The drill locations used in the mineral Resource Estimate and are deemed to be accurate by the author.

#### 9.1.2 **Drill Core Assay Database**

A total of 139,042 drill core samples exist within the drill database (590 drillholes in total). The database audit consisted of checking 10,885 database gold and silver values against the original ALS analytical certificates. The audit specifically focused on assays within reported mineralized intercepts. No discrepancies have been identified between the original ALS analytical certificates and Almaden's drillhole database values.

## 9.2 Site Visit

An independent consultant conducted reconnaissance of the Tuligtic Property from October 17 to October 20, 2011 to verify the reported exploration results. The author completed a traverse of the Ixtaca Zone, observed the progress of ongoing diamond drilling operations and recorded the location of select drill collars consistent with those reported by Almaden. Additionally, Almaden's complete drill core library was made available and the consultant reviewed mineralized intercepts in drill core from a series of holes across the Ixtaca Zone. The consultant personally collected quartered drill core samples as 'replicate' samples from select reported mineralized intercepts.

Additional visits to the Tuligtic Property were carried out by the author on September 23, 2012, November 20, 2013, and most recently September 12, 2019 to observe the status of current operations, review additional mineralized intercepts in drill core, and collect quarter drill core samples from select drillholes. A comparison of the results of the author's 'replicate' sampling versus original Almaden reported values for gold and silver are presented in **Table 9-1**.

**Table 9-1 Authors Independent Drill Core Sample Assays**

| Authors Sample | Almaden Sample | Drillhole | From (m) | To (m) | Interval (m) | Authors Au (ppm) | Authors Ag (ppm) | Almaden Au (ppm) | Almaden Ag (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| 11KRP201 | 51662 | TU-11-036 | 82.97 | 83.5 | 0.53 | 7.85 | 525 | 5.59 | 504 |
| 11KRP202 | 4596 | TU-10-006 | 332.62 | 333.66 | 1.04 | 3.00 | 164 | 2.79 | 191 |
| 11KRP203 | 45073 | TU-11-020 | 190.57 | 190.87 | 0.30 | 5.49 | 271 | 5.19 | 285 |
| 11KRP204 | 56217 | TU-11-051 | 91.70 | 92.20 | 0.50 | 1.98 | 229 | 4.04 | 349 |
| 11KRP205 | 46586 | TU-11-034 | 140.16 | 140.50 | 0.34 | 32.40 | 691 | 29.9 | 712 |
| 11KRP206 | 45347 | TU-11-021 | 168.67 | 169.16 | 0.49 | 17.60 | 1130 | 15.55 | 1460 |
| 12KRP601 | 086459 | TU-12-138 | 299.50 | 300.00 | 0.50 | 1.745 | 307 | 1.545 | 229 |
| 12KRP602 | 094696 | TU-12-164 | 188.00 | 188.50 | 0.50 | 0.819 | 126 | 1.745 | 134 |
| 12KRP603 | N298311 | TU-12-123 | 228.60 | 229.10 | 0.50 | 3.45 | 86.6 | 4.39 | 92.5 |
| 12KRP604 | N296249 | TU-12-124 | 174.80 | 175.30 | 0.50 | 1.165 | 100 | 2.01 | 155 |
| 12KRP605 | 098391 | TU-12-166 | 356.40 | 357.00 | 0.60 | 3.94 | 13.2 | 3.64 | 14.5 |
| 12KRP606 | 071443 | TU-12-103 | 273.50 | 274.00 | 0.50 | 5.20 | 118 | 4.36 | 136 |
| 13KRP201 | 126912 | TU-13-238 | 216.00 | 216.50 | 0.50 | 3.78 | 92 | 2.69 | 63.4 |
| 13KRP202 | 142029 | TU-13-287 | 166.98 | 168.00 | 1.02 | 0.668 | 48 | 0.775 | 87.7 |
| 13KRP203 | 141281 | TU-13-308 | 375.50 | 376.00 | 0.50 | 2.36 | 19 | 2.41 | 33.2 |
| 13KRP204 | 143281 | TU-13-309 | 195.00 | 195.50 | 0.50 | 11.35 | 756 | 14.4 | 1000 |

Based on the results of the traverses, drill core review, and 'replicate' sampling the independent consultant has no reason to doubt the reported exploration results. Slight variation in assays is expected due to variable distribution of mill feed minerals within a core section but the analytical data is considered to be representative of the drill samples and suitable for inclusion in the Resource Estimate.

# 10.0 **Mineral Processing and Metallurgical Testing**

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

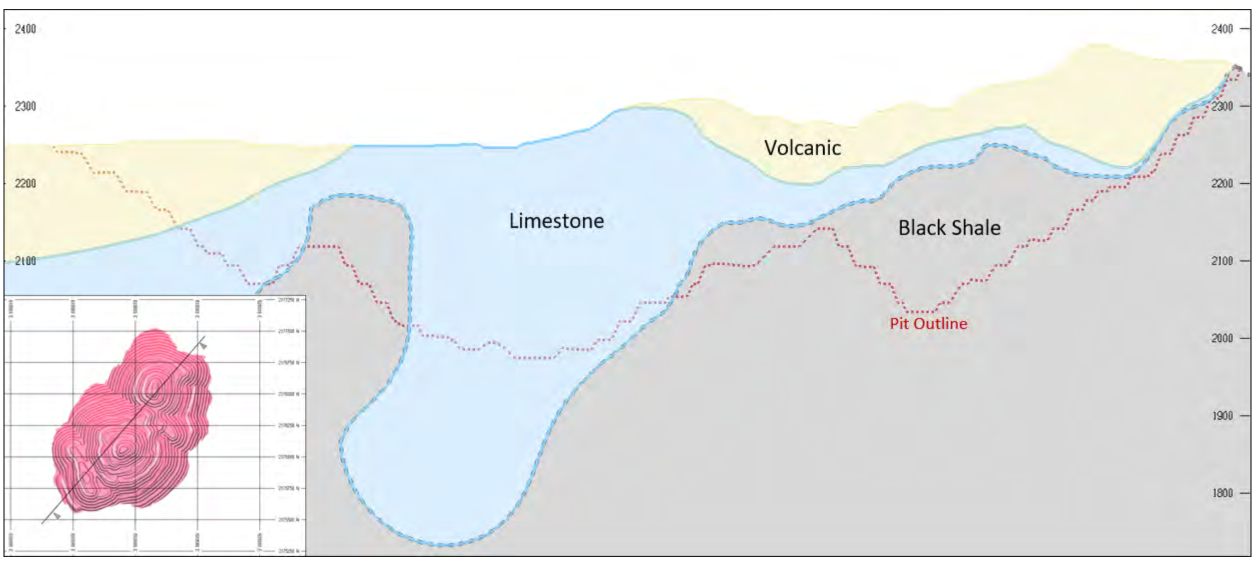
## 10.1 Introduction

Gold and Silver at Ixtaca is hosted by three metallurgical domains identified by host rock lithology (see Figure 10-1).

- **Volcanic** is a tuff unit overlying the deposit. It is a minor unit and contributes 11% of metal produced.
- **Limestone** is a calcareous unit underlying the volcanic unit. It is the primary ore bearing unit and contributes 75% of metal produced.
- **Black Shale** is a dark calcareous unit underlying the volcanic and limestone units. It is a minor unit and currently only contributes to 14% of metal produced. It is the bottom sequence and is mined last.

The limestone and black shale units contain pre-mineralization dykes.

**Figure 10-1 Ixtaca Metallurgical Domains**




*Source: MMTS, January 2019*

## 10.2 Metallurgical Test Work History

Metallurgical test work progressively developed a flowsheet for the metallurgical domains, focusing on optimizing limestone ore which represents the majority of mill feed. Metallurgical testing campaigns for the Ixtaca Project are summarized in Table 13-1. All laboratories used in the metallurgical studies are independent of the company and author.

**Table 10-1 History of Metallurgical testing campaigns for the Ixtaca Project**

| Phase | Laboratory | ISO | Sample type | Tests | Comments |
|---|---|---|---|---|---|
| Stage 1 - Exploratory | Craig H.B. Leitch, Ph.D., P. Eng. | N/A | Single core intervals | 22 samples subjected to petrographic investigation | Petrographic analysis provided initial insight into characterization of mineralization of the major ore types. |
| | Blue Coast Phase I (Parksville, BC) | Not accredited | Five composites | Scoping tests including, gravity GRG, cyanidation of gravity tails, flotation, hardness testing | Limestone had the best response to gravity concentration followed by black shale. Volcanic had poor gravity response. All units amenable to flotation.<br>Limestone identified as medium hardness, volcanics as soft, blackshale as moderate hardness.<br>Identified opportunity to recover Pb and Zn from black shale. |
| | Blue Coast Phase II (Parksville, BC) | Not accredited | Master composites by ore type | Gravity and Flotation tests | Gravity and flotation tests confirmed a combination of gravity and rougher flotation to be appropriate for all domains.<br>Identified $P_{80}$ 70µm. SIPX and Aero 3477 to enhance silver recovery in flotation. |
| | McClelland (Reno, NV) Phase 1 | ISO 17025:2005 | Master composites by ore type | Gravity concentration, Flotation, Cyanidation, Diagnostic Leach, residue cyanide speciation. | Diagnostic leach indicated gold and silver in limestone was well liberated and amenable to cyanidation. Silver in volcanic and black shale was well liberated. A third of the gold in volcanic was locked in sulphides, while black shale showed significant preg robbing.<br>Gravity, flotation, leach test work indicated 90% of silver potentially recoverable from all units, 90% gold recovery from limestone, and 50% gold recovery from volcanic and black shale.<br>Cyanide speciation indicated cyanide consumption was due to thiocyanate formation – to be remedied with early lime addition. |
| | Bureau Veritas (Richmond, BC) | Not accredited | Met test work samples | Qemscan analysis of leach residues from limestone and volcanic leach tests. | QEMSCAN Particle Mineral Analysis (PMA) and Trace Mineral Search (TMS) confirm results from diagnostic leach. Unliberated gold locked mainly in sulphides and non-sulphide gangue. confirmed that regrind required prior to leaching particularly for volcanic. |
| | Gekko (Ballarat, Australia) | ISO: 17025:2017 | Single core composites | Tested coarse gravity concentration potential | Tests indicated that coarse gravity not suitable for Ixtaca ore due to a significant fine grain portion of mineralization. |
| St ag e | McClelland (Reno, NV) | ISO 17025:2005 | Composite from core | Gravity concentration, | Gravity grind size tests indicated that 75 µm gravity feed was close to optimum. |

| Phase | Laboratory | ISO | Sample type | Tests | Comments |
|---|---|---|---|---|---|
| | | | from HG Main Limestone | Flotation, Cyanidation of concentrates, CIL, Merrill Crowe, comminution, whole ore leach. Focused on Limestone. | Optimization focused on flotation and leach conditions. Primary grind size optimized at $P_{80}$ 75µm. Flotation mass pull of 10% achieved good recoveries.<br><br>Regrind before leaching is required to maintain good leach recoveries. Lime addition during regrind significantly reduced cyanide consumption to less than 1 kg/t.<br>Typical leach kinetics for gold with gold leaching complete in 24 hours. Silver requires longer leach time of 72 hours.<br>No preg robbing detected in limestone. Merrill Crowe recommended for high silver content. CIL for processing black shale. Overall recovery projection the same as Stage 1 test work. |
| | Bureau Veritas (Richmond, BC) | Not accredited | Met test work samples | Mineralogical Assessment of Gravity, Flotation, Cyanidation Products | Supported Stage 2 McClelland test work, focused on detailed limestone mineralogy. |
| | Met-Solve (Langley, BC) | Not accredited | Met test work samples | GRG gravity tests on all domains. | GRG was used determined recoveries from industrial scale semi batch gravity concentrators. |
| Stage 3 | McClelland in Sparks, NV, and Met-Solve in BC | ISO 17025:2005 | Continuous intervals from various locations (lateral and depth variability) | Variability testing on limestone (gravity, flotation, leach, CIP, Merrill Crowe). Filtration. Leach optimization for volcanic. Comminution tests.<br><br>Organic Carbon rejection from black shale.<br><br>Volcanic concentrate leach tests. | Optimum conditions from Stage 2 applied to limestone samples representing various locations and grades throughout the limestone domain. Flotation recovery of gold and silver correlate with head grade, and improved with increased promoter concentration.<br>Gold and silver leach recoveries correlated with head grade. CIL gold recovery was higher than agitated leach confirming the preference for activated carbon when leaching limestone.<br>Black Shale pre-flotation with CMC cleaning indicated that organic CIL recoveries can be significantly improved with carbon liberation.<br>Ferric sulphate with additional regrind of volcanic followed by CIL leaching indicated significant gold recovery improvement potential. |
| | Tomra (Wedel, Germany) | ISO 9001:2015<br>ISO 14001:2015 | Bulk samples from drill core by ore type | Ore sort amenability and XRT ore bulk tests on commercial machines. | Ore sort tests showed significant waste rejection of coarse rock and upgrading of ore using commercial XRT ore sort machines. |
| | Bureau Veritas (Richmond, BC) | Not accredited | Met test work samples | Mineralogical Assessment of Black shale to characterize organic carbon. | Mineralogy investigation identified organic carbon in black shale as fine grained discrete particles in the host rock. Confirmed that the organic carbon can be liberated. |

| Phase | Laboratory | ISO | Sample type | Tests | Comments |
|---|---|---|---|---|---|
| | Met-Solve (Langley, BC) | Not accredited | Met test work concentrate samples | Ultrafine gravity for Organic carbon rejection for black shale followed by CIL tests. | Pre-flotation concentrates, and flotation concentrates were tested in an ultrafine gravity separation machines. The test work successfully separated organic carbon from gold and silver bearing concentrates. Carbon liberation requires a fine regrind (-20 µm). Concentrates leached at various organic carbon grades showed that gold recovery significantly improved when organic carbon is reduced to less than 0.5%. |
| | Metro Testing (Burnaby, BC) | ISO 9001 | Contiguous waste rock cores from various limestone locations | Aggregate characterization /qualification | Tests confirmed Ixtaca limestone is suitable for many types of concrete use. Concrete produced with the aggregate performed very well, largely achieving the 28-day design compressive strength of 30 MPa already at 7 days, and more than 40 MPa at 28 days. |

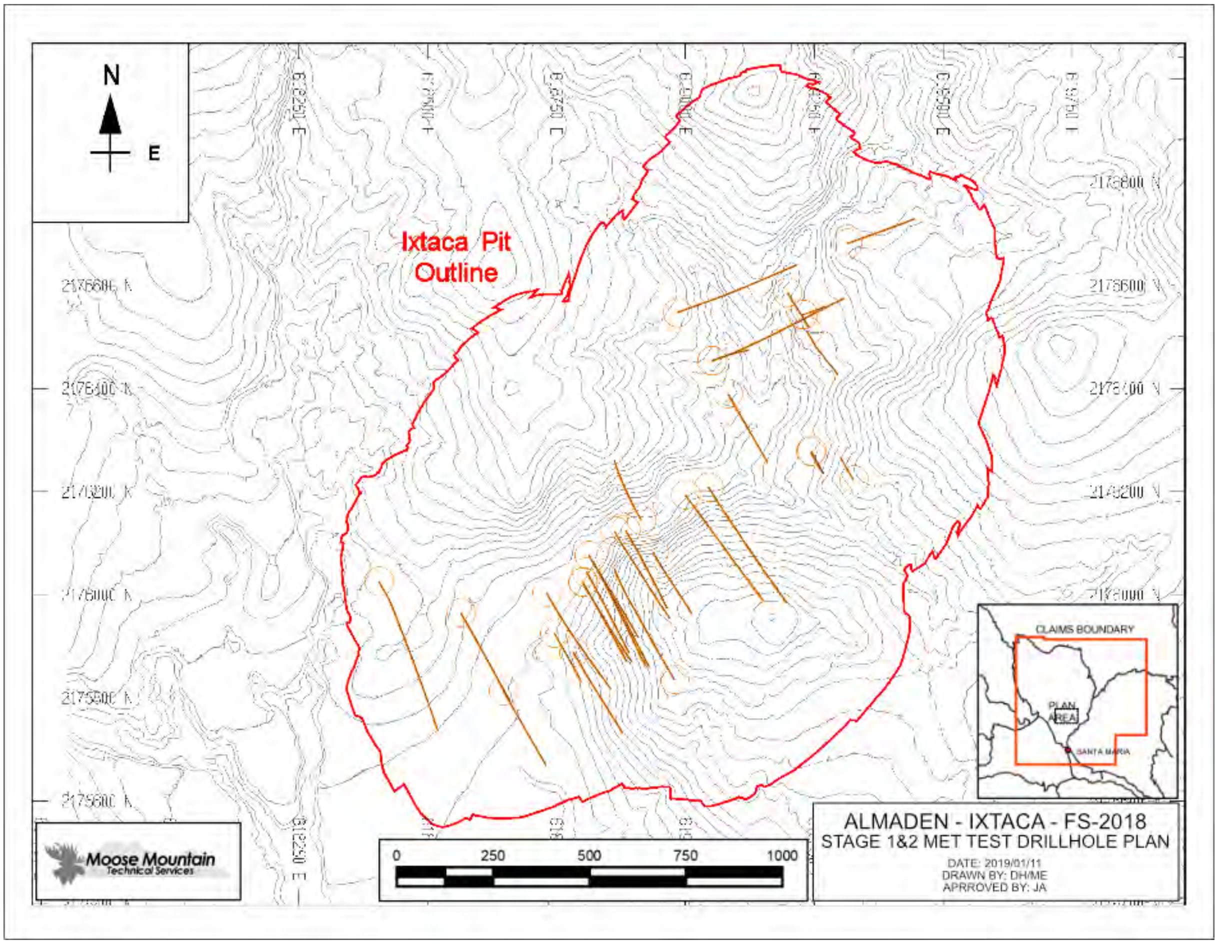
*ISO 17025 - International Organization for Standardization's general requirements for the competence of testing and calibration of laboratories.ISO 9001 - International Organization for Standardization that specifies requirements for a quality management system (QMS).*

*ISO 14001 - International Organization for Standardization that specifies requirements for an effective environmental management system (EMS).*

## 10.3 Samples

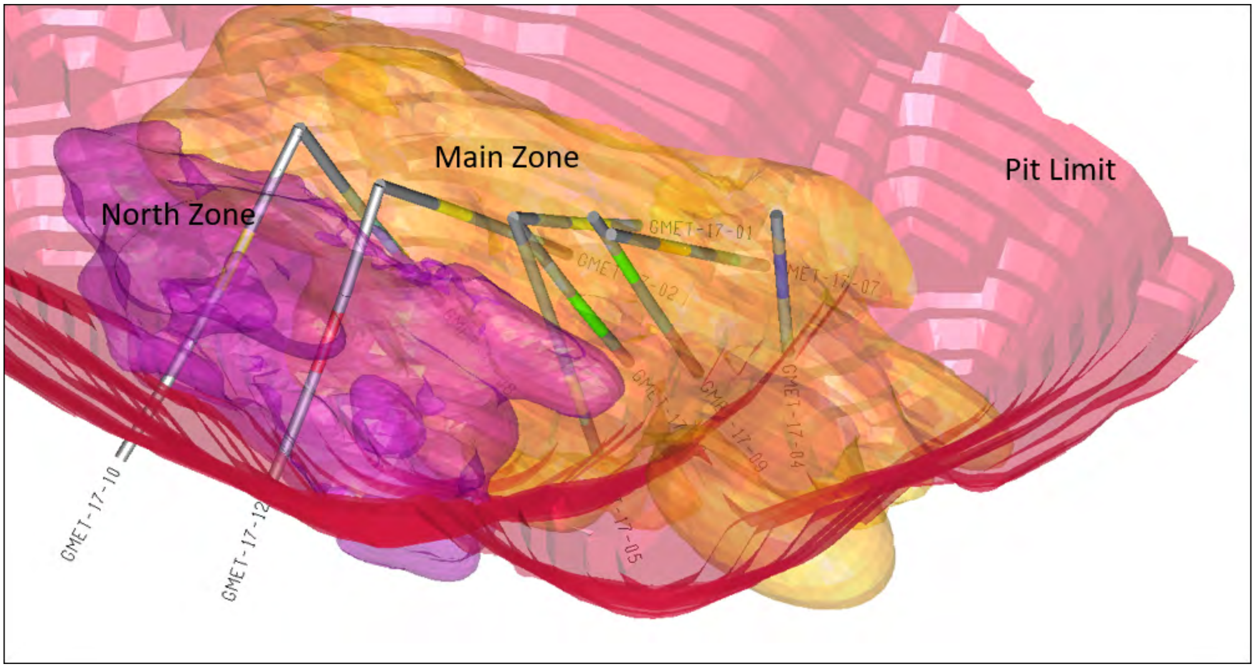
The location of the samples used for all metallurgical testing campaigns for Stage 1 and 2 can be seen in Figure 10-2.

**Figure 10-2 Plan View Of Drill holes used for Stage 1 and 2 Metallurgical Test Work**



Variability samples collected for the stage 3 metallurgical study limestone test work included contiguous drill core from various locations throughout the deposit as shown in Figure 10-3. Assays for the limestone variability samples are shown in Table 10-2.

**Figure 10-3 Location of Variability Samples for Stage 3 Metallurgical Test Work – 3D View from NW**




*Source: MMTS, January 2019*

**Table 10-2 Variability Samples for Stage 3 Metallurgical Test Work - Limestone Sample Head Assays**

| Lab Sample ID | Drill Hole ID | Au g/t | Ag g/t | C (Total) % | C (Organic) % | C (Inorganic) % | S (Total) % | S (Sulfate) % | S (Sulfide) % |
|---|---|---|---|---|---|---|---|---|---|
| 4237-004 | GMET-17-1 | 0.42 | 55 | 8.92 | 0.06 | 8.86 | 0.53 | 0.20 | 0.34 |
| 4237-005 | GMET-17-2 | 0.27 | 31 | 10.20 | 0.36 | 9.84 | 0.42 | 0.08 | 0.35 |
| 4237-006 | GMET-17-3 | 1.68 | 89 | 8.11 | 0.07 | 8.04 | 0.88 | 0.55 | 0.33 |
| 4237-007 | GMET-17-4 | 2.96 | 157 | 3.14 | 0.06 | 3.08 | 2.54 | 0.67 | 1.87 |
| 4237-008 | GMET-17-5 | 1.56 | 87 | 6.49 | 0.07 | 6.42 | 1.55 | 0.54 | 1.01 |
| 4237-009 | GMET-17-7 | 1.17 | 74 | 7.19 | 0.06 | 7.13 | 1.25 | 0.98 | 0.27 |
| 4237-010 | GMET-17-8 | 0.93 | 44 | 6.19 | 0.09 | 6.10 | 1.25 | 1.02 | 0.23 |
| 4237-011 | GMET-17-9 | 0.85 | 69 | 9.70 | 0.06 | 9.64 | 0.44 | 0.33 | 0.11 |
| 4237-012 | GMET-17-10 | 0.46 | 54 | 10.40 | 0.06 | 10.34 | 0.34 | 0.22 | 0.12 |
| 4237-013 | GMET-17-12 | 0.27 | 20 | 7.18 | 0.04 | 7.13 | 0.80 | 0.28 | 0.52 |
| **Average** | | **1.06** | **68** | **7.75** | **0.09** | **7.66** | **1.00** | **0.49** | **0.52** |

The samples tested represent the range of potential mill feed grades.

Samples for exploratory leach test work on Volcanics and Black shale in 2018 were collected from various drill core samples remaining from Stage 1 and 2 test work.

## 10.4 Mineralogy

### 10.4.1 Limestone

In 2017 a mineralogical assessment was conducted on a lime stone ore sample. The resulting chemical and mineral composition of the ore sample is shown in Table 10-3.

**Table 10-3 Limestone Ore Sample Chemical and mineral composition**

| Chemical Assays (% or g/t) | | | Mineral Contents (Wt. %) | | | |
|---|---|---|---|---|---|---|
| Element | Symbol | Assays | Sulphide Minerals | Mass | Non-Sulphide Minerals | Mass |
| Copper | Cu | 0.01 | Silver Minerals | 0.01 | Iron Oxides | 0.2 |
| Lead | Pb | 0.01 | Chalcopyrite | 0.01 | Calcite | 66.6 |
| Zinc | Zn | 0.04 | Galena | 0.02 | Ankerite/Rhodochrosite | 2.0 |
| Iron | Fe | 1.18 | Sphalerite | 0.06 | Quartz | 10.1 |
| Sulphur | S | 0.60 | Pyrite | 1.03 | Muscovite/Illite | 2.3 |
| Gold | Au | 0.77 | Arsenopyrite | <0.01 | K-Feldspars | 10.4 |
| Silver | Ag | 37.2 | | | Plagioclase Feldspar | 0.4 |
| Arsenic | As | 74.7 | | | Bustamite-Mn-silicate(Fe.Ca) | 2.1 |
| Carbon | C(t) | 8.76 | | | Chlorite | 1.8 |
| | | | | | Dolomite | 1.4 |
| | | | | | Rutile/Anatase | 0.2 |
| | | | | | Apatite | 0.2 |
| | | | | | Organic Carbon | 0.4 |
| | | | | | Others | 0.8 |
| | | | Total | 1.13 | Total | 98.9 |

Notes: 1) Gold, silver and arsenic were measured in grams per tonne, other elements were measured in percent.
2) Silver Minerals includes Freibergite, Acanthite/Argentite, Argentotennentite, Aguilarite and Geoffroyite.
3) Iron Oxides includes Hematite, Ilmenite, Magnetite, Steel/Pure Iron, Goethite and Limonite.
. 4) Others include Amphibole/Pyroxene, Kaolinite, Rutil/eAnatase, Apatite, Zircon, Barite, Andalusite

(Source: Bureau Veritas)

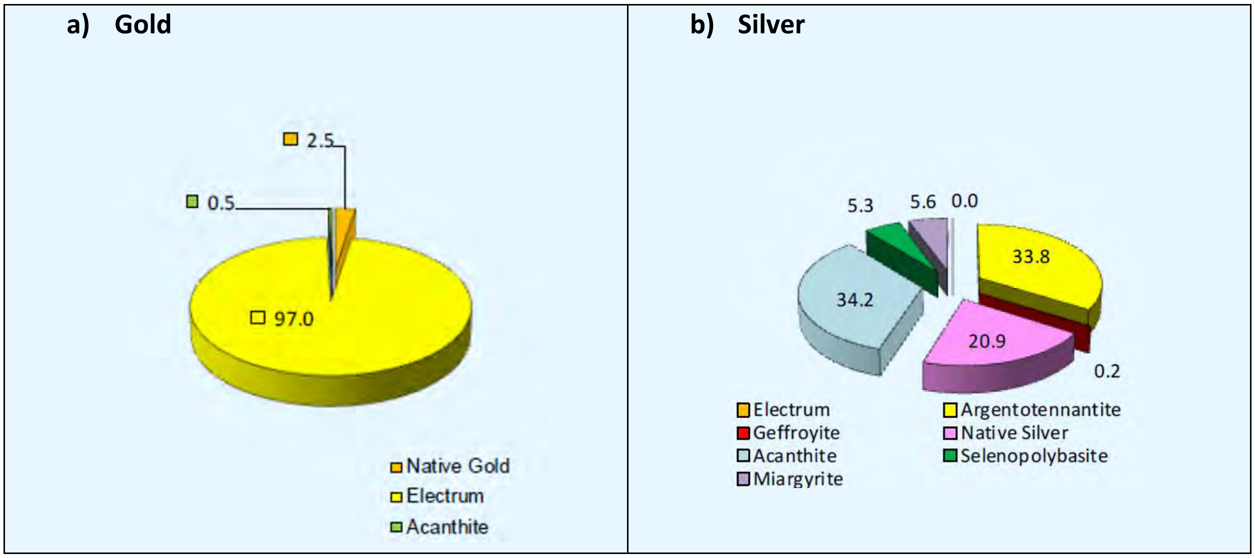
The ore sample presented as low sulphide mineralization with 1.13 percent by weight sulphide minerals. Pyrite was the dominant sulphide mineral and accounted for 92 percent of the total sulphide mass. Other sulphide minerals in trace amounts included sphalerite, galena, chalcopyrite and arsenopyrite.

The sample graded 0.77 g/t gold and 37.2 g/t silver.

Approximately 99.5 percent of the ore gold occurred as native gold and gold electrum. The remaining gold in ore was contained in silver sulphide minerals, including acanthite/argentite and freibergite. Percentage gold deportation by mineral species is shown in Figure 10-4 (a).

Silver bearing minerals were dominantly present as acanthite/argentite, native silver, argentotennentite /freibergite, miargyrite and selenopolybasite. Percentage silver deportation by mineral species is shown in Figure 10-4 (b).

**Figure 10-4 Limestone ore: estimated percentage deportment by mineral species**




(Source: Bureau Veritas, 2018)

The ore sample had a $P_{80}$ of 65µm. At this sizing, the liberation of gold, silver and pyrite were estimated at 5.7 percent, 42.4 percent and 66 percent, respectively. Unliberated gold and silver were mostly associated with pyrite. This observation suggests that sulphide flotation can be employed ahead of the cyanidation leach. Gold locking characteristics require regrinding of the flotation concentrate ahead of the cyanidation leach.

#### 10.4.2 **Volcanic**

In 2015 a mineralogical assessment was conducted on volcanic samples taken from gravity tails. The resulting chemical and mineral composition of the ore sample is shown in Table 10-4.

The volcanic samples contained 3.7 to 6.1 percent by weight sulphide minerals. Pyrite was the dominant sulphide mineral and accounted for 97 percent of the total sulphide mass. Other sulphide minerals in trace amounts included sphalerite, galena, chalcopyrite and arsenopyrite and alabandite.

The non-sulphide gangue minerals occurred mostly as silicates. The major silicate minerals were identified as quartz, K-feldspar, micas, rhodonite and kaolinite.

The sample graded 0.3 to 0.7 g/t gold and 48 to 62 g/t silver.

Table 10-4 Volcanic Sample Chemical and mineral composition

| Elements (% or g/t) | VC-02 Gravity Tails | VC-03 Gravity Tails |
|---|---|---|
| Gold (Au) | 0.7 | 0.3 |
| Silver (Ag) | 62 | 48 |
| Iron (Fe) | 2.5 | 4.4 |
| Sulphur (S) | 1.7 | 3.0 |
| **Minerals (wt. %)** | **VC-02 Gravity Tails** | **VC-03 Gravity Tails** |
| Chalcopyrite | 0.00 | 0.01 |
| Sphalerite | 0.03 | 0.55 |
| Galena | 0.00 | 0.11 |
| Pyrite | 3.59 | 5.39 |
| Arsenopyrite | 0.00 | 0.06 |
| Alabandite (MnS) | 0.09 | 0.00 |
| Total Sulphides | 3.72 | 6.12 |
| Quartz | 30.1 | 12.0 |
| K-Feldspars | 51.7 | 62.0 |
| Micas | 5.2 | 7.6 |
| Carbonates | 4.4 | 2.1 |
| Rhodonite | 2.5 | 0.8 |
| Iwakiite | 0.1 | 6.7 |
| Kaolinite/Pyrophyllite | 0.7 | 1.5 |
| Ca-sulphate | 0.0 | 0.0 |
| Other Silicates | 0.4 | 0.2 |
| Others | 1.1 | 1.1 |
| Total | 100.0 | 100.0 |

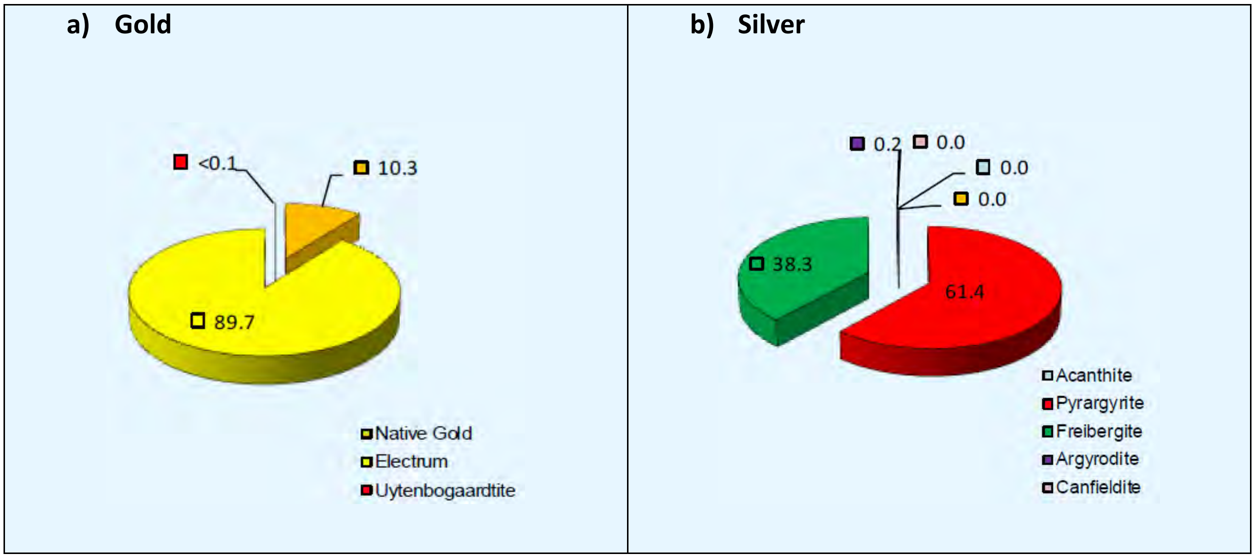
Notes: 1. Micas include Muscovite/illite and Biotite/Phlogopite. 2. Others Silicates include Chalorite and Amphibole
3. Carbonates include Calcite, Ankerite, Dolomite, Kutnohorite, Rhodochrosite and Siderite.
4. Others includes Iron Oxides, Apatite and Anatase.

(Source: Bureau Veritas)

Gold observed was poorly liberated and mostly fine grained. The combined amounts of liberated gold and gold adhesions ranged from 23 to 35 percent. The remainder of the gold was almost all locked with pyrite in binary or multiphase forms. Percentage gold deportation by mineral species is shown in Figure 10-5 (a).

The two volcanic samples assayed 62 and 48 g/t silver, respectively. The dominant silver bearing minerals in these two tails were pyrargyrite and freibergite. The liberations of the silver minerals were measured at 64.5 and 31.1 percent respectively. Significant amounts of silver in one of the samples occurred as adhesion form with exposed surfaces. Percentage silver deportation by mineral species is shown in Figure 10-5(b).

**Figure 10-5 Volcanic: estimated percentage deportment by mineral species**




(Source: Bureau Veritas, 2018)

The mineralogy results indicate good potential metal recovery with flotation. Poorly liberated fine-grained gold in volcanic ore will require significant regrind prior to cyanide leaching to achieve good leach recoveries.

### 10.4.3 Black Shale

In 2017 a mineralogical assessment was conducted on black shale ore sample separated into a fine fraction (overflow, or O/F) and coarse fraction (underflow, or U/F) during metallurgical test work. The resulting chemical and mineral composition of the ore sample is shown in Table 10-5.

**Table 10-5 Black Shale Sample Chemical and mineral composition**

| Chemical Assays (% or g/t) | | | Mineral Contents (Wt. %) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Element | 4237 E 1/2 OF | 4237 E-2 UF | Sulphide Minerals | 4237 E 1/2 OF | 4237 E-2 UF | Non-Sulphide Minerals | 4237 E 1/2 OF | 4237 E-2 UF |
| Fe | 1.86 | 3.32 | Acanth/Argentite | 0.01 | 0.01 | Iron Oxides | 0.33 | 0.44 |
| S | 1.44 | 3.13 | Chalcopyrite | 0.02 | 0.01 | Quartz | 29.4 | 30.9 |
| Ag | 32.2 | 110.8 | Galena | 0.04 | 0.10 | Calcite | 34.3 | 30.5 |
| As | 91.8 | 309.3 | Sphalerite | 0.13 | 0.23 | K-Feldspars/Plagioclase | 19.3 | 21.5 |
| Au | 0.82 | 8.33 | Pyrite | 2.49 | 5.62 | Muscovite/Illite | 6.00 | 3.47 |
| C (t) | 5.58 | 5.07 | | | | Ankerite/Dolomite | 2.69 | 2.88 |
| C (org) | 1.36 | 1.08 | | | | Kutnohorite/Rhodochrosite | 0.11 | 0.38 |
| | | | | | | Other Silicates | 1.51 | 1.01 |
| | | | | | | Organic Carbon | 0.92 | 1.08 |
| | | | | | | Others | 2.72 | 1.84 |
| | | | Total | 2.68 | 5.97 | Total | 97.3 | 94.0 |

Notes: 1) Gold, silver and arsenic were measured in grams per tonne, other elements were measured in percent.
2) Iron Oxides includes Chromferide, Magnetite, Hematite and Goethite.
3) Other Silicates include Chlorite, Kaolinite and Amphibole group minerals.
4) Others include Fluorite, Anatase, Apatite, Alunite and Zircon. See Appendix III for details.

(Source: Bureau Veritas)

The volcanic samples contained 2.7 to 5.9 percent by weight sulphide minerals. Pyrite was the dominant sulphide mineral and accounted for 93 percent of the total sulphide mass. Other sulphide minerals in trace amounts included sphalerite, galena, chalcopyrite and argentite.

The non-sulphide gangue minerals occurred mostly as silicates and carbonates.

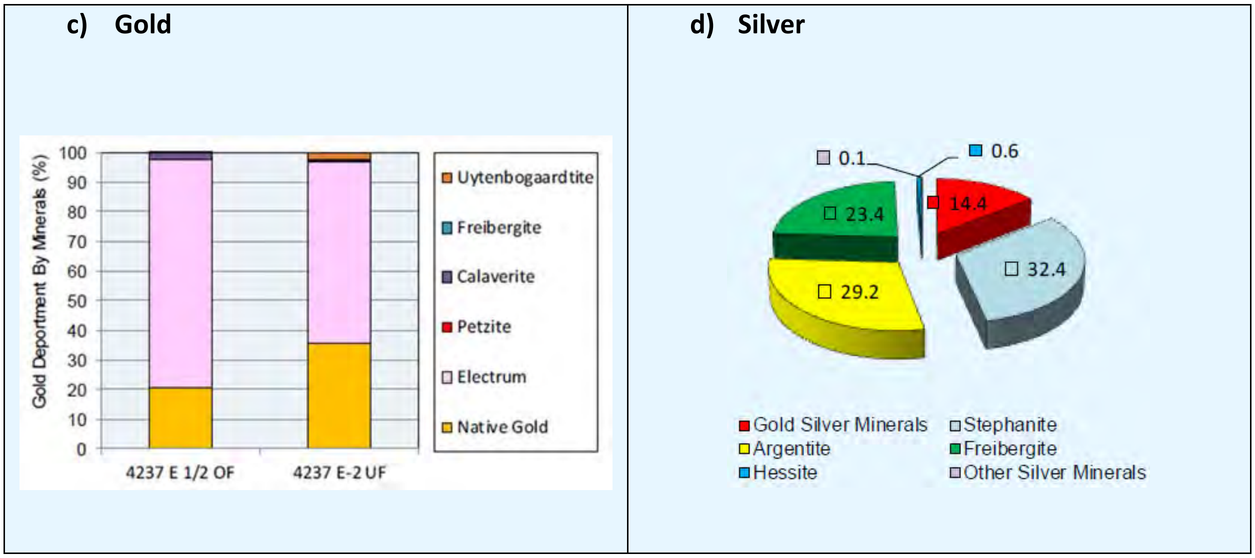
The sample graded 0.8 to 8.3 g/t gold and 32.2 to 110 g/t silver.

Over 95 percent of the gold was contained in native gold and gold electrum, and the remainder was carried by calaverite, petzite and gold bearing silver minerals. The silver was mainly present as sulphide form, and contained in stephanite/pyrargyrite, acanthite/argentite, freibergite and hessite, in the relative mineral abundances.

The particle sizes of two samples were measured at 18 µm P80 and 47 µm P80, respectively. At those differently particle sizes, the averaged two-dimensional liberations of gold were estimated at 60.1 and 73.4 percent, respectively. Unliberated gold and silver was predominantly associated with each other or with pyrite in binary or multiphase forms. More than 95 percent of the unliberated pyrite, gold and silver occurred as exposed surfaces or contained in the pyrite rich particles. Percentage gold deportation by mineral species is shown in Figure 10-6(a).

Silver in the two samples were mainly in sulphide form, and contained in stephanite ($Ag_5SbS_4$)/ pyrargyrite ($Ag_3SbS_3$), acanthite/argentite ($Ag_2S$), freibergite and silver bearing gold minerals. The remainder of the sample silver was contained in hessite ($Ag_2Te$) and naumannite ($Ag_2Se$), jalpaite ($(Ag)_3CuS_2$) and bohdanowiczite ($AgBiSe_2$). Approximately 75 to 78 percent by weight silver in the two samples were liberated. Percentage silver deportation by mineral species is shown in Figure 10-6(b).

**Figure 10-6 Black Shale: estimated percentage deportment by mineral species**

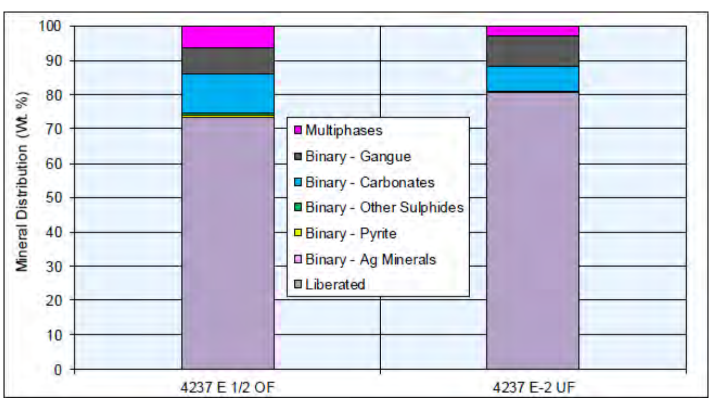



(Source: Bureau Veritas)

The mineralogical observations above suggest that an effective sulphide flotation probably will recovery majority of the gold and silver from the feeds into the sulphide concentrates. The black shale samples contained approximately 1% organic carbon. The organic carbon may cause certain difficulties in the process of cyanidation gold and silver leach.

The liberation and associations of organic carbon in O/F and U/F samples are presented in Figure 10-7. The data reveals that on average, about 75 to 80 percent of the organic carbon was liberated when estimated in two dimensions. Unliberated organic carbon was primarily associated with carbonates or other non-sulphide minerals.

**Figure 10-7 Black Shale: organic carbon mineral distribution**




(Source: Bureau Veritas)

Gold and silver minerals in the black shale samples were rarely associated with organic carbon. Therefore, it is recommended that organic carbon rejection process such as pre-flotation, flotation cleaning with organic carbon depression, or gravity concentration can likely be deployed prior to leaching.

## 10.5 Diagnostic Leaching

In 2016 diagnostic leach tests were carried out on the Limestone, Volcanics and Black shale concentrates to determine the proportion of gold and silver associated with various mineral phases.

Each diagnostic leach test feed (0.2 - 0.5 kg) was tested as-is, without regrind (no coarser than 80%-53µm). A total of three sequential leach steps were performed on the unleached flotation concentrate samples from the BS and LC composites, including direct carbon in leach (CIL)/cyanidation, hydrochloric acid (HCl) digestion followed by CIL, and aqua regia (AR) digestion followed by CIL. The residue from the final CIL/cyanidation (after AR) was subjected to roasting followed by cyanidation of the calcine, and fire assay in triplicate of the final leached residue to determine residual precious metals content.

The results of the diagnostic leach tests summarized in Figure 10-8and Figure 10-9 and discussed below.

**Figure 10-8 Gold diagnoistic Leach**

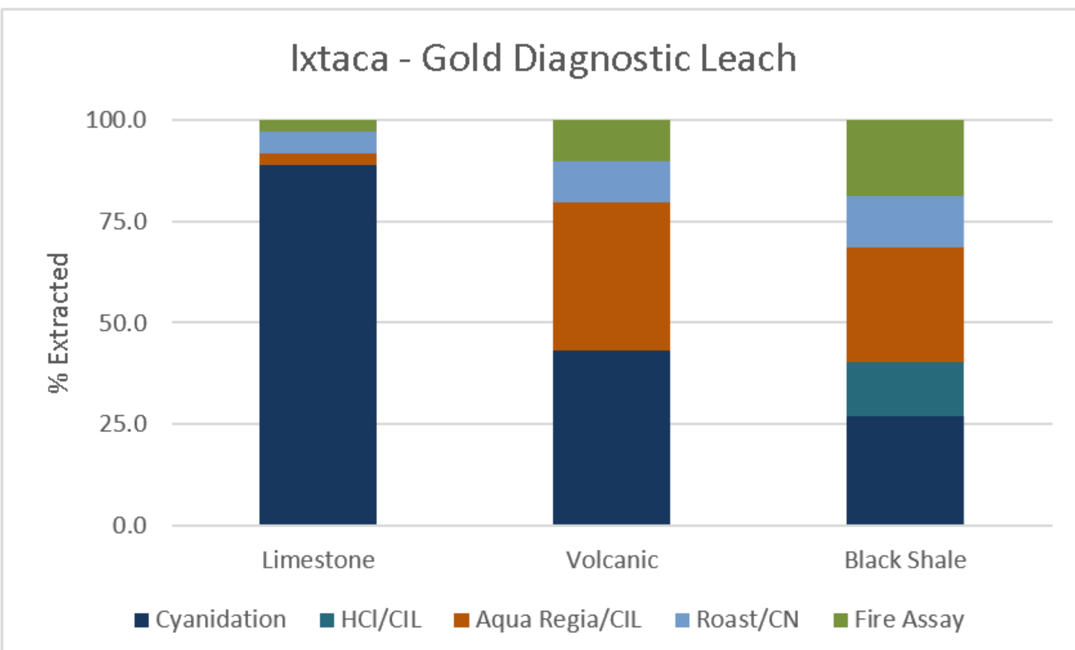
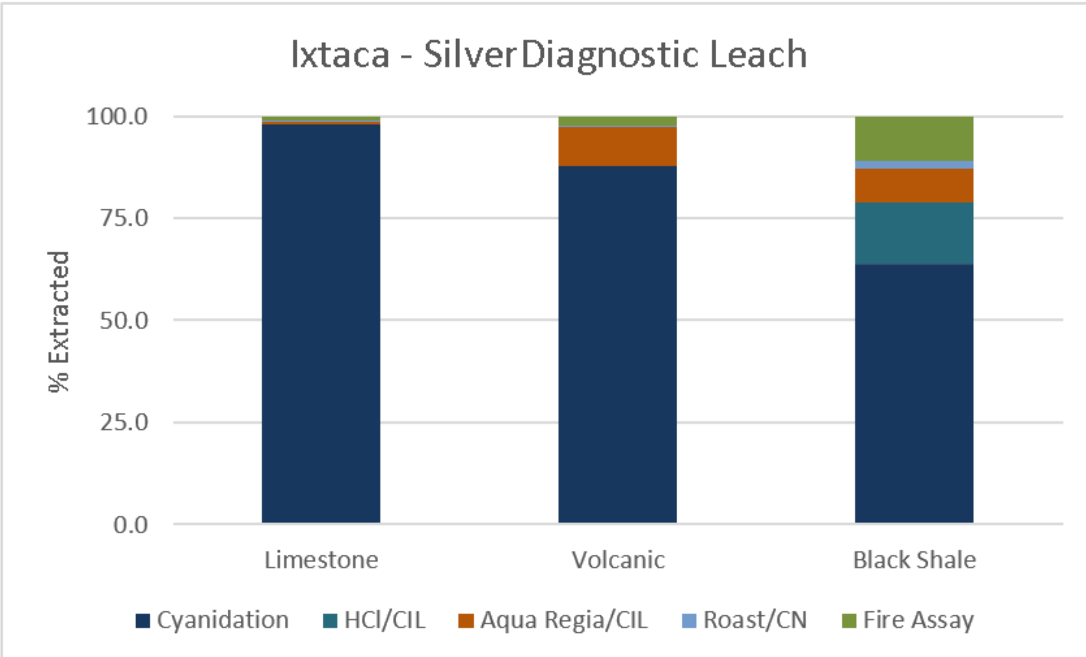


**Figure 10-9 Silver diagnoistic Leach**




#### 10.5.1 Limestone

Gold and Silver in limestone concentrates are very well liberated with good cyanidation recoveries.

#### 10.5.2 Volcanic

Silver in volcanic is very liberated with good cyanidation recoveries.

A significant portion of gold in volcanic is extracted with Aqua Reqia confirming that a significant proportion of gold in volcanic is locked in sulphides minerals (pyrite from the mineralogy).

#### 10.5.3 Black Shale

Silver in Black Shale is well liberated. Silver and gold recoveries improve with CIL confirming the presence of organic carbon.

A significant portion of the gold in Black Shale is extracted with aqua reqia indicating some gold is locked in sulphides minerals.

## 10.6 Comminution Test Work

Results from comminution tests on selected samples in Stage 1 and 2 test work are summarized in Table 10-6. Comminution test work on limestone variability samples carried out in 2018 are summarized in Table 10-7.

**Table 10-6 Stage 1 and 2 Comminution Results (2014 and 2016)**

| Ore type | Date | Crushing Work Index kWh/tonne | Abrasion Index Ai, grams | Ball Mill Work Index kWh/tonne |
|---|---|---|---|---|
| **Limestone** | | | | |
| Limestone | 2014 | - | - | 13.2 |
| Limestone | 2016 | 7.5 | 0.03 | 13.2 |
| Limestone | 2016 | 8.7 | 0.06 | 14.2 |
| **Average Limestone** | | **8.1** | **0.05** | **13.5** |
| **Volcanic** | | | | |
| Volcanic | 2014 | - | - | 10.5 |
| Volcanic | 2016 | 5.6 | 0.02 | - |
| Volcanic | 2016 | 6.6 | 0.12 | 13.2 |
| **Average Volcanic** | | **6.1** | **0.07** | **11.9** |
| **Black Shale** | | | | |
| Black Shale | 2014 | - | - | 18.6 |
| Black Shale | 2016 | 5.5 | 0.10 | 13.4 |
| Black Shale | 2016 | 6.2 | 0.02 | 8.2 |
| **Average Black Shale** | | **5.9** | **0.06** | **13.4** |

**Table 10-7 Limestone Comminution Variability Results (2018)**

| Sample ID | Crushing Work Index (kWh/tonne) | Ball Mill Work Index kWh/tonne) | Abrasion Index (grams) |
|---|---|---|---|
| 4237-004 | 7.0 | 12.2 | 0.05 |
| 4237-005 | 6.4 | 12.7 | 0.06 |
| 4237-006 | 11.0 | 13.3 | 0.11 |
| 4237-007 | 8.9 | 15.7 | 0.16 |
| 4237-008 | 5.8 | 12.8 | 0.11 |
| 4237-009 | 8.6 | 12.0 | 0.10 |
| 4237-010 | 6.0 | 14.2 | 0.08 |
| 4237-011 | 7.7 | 13.4 | 0.07 |
| 4237-012 | 8.0 | 12.3 | 0.03 |
| 4237-013 | 6.5 | 10.9 | 0.11 |
| **Average** | **7.6** | **12.9** | **0.09** |

#### 10.6.1 **Limestone**

The limestone variability comminution tests in 2018 confirm a medium hardness with an average crushing work index of 7.6 kWh/tonne, abrasion index of 0.09 grams, and Bond's ball mill work index of 12.9 kWh/tonne. The results indicate a medium hardness with low abrasion. The range of results indicate a low hardness variability for limestone rock.

#### 10.6.2 **Volcanic**

Volcanic samples had average crushing work index of 6.1 kWh/tonne, abrasion index of 0.07 grams, and Bond's ball mill work index of 11.9 kWh/tonne, indicating medium to soft rock. Volcanics ball mill bond work index varied by up to 2.7 kWh/tonne indicating hardness variability.

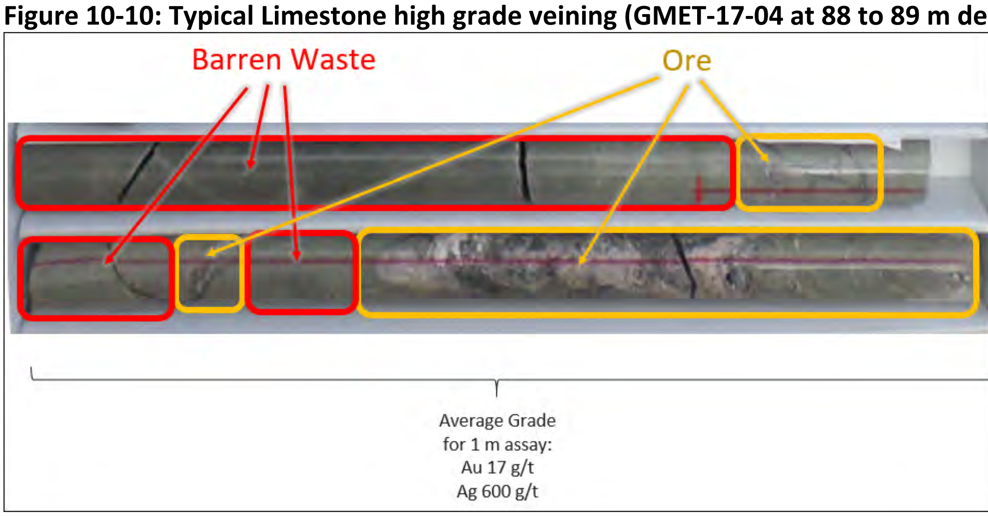
#### 10.6.3 **Black Shale**

Black Shale samples had average crushing work index of 5.86 kWh/tonne, abrasion index of 0.06 grams, and Bond's ball mil work index of 13.4 kWh/tonne. A large difference of approximately 10 kWh/tonne in the ball mill work index is observed suggesting a potential large hardness variability in the Black Shale material.

## 10.7 Ore Sorting

The anastomosing epithermal vein character of Ixtaca limestone ore illustrated in Figure 10-10 is characterized by high grade ore in veins surrounded by barren unmineralized waste rock. The 1m average assay for Figure 10-10 is Au 17 g/t and Ag 600 g/t with significant barren limestone waste rock internal dilution between ore veins.

**Figure 10-10: Typical Limestone high grade veining (GMET-17-04 at 88 to 89 m depth)**

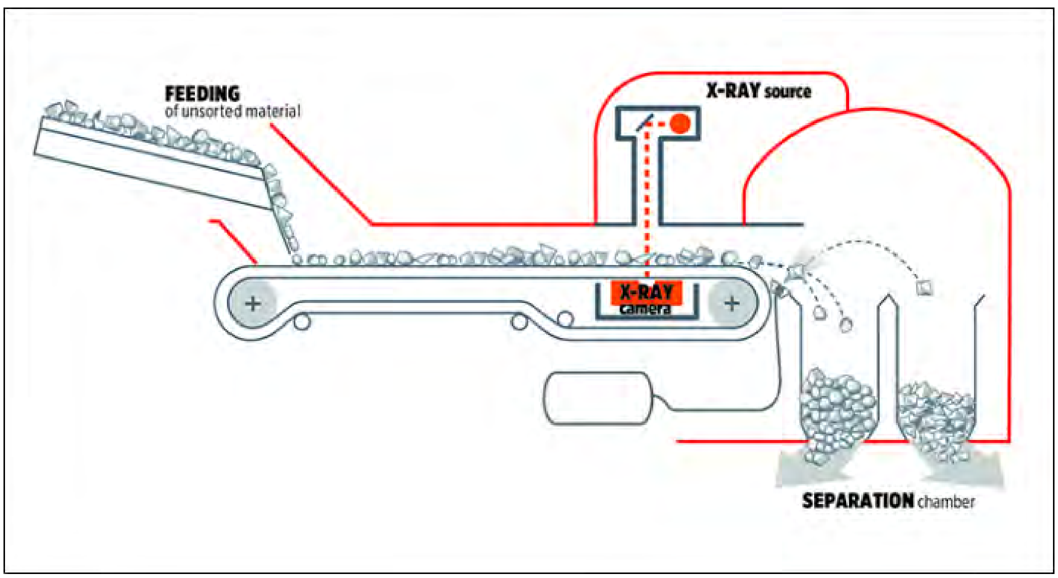


The significant variance in physical properties between mineralized veins and barren rock make Ixtaca ore ideal for mechanized ore sorting where barren waste rock between the ore veins can be rejected before processing.

### 10.7.1 **How it works**

Sensor based ore sorting has been used in the mining industry for decades. The operation of a commercial ore sort machine is shown below. Crushed and screened mineralized rock is evenly fed over a conveyor belt. An electric X-ray tube creates a broad-band radiation. This radiation penetrates the material and provides spectral absorption information that is measured with an X-ray camera. The resulting sensor information is then processed to provide a detailed "density image" of the material allowing it to be separated into high and low-density fractions. If the sensor detects material to be sorted out, it signals the control unit to open the appropriate valves of the ejection module at the end of the conveyor belt. The detected materials are separated from the material flow by jets of compressed air. The sorted material is divided into two fractions in the separation chamber.

**Figure 10-11: XRT Ore Sorting**




*Source: Tomra*

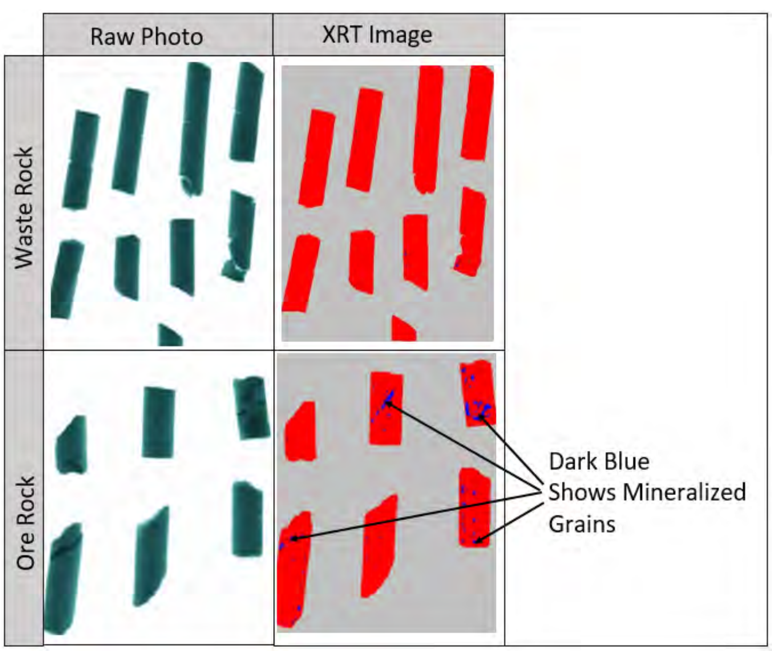
**Figure 10-12: Tomra high capacity commercial XRT Ore Sorting Machine**


*Source: Tomra*

### 10.7.2 Limestone Ore Sort Amenability Tests

An amenability test on limestone ore and waste rock samples carried out at the Tomra testing centre in Germany showed that an XRT sorter, is able to detect high atomic density sulfide inclusions within the limestone host rock (see Figure 10-13 below). The XRT scan showed a concentration of high atomic density particles in economic mineralized veins (dark blue in Figure 10-13 ) compared to lower density waste rock (red in Figure 10-13 ) The stark differences in sensor response between potential ore rocks and waste rocks confirmed that Ixtaca limestone ore is suitable for XRT ore sorting.

**Figure 10-13: Ixtaca XRT Amenability Test Images**




*Source: MMTS, January 2019*

#### 10.7.3 **Limestone Ore Sort Performance Tests**

Ore sorting performance tests were carried out on a commercial scale XRT machine at the Tomra testing centre in Germany.

A 2,200 kg sample of limestone was collected from fresh drill core in the main zone. The samples were prepared for sorting by crushing and screening at a McClelland metallurgical laboratory in Reno and shipped to the Tomra ore sorting test center in Wedel, Germany.

Tests were carried out using various Tomra XRT equipment parameters at various feed size fractions. All waste and ore products from the trials were weighed and analyzed independently by ALS Global in Romania.

Limestone ore sort tests results summarized in Table 10-8 showed that

- ejecting waste rock instead of ore significantly improved sorting efficiency (Test 1.1 compared to 2.1);
- Ore sorting tests 2.1 to 6.1 successfully ejected waste rock for the coarse (+18mm) and mid size (12-16mm) fractions;
- Ore sorting had poor performance for fine rock (-12mm);

**Table 10-8 Limestone Ore Sort Test Results Summary**

| **Test** | | **1.1** | **2.1** | **3.1** | **4.1** | **5.1** | **6.1** | **7.1** |
|---|---|---|---|---|---|---|---|---|
| **Feed Size** | | **+18 mm** | **+18 mm** | **+18 mm** | **12-16mm** | **12-16mm** | **12-16mm** | **6-12mm** |
| **Ejecting** | | **Ore** | **Waste** | **Waste** | **Waste** | **Waste** | **Waste** | **Waste** |
| **Calculated Feed** | | | | | | | | |
| Mass | kg | 274.5 | 268 | 290.5 | 219.3 | 197 | 204 | 118.5 |
| Au | g/t | 0.62 | 0.57 | 0.81 | 0.67 | 0.64 | 0.77 | 0.44 |
| Ag | g/t | 65 | 37 | 73 | 44 | 41 | 54 | 39 |
| **Concentrate** | | | | | | | | |
| Mass | kg | 86 | 149.5 | 176 | 92 | 94 | 148.5 | 32.5 |
| Yield | % | 31% | 56% | 61% | 42% | 48% | 73% | 27% |
| Au | g/t | 1.13 | 0.87 | 1.17 | 1.27 | 1.09 | 0.97 | 0.91 |
| Ag | g/t | 96.80 | 57 | 113 | 92 | 73 | 70 | 96 |
| Au Recovery | % | 57% | 84% | 88% | 80% | 82% | 91% | 57% |
| Ag Recovery | % | 47% | 88% | 93% | 89% | 85% | 94% | 66% |
| **Waste** | | | | | | | | |
| Mass | kg | 188.5 | 118.5 | 114.5 | 127.3 | 103 | 55.5 | 86 |
| Yield | % | 69% | 44% | 39% | 58% | 52% | 27% | 73% |
| Au | g/t | 0.39 | 0.20 | 0.25 | 0.23 | 0.22 | 0.24 | 0.26 |
| Ag | g/t | 50 | 10 | 12 | 9 | 12 | 11 | 18 |

The ore sort performance tests demonstrated that the commercial XRT could successfully reject:

- 39% of waste rock from coarse rock (18mm to 50 mm) at grades of Au 0.25 g/t and 12 g/t Ag (Test 3.1)
- 52% of waste rock from midsize rock (12mm to 16 mm) at grade of Au 0.22 g/t and 12 g/t Ag (Test 5.1)

The above waste grades are below the anticipated mine cutoff grades. Fines in the crushing process (-12 mm) bypasses the ore sorting process and reports directly to mill feed.

Drill core samples used in the performance tests have a more significant variation of thickness in cross-section (thin at the edges and thick at the center of the core) compared to typical crushed ROM rock. XRT performance is influenced by densities and rock cross section thickness. The large variability in thickness from the drill core samples impacted the performance of the sorting machine. Better results are expected with more natural shaped material from run of mine rock in future operations.

A mass balance of the ore sort test including consideration of the fines that will bypass the ore sorter and sent directly to mill feed is summarized in Figure 10-14 and Table 10-9.

**Figure 10-14: Limestone Ore Sort Mass Balance**

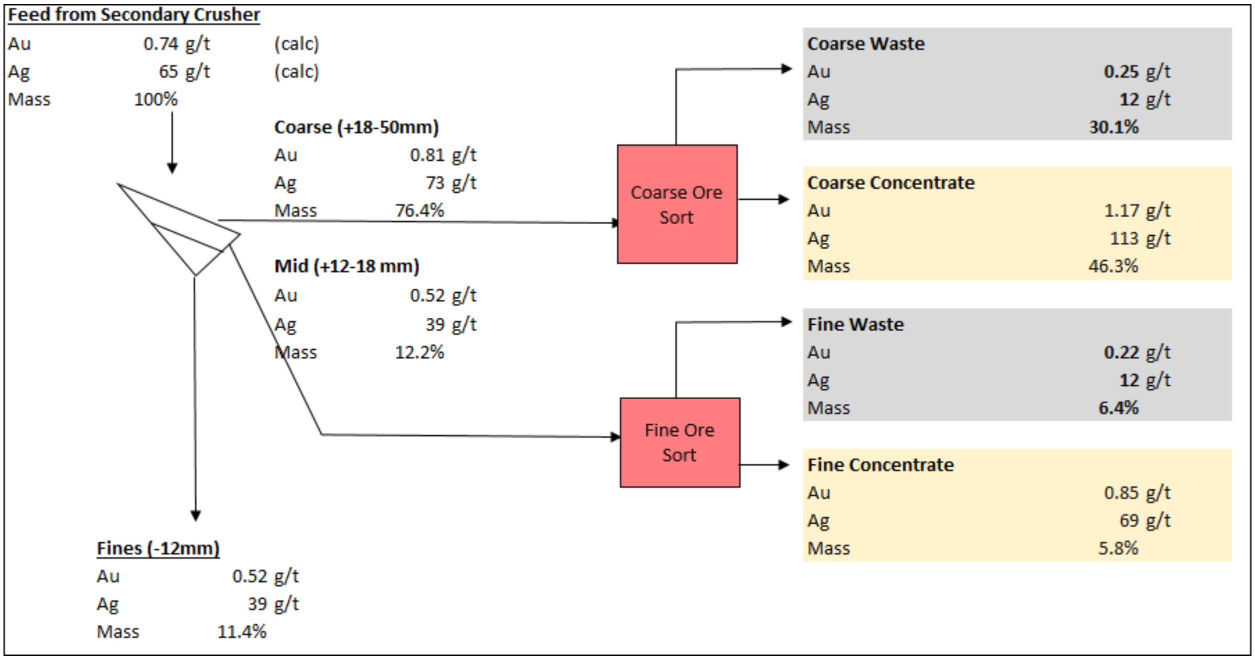



**Table 10-9 Limestone Ore Sort Mass Balance Summary**

| Item | Unit | Value |
|---|---|---|
| Sample Head AU Grade | (g/t) | 0.74 |
| Sample Head AG Grade | (g/t) | 65 |
| Total Waste Mass Rejection | % | 36% |
| Total Waste AU Grade | (g/t) | 0.24 |
| Total Waste AG Grade | (g/t) | 12 |
| AU Total Recovery | % | 88% |
| AG Total Recovery | % | 93% |
| New Mill Feed Grade AU | (g/t) | 1.03 |
| New Mill Feed Grade AG | (g/t) | 95 |
| AU Grade Improvement | % | 39% |
| AG Grade Improvement | % | 47% |

The setting on the XRT ore sort machine can be adjusted to increased or decrease the grade of the ejected waste to optimize process economics.

### 10.7.4 Black Shale Ore Sort Performance Tests

Results from ore sort performance tests on bulk black shale drill core sample are summarized in Table 10-10.

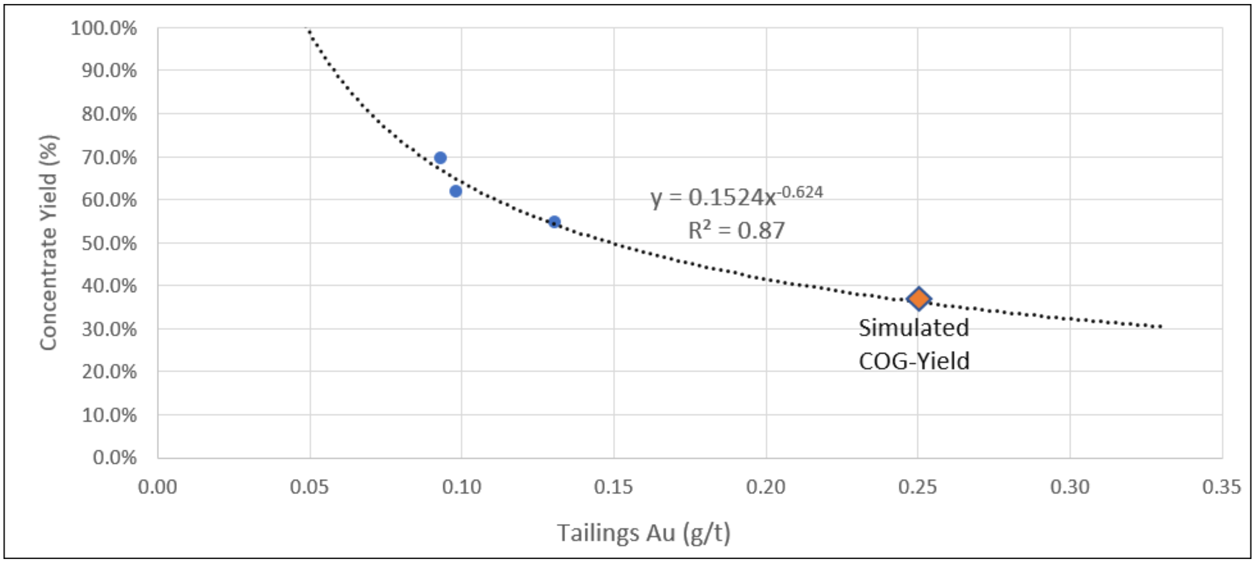
**Table 10-10 Black Shale Ore Sort Test Results Summary**

| Test | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **Feed Size** | | **+20 mm** | **+20 mm** | **+20 mm** | **12-20mm** |
| **Calculated Feed** | | | | | |
| Mass | kg | 114.5 | 116.5 | 135.5 | 34.8 |
| Au | g/t | 1.38 | 0.68 | 0.44 | 0.81 |
| Ag | g/t | 22.0 | 28.1 | 23.6 | 29.7 |
| $C_{org}$ | % | 0.88 | 0.95 | 0.86 | - |
| **Concentrate** | | | | | |
| Mass | kg | 62.5 | 72 | 94.5 | 25.5 |
| Yield | % | 55% | 62% | 70% | 73% |
| Au | g/t | 2.42 | 1.03 | 0.59 | 1.04 |
| Ag | g/t | 31.7 | 40.5 | 30.0 | 37.3 |
| $C_{org}$ | | 0.78 | 0.90 | 0.79 | - |
| Au Recovery | % | 96% | 94% | 94% | 94% |
| Ag Recovery | % | 78% | 89% | 89% | 92% |
| $C_{org}$ Recovery | % | 48% | 58% | 63% | - |
| **Waste** | | | | | |
| Mass | kg | 52 | 44.5 | 41 | 9.3 |
| Yield | % | 45% | 38% | 30% | 27% |
| Au | g/t | 0.13 | 0.10 | 0.09 | 0.19 |
| Ag | g/t | 10.5 | 8.0 | 8.8 | 9.1 |
| $C_{org}$ | % | 1.01 | 1.04 | 1.04 | - |

A regression of concentrate yield and tailings grade was used to estimate concentrate yield of 36% at an estimated tailings grade of Au 0.25 g/t and Ag 20 g/t, reflecting the potential cut off grade for black shale.

It is also worth noting that organic carbon ($C_{org}$) in black shale product was consistently lower in concentrate compared to waste or feed grade. The selective rejection of organic carbon by ore sorting will assist in reducing the preg robbing potential of organic carbon in black shale.

**Figure 10-15: Black Shale Concentrate Yield vs Tailings Au Grade**




A mass balance of the ore sorting for black shale including consideration of the fines that will bypass the ore sorter and be sent directly to mill feed is summarized in Figure 10-16 and Table 10-11.

**Figure 10-16: Black Shale Ore Sort Mass Balance**

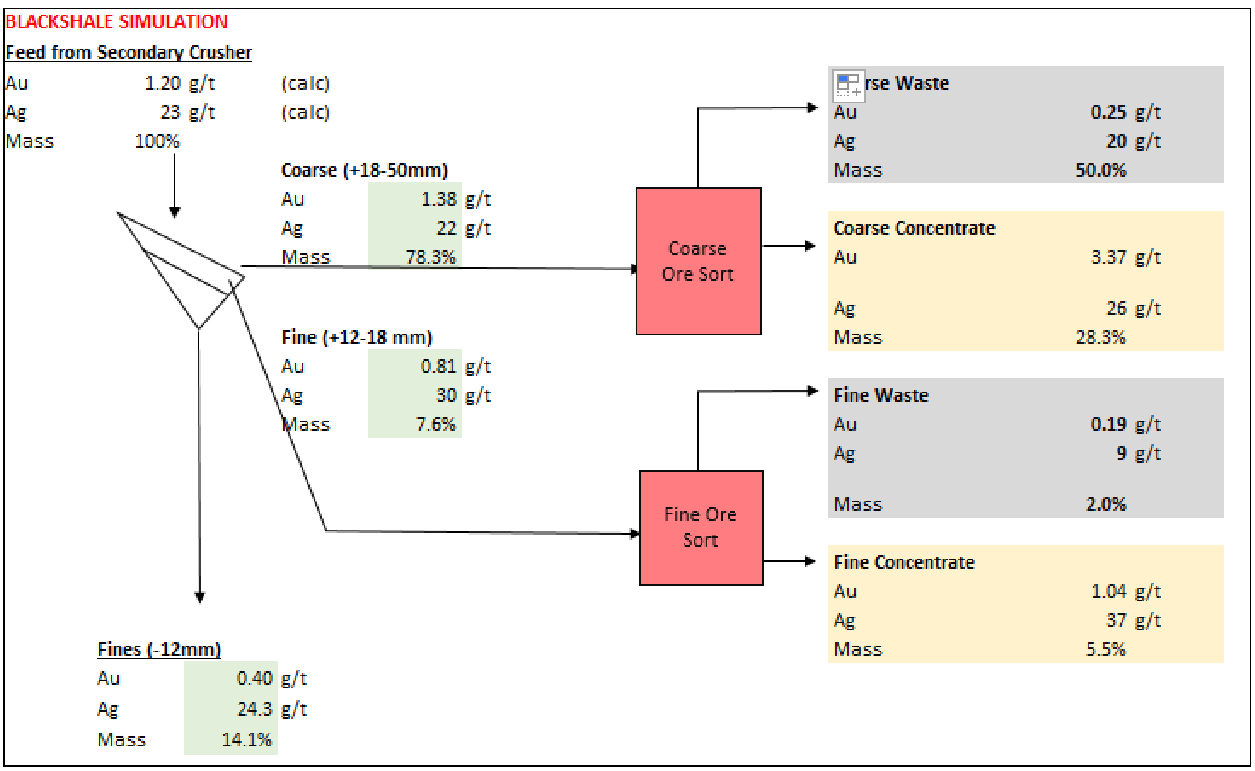


**Table 10-11 Black Shale Ore Sort Mass Balance Summary**

| Item | Unit | Value |
|---|---|---|
| Sample Head AU Grade | (g/t) | 1.20 |
| Sample Head AG Grade | (g/t) | 23 |
| Total Waste Mass Rejection | % | 52% |
| Total Waste AU Grade | (g/t) | 0.25 |
| Total Waste AG Grade | (g/t) | 19.6 |
| AU Total Recovery | % | 89% |
| AG Total Recovery | % | 55% |
| New Mill Feed Grade AU | (g/t) | 2.22 |
| New Mill Feed Grade AG | (g/t) | 26.5 |
| AU Grade Improvement | % | 86% |
| AG Grade Improvement | % | 16% |

### 10.7.5 Volcanic Ore Sort Performance Tests

Results from ore sort performance tests on bulk volcanic drill core sample are summarized in Table 10-12.

**Table 10-12 Black Shale Ore Sort Test Results Summary**

| Test | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **Feed Size** | | **+20 mm** | **+20 mm** | **+20 mm** | **12-20mm** |
| **Calculated Feed** | | | | | |
| Mass | kg | 144.5 | 158.5 | 141 | 53.8 |
| Au | g/t | 0.77 | 1.88 | 1.26 | 0.90 |
| Ag | g/t | 12.1 | 13.8 | 10.1 | 12.7 |
| **Concentrate** | | | | | |
| Mass | kg | 18.5 | 40 | 49.5 | 27.7 |
| Yield | % | 13% | 25% | 35% | 52% |
| Au | g/t | 0.95 | 5.00 | 2.17 | 1.05 |
| Ag | g/t | 24.7 | 25.6 | 9.1 | 15.7 |
| Au Recovery | % | 16% | 67% | 60% | 60% |
| Ag Recovery | % | 26% | 47% | 31% | 64% |
| **Waste** | | | | | |
| Mass | kg | 126 | 118.5 | 91.5 | 26.1 |
| Yield | % | 87% | 75% | 65% | 49% |
| Au | g/t | 0.75 | 0.83 | 0.77 | 0.75 |
| Ag | g/t | 10.3 | 9.8 | 10.7 | 9.5 |

Volcanic ore sorting showed significant upgrading of concentrate grade with concentrate grades approximately double the sample feed grade, but ejected waste grade was marginally above volcanic ore cut off grade. Volcanic ore sort waste will therefore be treated as low grade ore and will be stockpiled for mill feed late in the mine life when minable resource is depleted.

A mass balance of the ore sorting for volcanic ore including consideration of the fines that will bypass the ore sorter and be sent directly to mill feed is summarized in Figure 10-17 and Table 10-13.

**Figure 10-17: Volcanic Ore Sort Mass Balance**

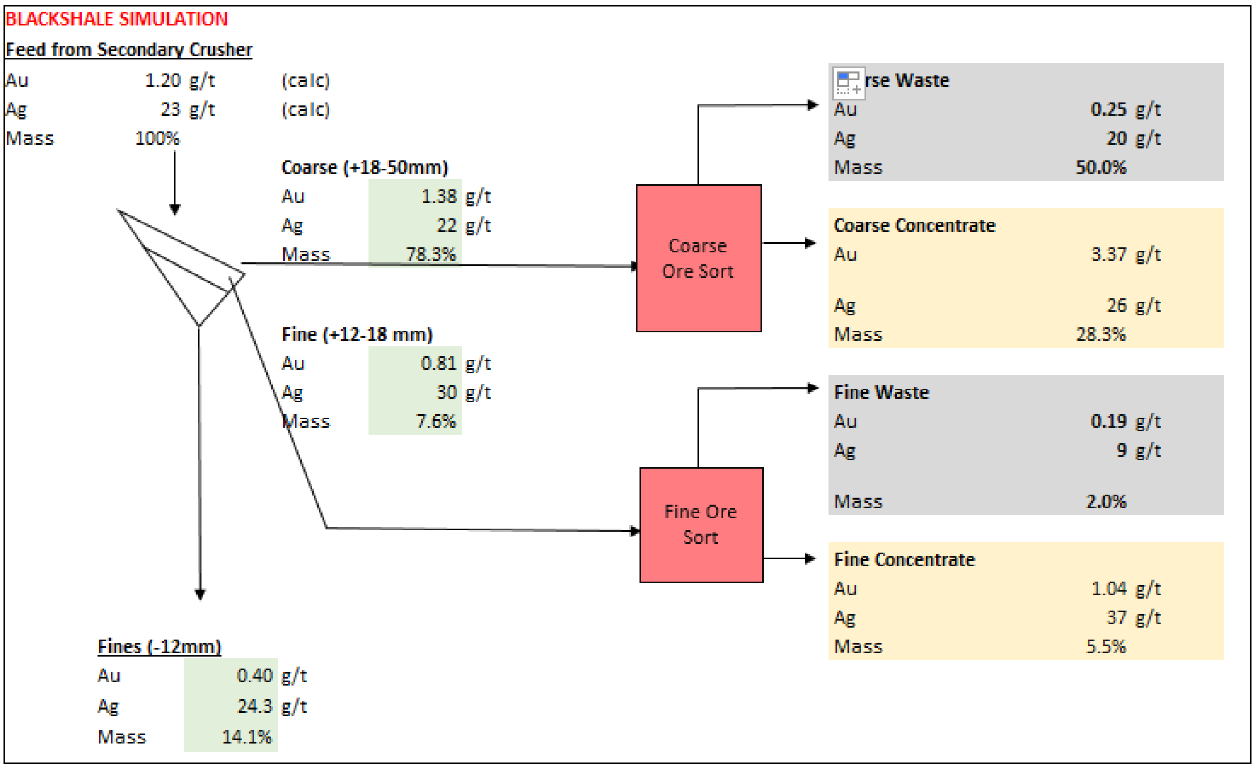


**Table 10-13 Volcanic Ore Sort Mass Balance Summary**

| Item | Unit | Value |
|---|---|---|
| Sample Head AU Grade | (g/t) | 1.20 |
| Sample Head AG Grade | (g/t) | 23 |
| Total Waste Mass Rejection | % | 52% |
| Total Waste AU Grade | (g/t) | 0.25 |
| Total Waste AG Grade | (g/t) | 19.6 |
| AU Total Recovery | % | 89% |
| AG Total Recovery | % | 55% |
| New Mill Feed Grade AU | (g/t) | 2.22 |
| New Mill Feed Grade AG | (g/t) | 26.5 |
| AU Grade Improvement | % | 86% |
| AG Grade Improvement | % | 16% |

## 10.8 Whole Ore Leaching

Whole ore leaching tests carried out in Stage 1 and 2 indicated lower recoveries and higher reagent consumptions compared to a process that leaches a gravity and flotation concentrate.

## 10.9 Gravity Concentration

Gravity concentration tests have been carried out in all stages of development using Falcon laboratory scale centrifugal gravity separators. Met-Solve laboratory tested Limestone, Volcanic and Black Shale samples using the standard Detailed Gravity Recoverable Gold test (DGRG) and modeled the Ixtaca grinding-gravity concentration to forecast potential gravity recovery at industrial scale.

### 10.9.1 **Limestone**

Results from EGRG tests conducted at Blue Coast in 2013 shown in Table 10-14 indicated a potential gold gravity recovery of 58.7%. These results showed that total gravity recovery was sensitive to grind size.

**Table 10-14 2013 Limestone EGRG results**

| Grind Size | Product | Mass wt % | Assay g/t | Distribution % |
|---|---|---|---|---|
| $P_{80}$ = 956 µm | Stage 1 Concentrate | 0.4 | 41.49 | **19.6** |
| | Stage 1 Tails | 99.6 | 0.63 | 80.4 |
| $P_{80}$ = 250 µm | Stage 2 Concentrate | 0.4 | 34.30 | **18.6** |
| | Stage 2 Tails | 99.2 | 0.62 | 78.4 |
| $P_{80}$ = 75 µm | Stage 3 Concentrate Stage 3 | 0.4 | 42.90 | **20.5** |
| | Tails Sample | 2.5 | 0.34 | 1.1 |
| | Final Tails | 91.6 | 0.34 | 40.2 |
| | Head | 100.0 | 0.78 | 100.0 |
| | **Total Concentrate** | **1.2** | **39.32** | **58.7** |
| | Total Tailings | 94.1 | 0.34 | 41.3 |

(Source: Blue Coast)

Results from EGRG tests conducted at Met Solve in 2016 shown in Table 10-15 indicated a potential gold gravity recovery of 60.9 %. These results showed that total gravity recovery was sensitive to grind size.

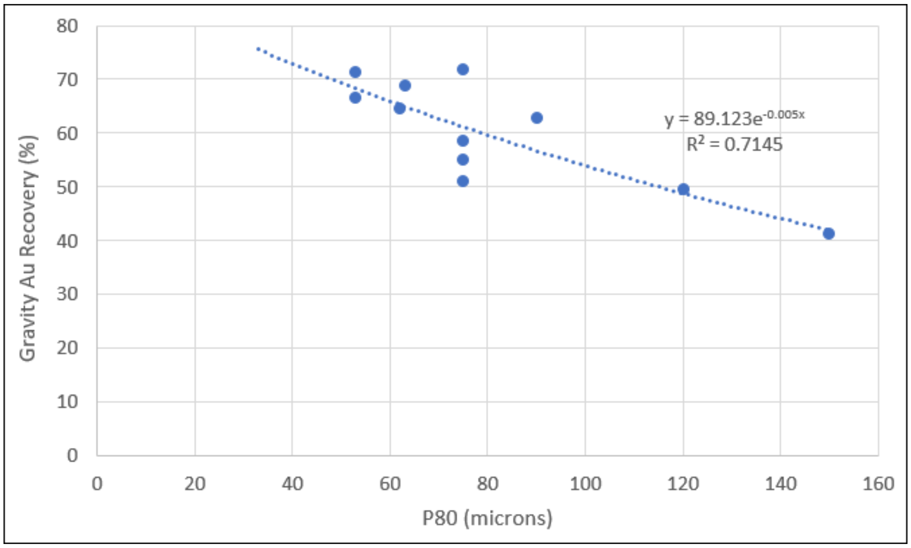
**Table 10-15 2016 Limestone EGRG results**

| Grind Size ($P_{80}$ in µm) | Product | Weight (%) | Au g/t | Au Dist'n (%) |
|---|---|---|---|---|
| 1,8 93 | Stage 1 Concentrate | 0.58 | 13.56 | 10.8 |
| 284 | Stage 2 Concentrate | 0.47 | 23.12 | 15.1 |
| | Stage 1+2 Concentrate | 1.05 | 17.86 | 25.9 |
| 62 | Stage 3 Concentrate | 0.48 | 53.30 | 35.0 |
| | **Total Concentrate** | **1.53** | **28.90** | **60.9** |
| 62 | Final Tailings | 98.47 | 0.29 | 39.1 |
| | Calculated Head | 100.00 | 0.73 | 100.0 |

(Source: Metsolve)

Gravity concentration testwork carried out in 2 stages at McClelland in 2016 demonstrated the improved gravity gold recovery potential by reducing grind size as shown in Figure 10-18.

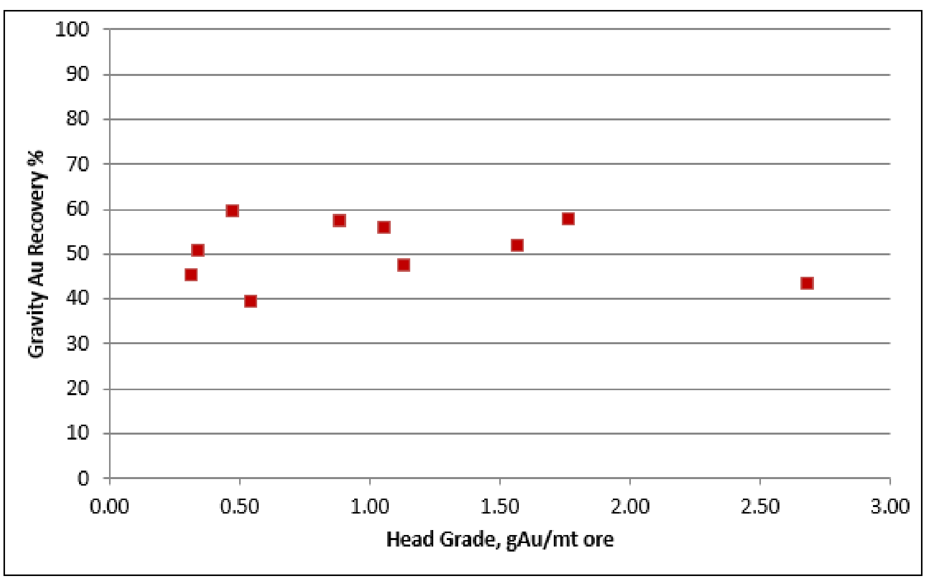
**Figure 10-18: Limestone gravity recovery vs grind size**




Grind size design was set for optimized downstream rougher flotation P80 of 75 µm based on 2016 test work (discussed below). The 75 µm P80 was used in all subsequent limestone gravity test work.

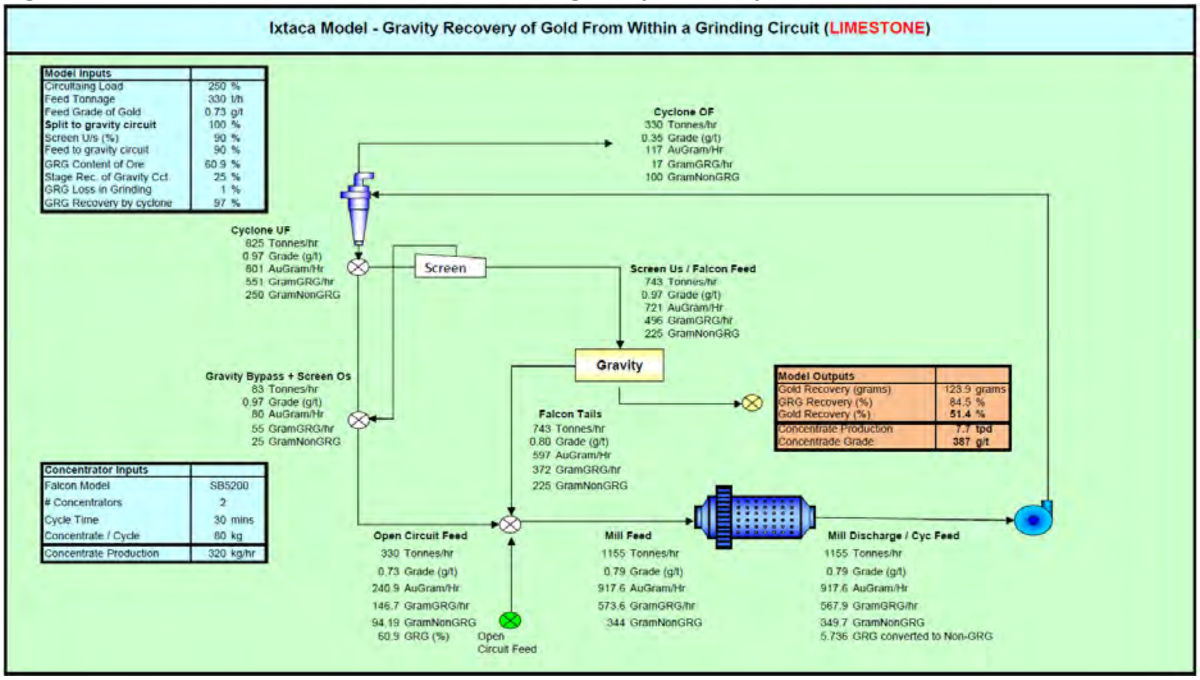
In 2018 limestone samples collected from various locations representing the limestone deposit were milled to P80 of 75 µm and subjected to a 3-pass gravity concentration on a falcon laboratory gravity concentrator. The results shown in Figure 10-19 showed no correlation between head grade and gravity recovery.

**Figure 10-19: 2018 Limestone gravity recovery vs head grade (P80 = 75 µm)**



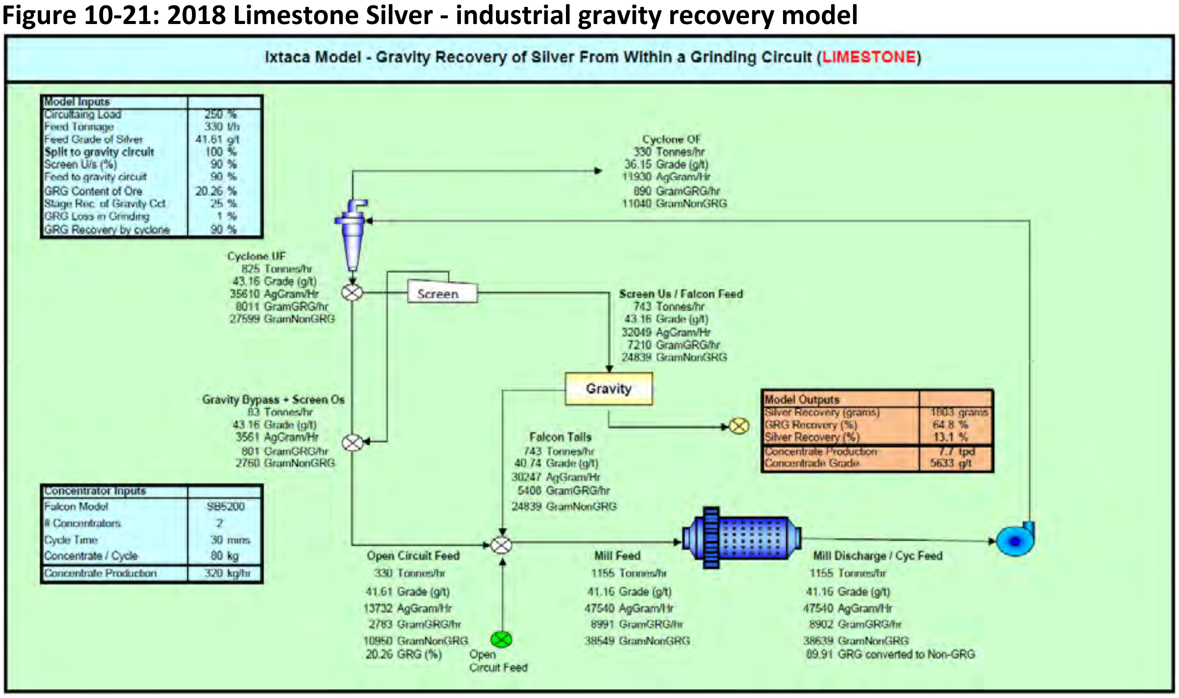
In 2018 Sepro Mineral Systems (Sepro), who manufacture Falcon gravity concentrators, modeled the Limestone gravity recovery to industrial scale semi batch gravity concentrators and estimated 51.4% gold and 13.1 silver gravity recovery.

**Figure 10-20: 2018 Limestone Gold - industrial gravity recovery model**




(Source: Sepro Mineral Systems)

**Figure 10-21: 2018 Limestone Silver - industrial gravity recovery model**




(Source: Sepro Mineral Systems)

### 10.9.2 **Volcanic**

Results from EGRG tests conducted on volcanic sample at Blue Coast in 2013 shown in Table 10-16 indicated a potential gold gravity recovery of 15.1%. The EGRG results showed that total gravity recovery was sensitive to grind size.

**Table 10-16 2013 Volcanic EGRG results**

| Grind Size | Product | Mass wt % | Assay g/t | Distribution % |
|---|---|---|---|---|
| $P_{80}$ = 825 µm | Stage 1 Concentrate | 0.4 | 11.88 | **5.4** |
| | Stage 1 Tails | 99.6 | 0.81 | 94.6 |
| $P_{80}$ = 226 µm | Stage 2 Concentrate | 0.4 | 10.73 | **4.6** |
| | Stage 2 Tails | 99.2 | 0.77 | 90 |
| $P_{80}$ = 85 µm | Stage 3 Concentrate<br>Stage 3 Tails Sample | 0.4 | 11.26 | **5.1** |
| | Final Tails | 3.2 | 0.76 | 2.9 |
| | | 91.2 | 0.76 | 82 |
| | Head | 100 | 0.85 | 100 |
| | **Total Concentrate** | **1.1** | **11.3** | **15.1** |
| | Total Tailings | 94.4 | 0.76 | 84.9 |

(Source: Blue Coast)

Results from EGRG tests conducted at Met Solve in 2016 shown in Table 10-17 indicated a potential gold gravity recovery of 33.3 %. These results confirmed that total gravity recovery was sensitive to grind size.

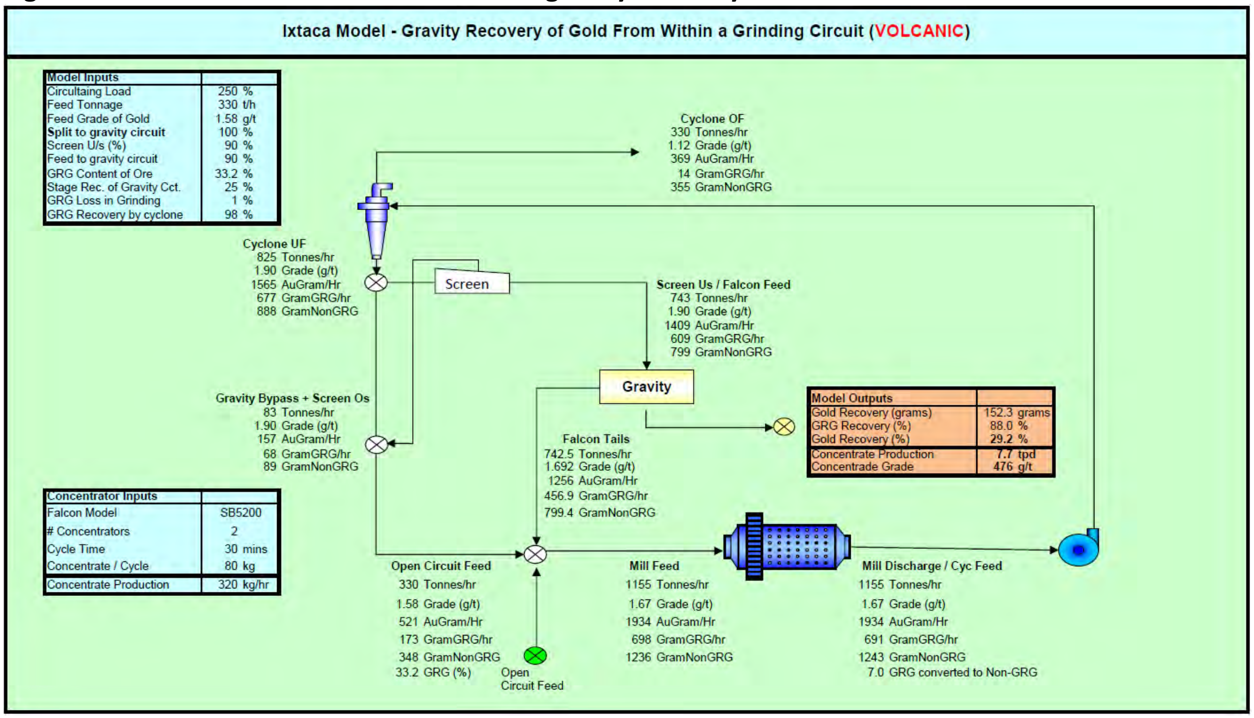
**Table 10-17 2016 Volcanic EGRG results**

| Grind Size ($P_{80}$ in µm) | Product | Weight (%) | Au g/t | Au Dist'n (%) |
|---|---|---|---|---|
| 905 | Stage 1 Concentrate | 0.49 | 19.46 | 6.1 |
| 227 | Stage 2 Concentrate | 0.44 | 26.17 | 7.3 |
| | Stage 1+2 Concentrate | 0.93 | 22.62 | 13.3 |
| 70 | Stage 3 Concentrate | 0.48 | 65.51 | 19.9 |
| | **Total Concentrate** | **1.41** | **37.20** | **33.2** |
| 70 | Final Tailings | 98.59 | 1.07 | 66.8 |
| | Calculated Head | 100.00 | 1.58 | 100.0 |

(Source: Metsolve)

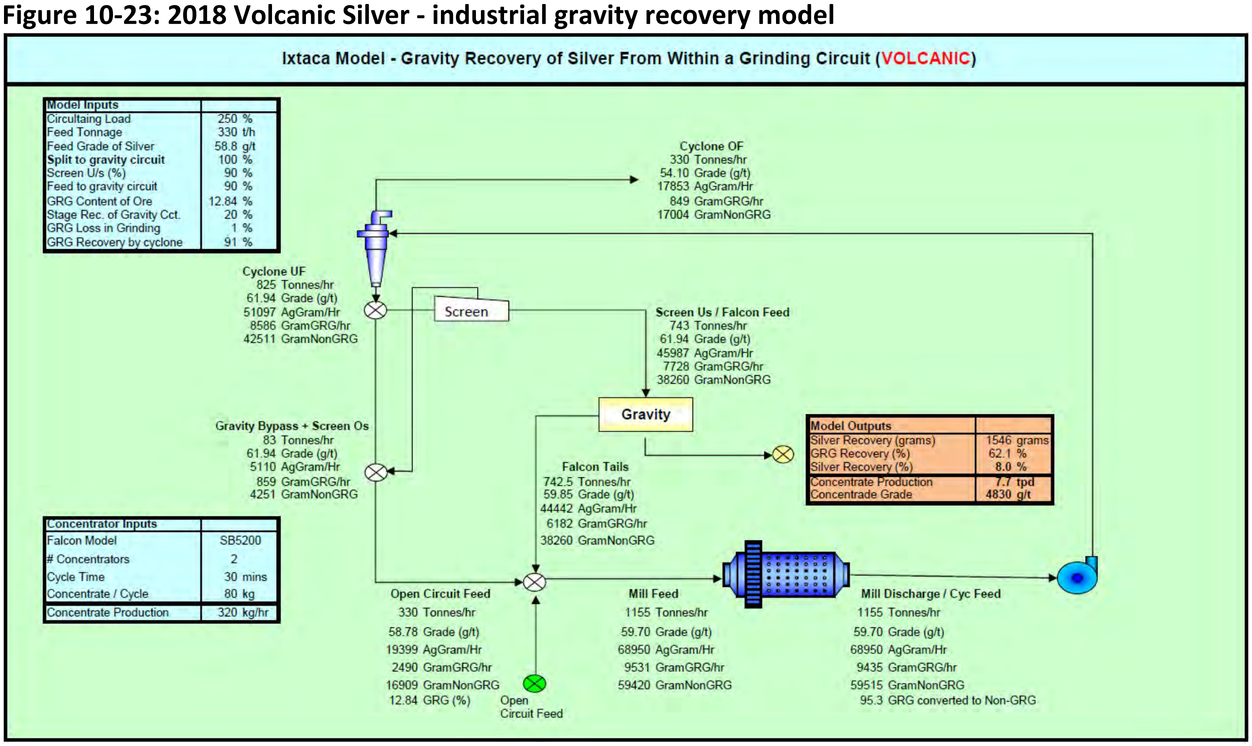
In 2018 Sepro Mineral Systems (Sepro), modeled the volcanic gravity recovery to industrial scale semi batch gravity concentrators and estimated 29.2% gold and 8.0% silver gravity recovery (See Figure 10-22 and Figure 10-23).

**Figure 10-22: 2018 Volcanic Gold - industrial gravity recovery model**




(Source: Sepro Mineral Systems)

**Figure 10-23: 2018 Volcanic Silver - industrial gravity recovery model**




(Source: Sepro Mineral Systems)

### 10.9.3 **Black Shale**

Results from EGRG tests conducted at Blue Coast in 2013 shown in Table 10-18 indicated a potential gold gravity recovery of 54.9%. These results showed that total gravity recovery for black shale was similar to the limestone and was also sensitive to grind size.

**Table 10-18 2013 Black Shale EGRG results**

| Grind Size | Product | Mass wt % | Assay g/t | Distribution % |
|---|---|---|---|---|
| $P_{80}$ = 747 µm | Stage 1 Concentrate | 0.5 | 65.41 | **24.2** |
| | Stage 1 Tails | 99.5 | 0.93 | 75.8 |
| $P_{80}$ = 194 µm | Stage 2 Concentrate | 0.5 | 47.75 | **17.8** |
| | Stage 2 Tails | 99.1 | 0.93 | 75.2 |
| $P_{80}$ = 70 µm | Stage 3 Concentrate Stage 3 | 0.4 | 36.31 | **12.8** |
| | Tails Sample | 1.8 | 0.60 | 0.9 |
| | Final Tails | 90.3 | 0.60 | 44.3 |
| | Head | 100.0 | 1.22 | 100.0 |
| | **Total Concentrate** | **1.3** | **50.04** | **54.9** |
| | Total Tailings | 92.1 | 0.60 | 45.1 |

(Source: Blue Coast)

Results from EGRG tests conducted at Met Solve in 2016 shown in Table 10-19 had a gold gravity recovery of 24.3 %. The lower recovery was also from a lower head grade indicating potential variability of recovery with head grade.

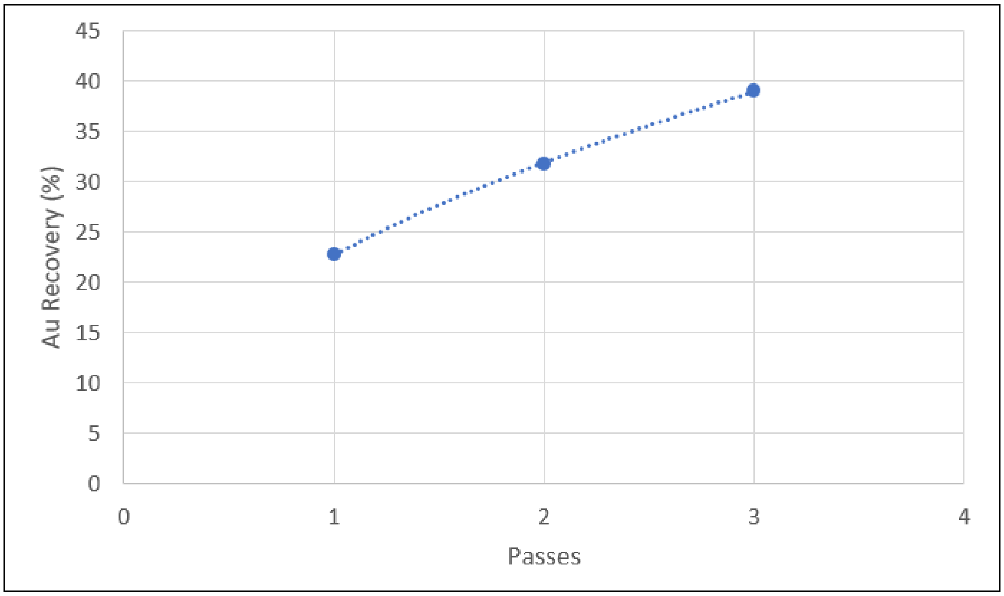
**Table 10-19 2016 Blackshale EGRG results**

| Grind Size ($P_{80}$ in µm) | Product | Weight (%) | Au g/t | Au Dist'n (%) |
|---|---|---|---|---|
| 942 | Stage 1 Concentrate | 0.46 | 11.39 | 6.1 |
| 313 | Stage 2 Concentrate | 0.47 | 10.12 | 5.5 |
| | **Stage 1+2 Concentrate** | **0.93** | **10.75** | **11.6** |
| 71 | Stage 3 Concentrate | 0.51 | 21.47 | 12.7 |
| | **Total Concentrate** | **1.43** | **14.55** | **24.3** |
| 71 | Final Tailings | 98.57 | 0.66 | 75.7 |
| **Calculated Head** | | **100.00** | **0.86** | **100.0** |

(Source: Metsolve)

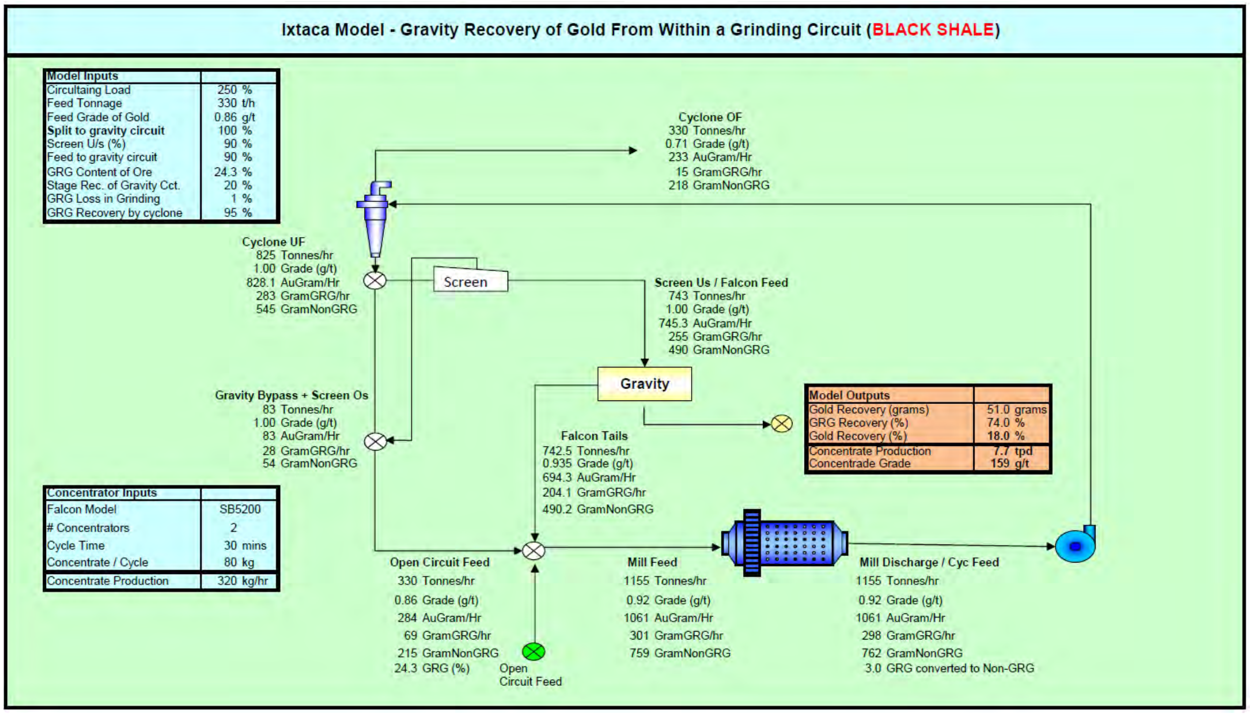
In 2016 Mclelland achieved 39% gold recovery to gravity concentrate using 3-passes at P80 of 75µm shown in **Figure 10-24**.

**Figure 10-24: 2016 Black Shale Gold recovery sensitivty to number of passes**



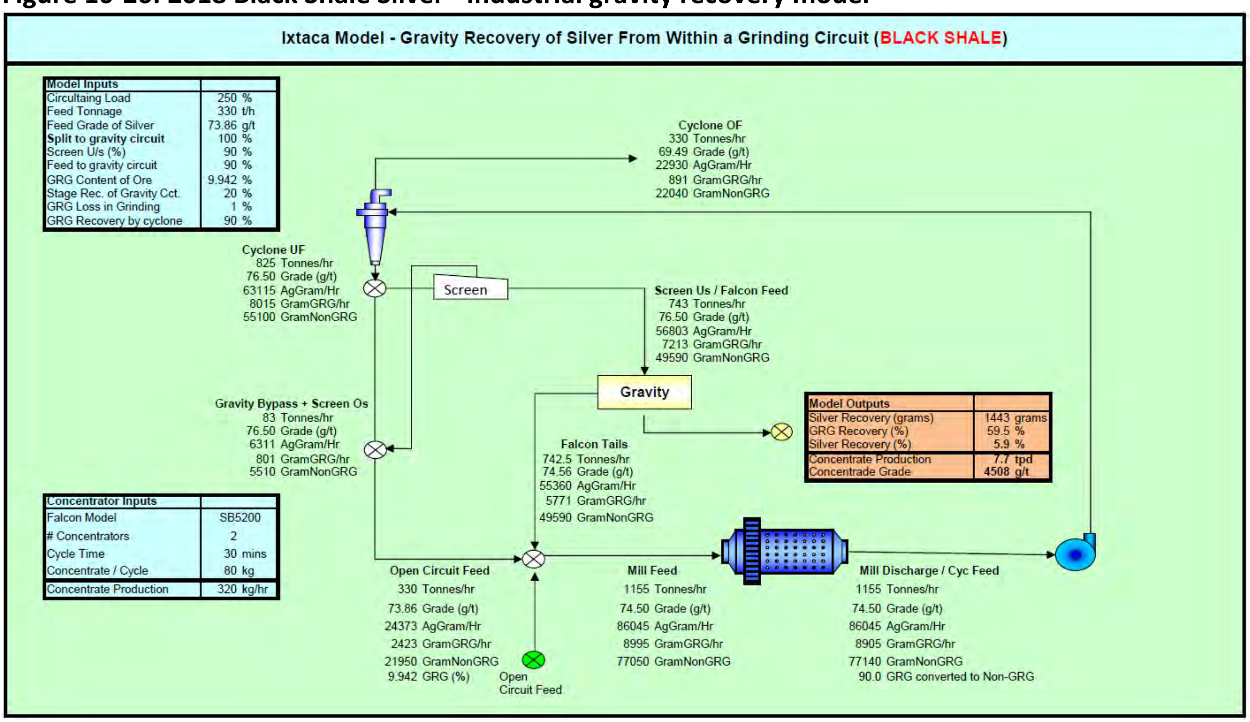

In 2018 Sepro modeled the Black Shale gravity recovery to industrial scale semi batch gravity concentrators using the 2016 Met Solve EGRG results and estimated 18% gold and 5.9% silver gravity recovery (See Figure 10-25 and Figure 10-26). These values are considered conservative as significantly higher recoveries were achieved in lab scale tests in 2013 and 2016.

## Figure 10-25: 2018 Black Shale Gold - industrial gravity recovery model




(Source: Sepro Mineral Systems)

## Figure 10-26: 2018 Black Shale Silver - industrial gravity recovery model




(Source: Sepro Mineral Systems)

## 10.10 Flotation of Gravity Tails

Stage 1 and 2 metallurgical test work identified that flotation concentration of gravity tails is required to achieve good gold and silver recoveries to a concentrate before leaching.

### 10.10.1 Flotation Optimization (2016)

Flotation optimization test work carried on gravity tails in 2016 studied grind size and flotation conditions.

Initial optimization test work at increasing flotation grind size shown in Figure 10-27 and Figure 10-28 indicated an optimum flotation grind size P80 of 75 µm. The results also show that lower recovery in gravity was compensated with higher recovery in flotation.

**Figure 10-27: Summary of Gold recovery by flotation grindsize (2016)**

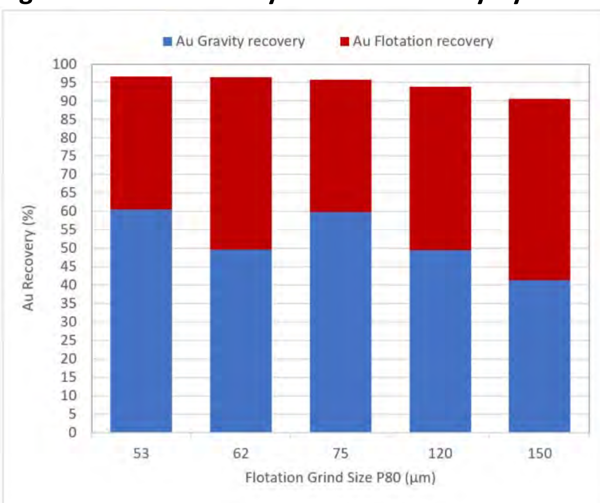
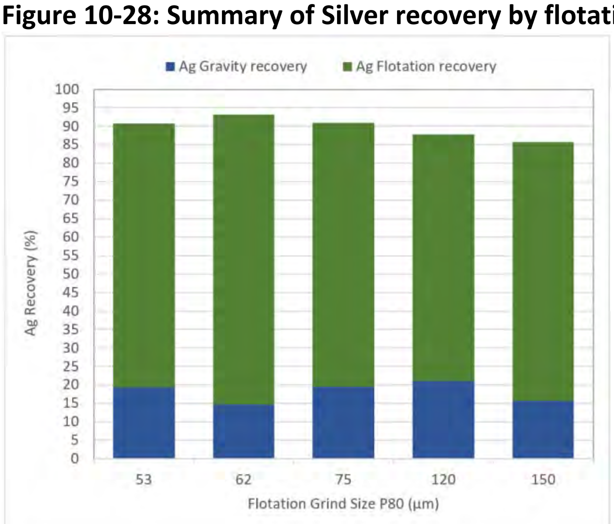



**Figure 10-28: Summary of Silver recovery by flotation grindsize (2016)**



The combination of both processes yielded above 96% gold when $P_{80}$ ranged from 53 μm to 75 μm. The silver performance shows a similar trend to that of gold, with a combined silver recovery in the order of 90% to 93%.

A series of gravity concentration and 7kg bulk flotation tests was executed to generate enough concentrate for leaching test. Results from the flotation bulk test confirmed initial stage recovery estimation as follows:

- 50.2% of gold and 11.8% of silver reported to gravity concentrate weighing 0.52% of the feed (mass pull)
- 46.2% of gold and 81.6% of silver reported to flotation rougher concentrate weighing 8.2% of the feed (mass pull).
- The combined gravity concentration and flotation recovery results are 96.4% for gold and 93.4% for silver.
- Flotation time of up to 25 minutes was required to complete flotation.

Reagent optimization tests resulted in the recommended flotation conditions shown in Table 10-20.

**Table 10-20 Flotation Conditions**

| | |
|---|---|
| Primary grind size | 80% -75μm |
| Flotation concentration | 33% w/w |
| Activator | Copper sulfate 0.125 kg/t |
| Collector | SIPX 0.125 kg/t, AERO3477 0.0625 kg/t |
| Frother | Aerofroth 65 |

### 10.10.2 Flotation Variability Test Work (2018)

In 2018 flotation test work was carried on limestone gravity tails using variability samples from various locations representing the limestone deposit. The test work used conditions established in the 2016 test work. Gold recovery to combined gravity and flotation concentrate shown in Figure 10-29 shows a strong correlation to head grade. Silver recovery to combined gravity and flotation concentrate shown in Figure 10-30 shows a correlation to head grade but with significant variability. For example, a silver head grade of approximately 88 g/t to 90 g/t had recoveries ranging from 89.6% to 93.4%.

**Figure 10-29: Gold recovery to combined flotation and gravity concentrate by head grade**

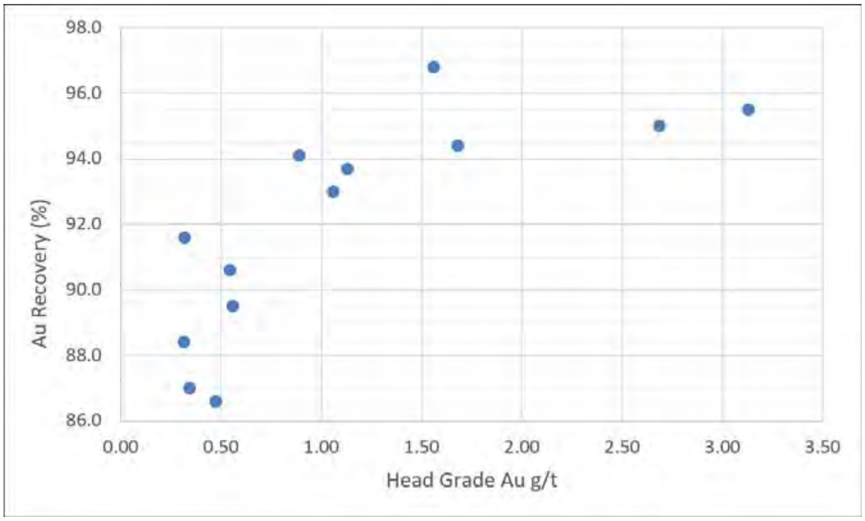
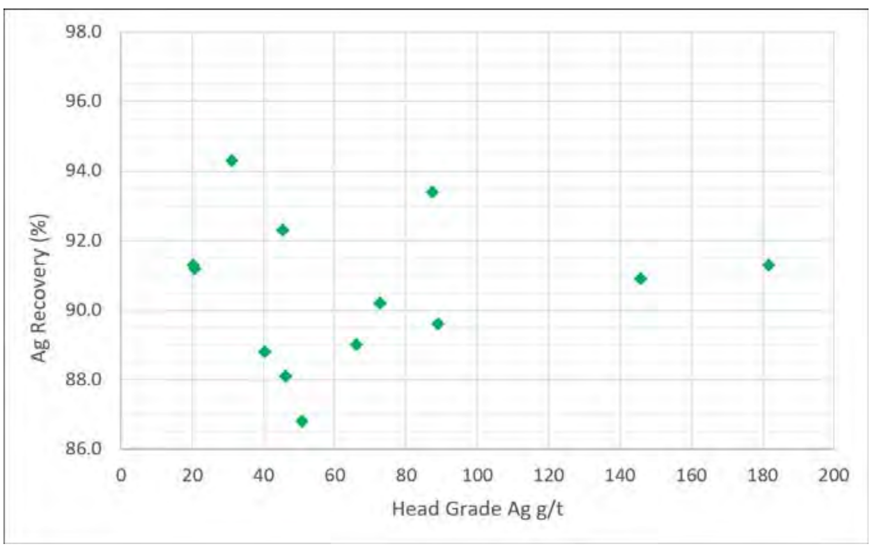



**Figure 10-30: Silver recovery to combined flotation and gravity concentrate by head grade**




Grind size sensitivity tests on selected samples indicated that flotation recovery can be improved by 3% for gold and 1.3% for silver with a finer grind size. The economic impact of throughput reduction for the finer grind size resulted in the decision to maintain a P80 of 75 µm.

Subsequent test work was carried out to determine if recovery can be improved by increased promoter concentration. The results shown in Figure 10-31 and Figure 10-32 showed that a 25% increase in promoter increased gold recovery by 1.7% and increased silver recovery by 1.5%. No additional recovery improvement was observed by increasing the promoter by 50%.

**Figure 10-31: Gold flotation recovery sensitivity to flotation reagent**

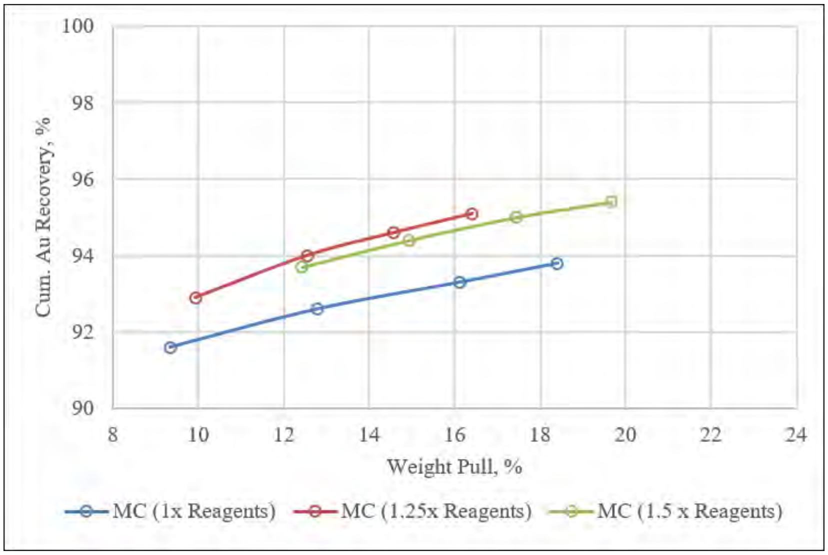
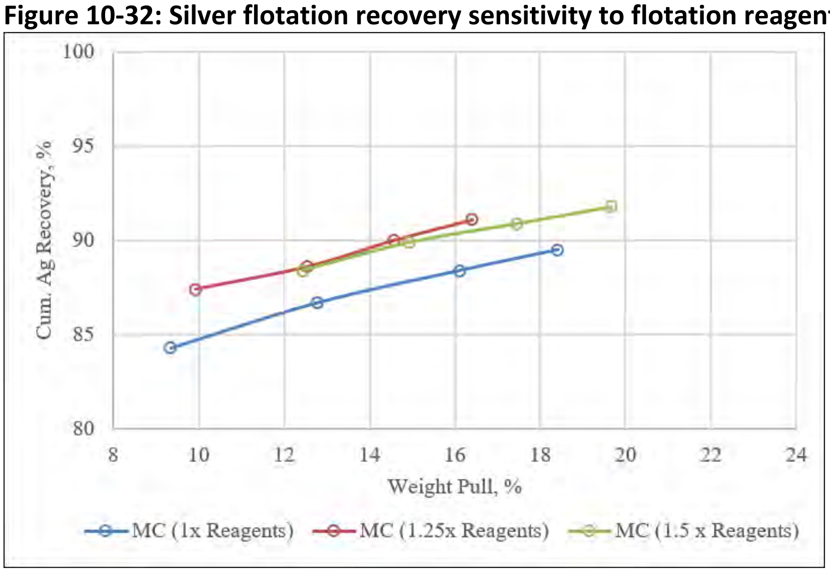



**Figure 10-32: Silver flotation recovery sensitivity to flotation reagent**



## 10.11 Leaching of gravity concentrate

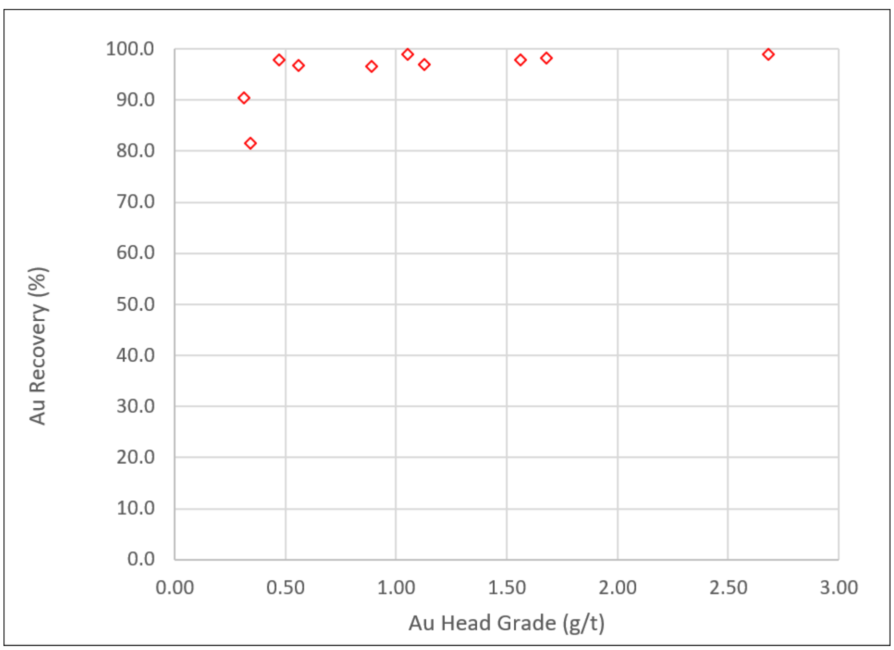
Intensive cyanidation test work of limestone gravity concentrates in 2016 resulted in leach gold recoveries of up to 98.6 % and silver leach recoveries of 96.1% using the following ILR (intensive leach reactor) conditions:

- Regrind the 150 g sample in the porcelain pebble mill for 60 min;
- Dry, weight and assay the pebble mill clean-out sand;
- Leach in a bottle roll:
    - 20% solids;
    - Add 10 kg/mt NaOH initially. Add additional NaOH as required to maintain pH<12.0;
    - Add 5 g/L LeachWell GC with the initial cyanide addition;
    - Initial cyanide addition of 13 gNaCN/L – allow to "coast-down" (make up only the amount of cyanide removed when interim pregnant solution samples are taken);

The 2016 leach tests indicated that recoveries were relatively insensitive to leach parameters. Leaching was complete in 12 hours.

Gold intensive leach recovery showed were consistently 98% or higher when overall sample head grades were higher than 0.4 g/t as shown in Figure 10-33. Average silver intensive leach recovery was 96%.

**Figure 10-33: Gravity concentrate intensitve leach gold recovery**



## 10.12 Leaching of flotation concentrate

### 10.12.1 **Limestone**

Cyanidation tests were carried out in 2016 on limestone flotation concentrate evaluating:

- grind size (regrind time);
- point of addition for lime;
- carbon in leaching (CIL) vs direct agitated leaching (CN);
- slurry pre-treatment with air sparging;
- calcium peroxide;
- solids concentration;
- sodium cyanide concentration;

Optimized agitated leach test work conditions were as follows:

- 30 min regrind time
- 4 kg/mt Lime added during regrinding
- 33% solids (not optimized during earlier testing)
- pH 11.0 with lime
- 8 g NaCN/L, maintained during first 12 hrs leaching, then allowed to coast-down
- 96 hour leach cycle

Leaching stage recovery of gold reached values up to 88.8% and silver reached up to 97.2% with cyanide consumption less than 1kg/tonne ore. Cyanide consumption was found to be sensitive to lime addition during the regrind stage before leaching was initiated.

Agitated leach kinetics work in showed that gold leaching was complete with 24 hours, but silver leaching requires up to 72 hours for leaching to complete (See Figure 10-34 and Figure 10-35).

**Figure 10-34: Limestone Gold Leach Rates Limestone (2016)**

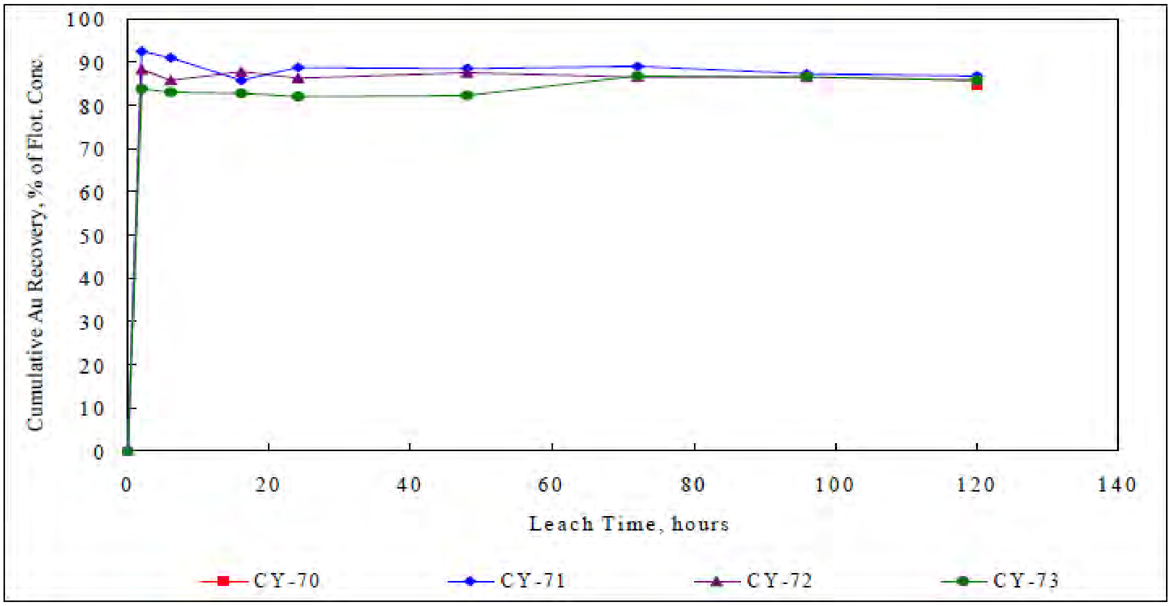
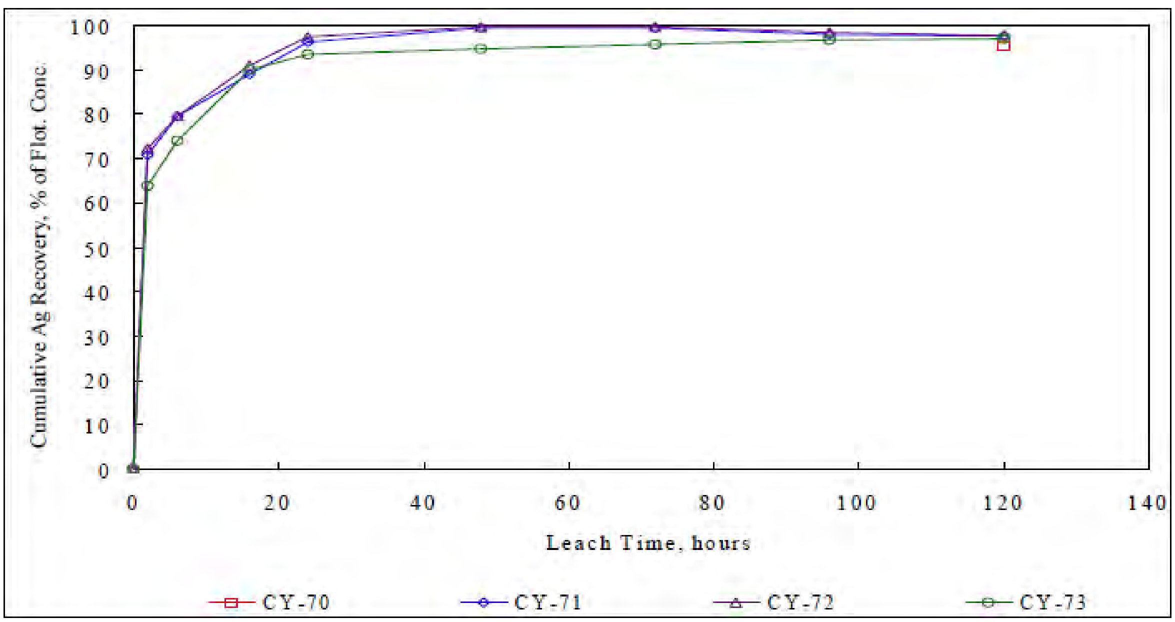



**Figure 10-35: Limestone Silver Leach Rates Limestone (2016)**




Carbon absorption tests showed that gold absorption was complete with 12 hours. Silver absorption was completed in 24 hours. (See Figure 10-36). Carbon absorption capacity tests indicated equilibrium gold loading of approximately 924 g/t (Figure 10-37) and silver loading of 29,000 g/t (Figure 10-38).

**Figure 10-36: Carbon absorption rates**

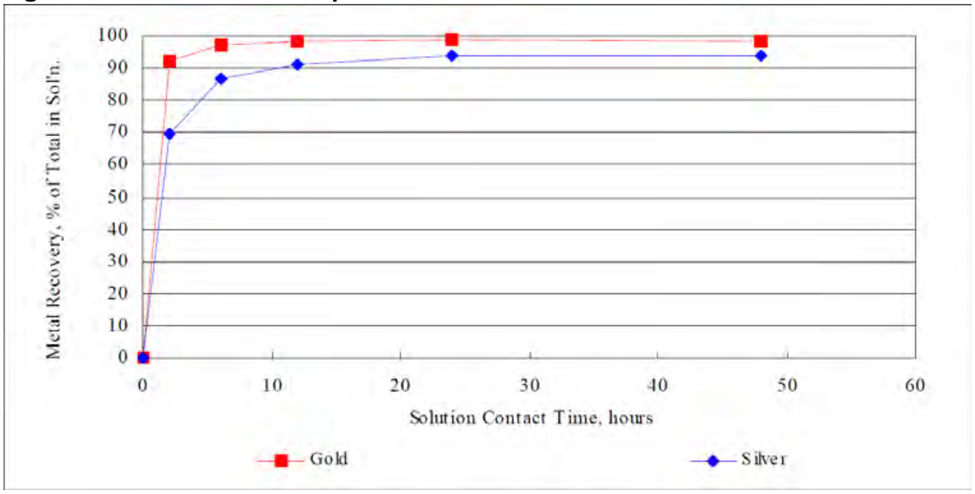



**Figure 10-37: Carbon absorption capacity test – gold loading**

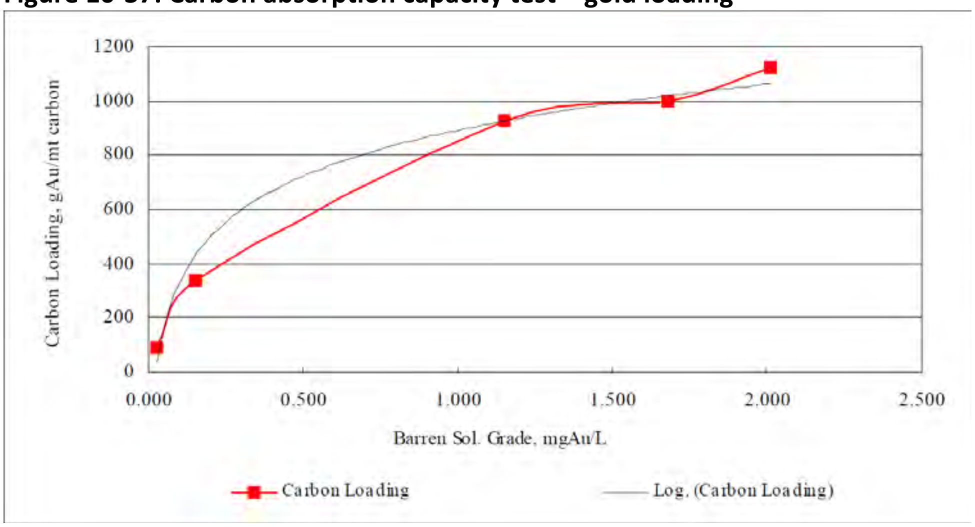
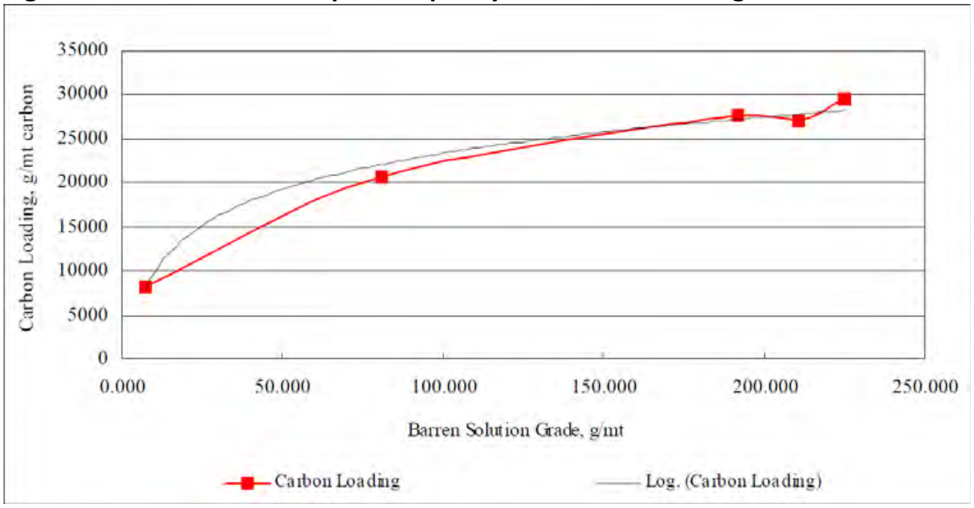


**Figure 10-38: Carbon absorption capacity test – silver loading**




CIL test work in 2018 on variability samples had significantly higher gold recoveries compared to agitated leach without activated carbon. A decision was made to adopt CIL for limestone processing to maximize gold recoveries.

The CIL test work in 2018 showed a correlation between recoveries and head grades (See Figure 10-39 and Figure 10-40). Average CIL cyanide consumption was 0.49 kg/t ore and average lime consumption was 0.66 kg/t ore.

**Figure 10-39: CIL Gold recovery vs head grade**

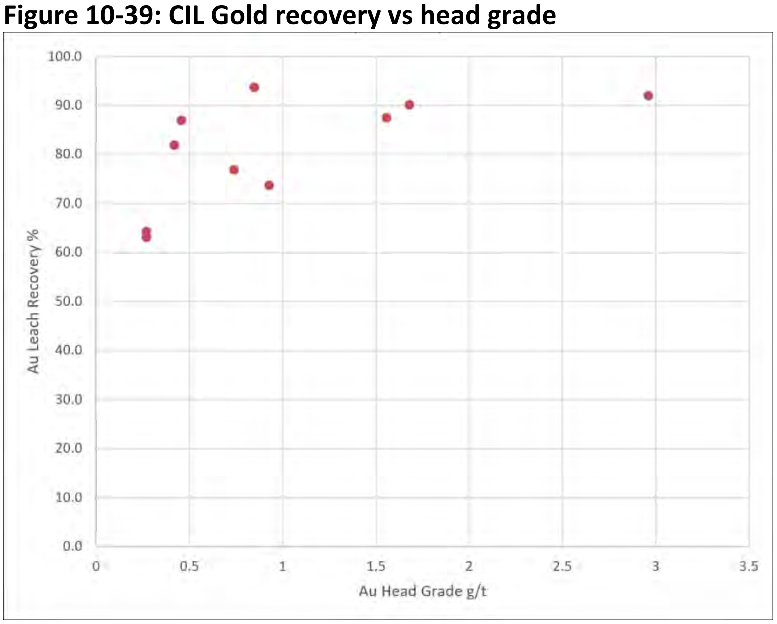
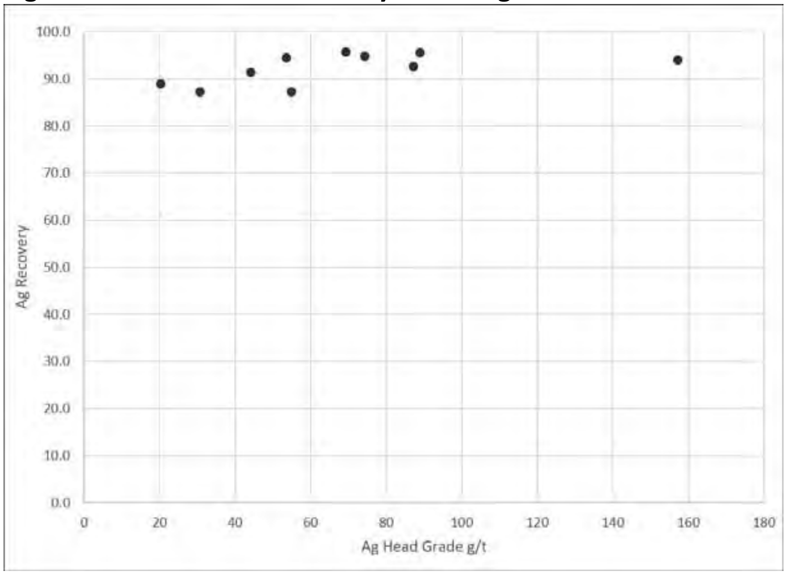
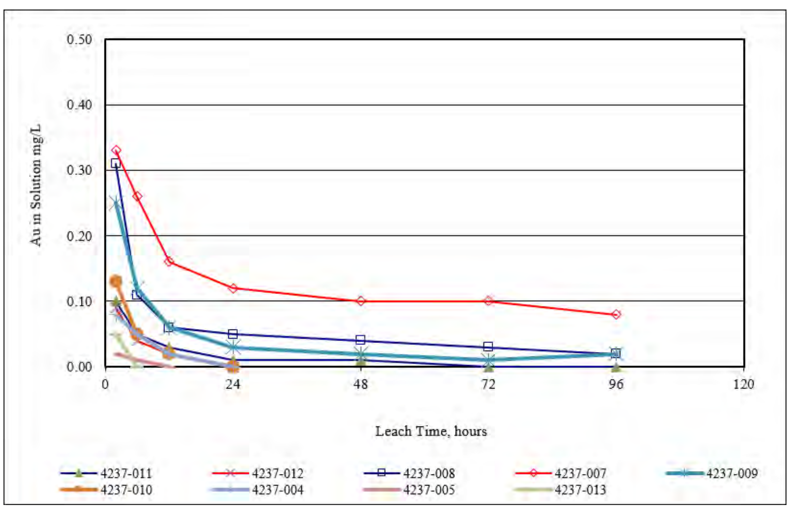


**Figure 10-40: CIL Silver recovery vs head grade**




Gold in solution analysis show in Figure 10-41 shows that gold absorption from solution to carbon was complete within 24 hours. Gold and silver remaining in solution after CIL would be recoverable by a Merrill Crowe process.

**Figure 10-41: CIL – Gold in Solution**




Gold leaching with CIL is complete in 24 hours and silver leaching continues for up to 72 hours. The Ixtaca leach process will there require 24 hours of CIL leaching followed by 48 hours of agitated leaching without carbon.

The CIL with associated carbon circuit maximizes gold recovery, while agitated leach with Merrill Crowe maximizes silver recovery.

### 10.12.2 **Volcanic**

Mineralogy and leach test work conducted in Stage 1 and indicated that a significant portion of the gold is locked in sulphides and requires either significant regrind or oxidation for liberations. Agitated leach tests shown in Figure 10-42 and Figure 10-43 show that leach kinetics are significantly improved with additional regrind for both silver and gold. The regrind test work achieved a gold recovery increased on 6% and silver recovery increase of 12% in going from a 30 minute regrind to a 60 min regrind.

**Figure 10-42: Volcanic gold leach kinetics at different grind sizes**

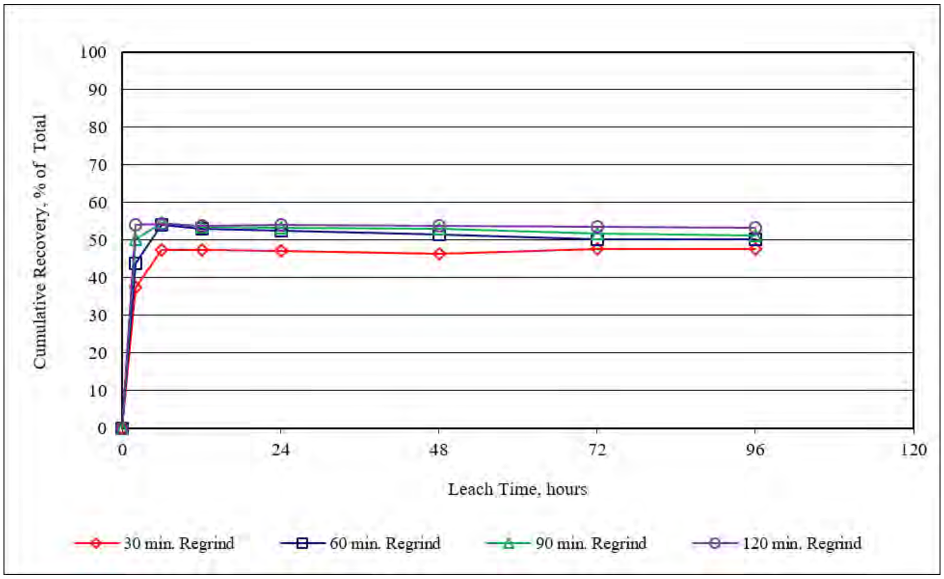
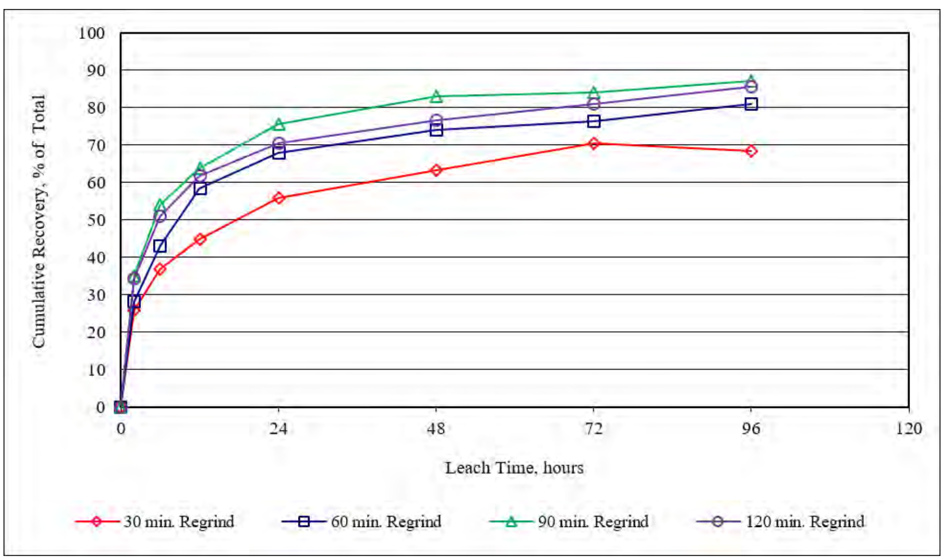



**Figure 10-43: Volcanic silver leach kinetics at different grind sizes**



CIL tests after 30 min regrind resulted in a gold recovery of 57.8 %. Gold recovery with CIL was 10% higher than gold recovery without activated carbon.

CIL test with a 60 minute regrind has not yet been completed but is expected to significantly increased gold and silver recovery.

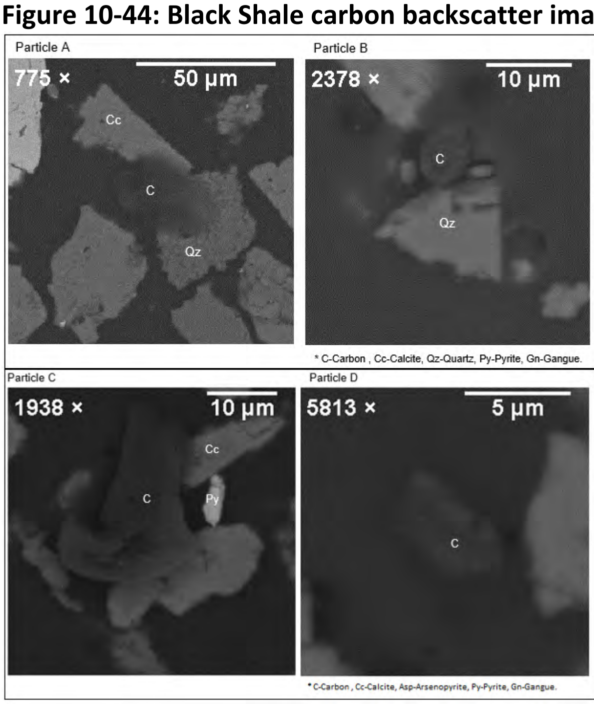
A leach test after roasting the volcanic flotation concentrate yield a gold recovery of 75.8% and silver recovery of 86.8%. (Note: roasting is not anticipated to be employed at Ixtaca). This test confirmed that the lower leach recoveries for gold and silver were mostly due to locking of gold and silver in sulphides.

### 10.12.3 **Black Shale**

Stage 1 and 2 test work identified that black shale ore was strongly preg-robbing due to elevated organic carbon ($C_{org}$) content. Leaching test work on black shale flotation concentrate at McClelland in 2016 showed that CIL leaching of black shale achieved gold leach recoveries of approximately 50%. Due to the low contribution of black shale to the Ixtaca ore reserve and late mine life processing of black shale, it was decided to limit resources committed to of black shale test work in favor of limestone process optimization. Any further improvement in gold recovery would require rejection or passivation of organic carbon.

Mineralogy on Black Shale in 2017 showed that organic carbon occurs as fine-grained particles in the host rock and is pre-mineralization (See Figure 10-44). The mineralogy also confirmed that gold and silver were generally attached to gold and silver with 75 to 80 percent of the organic carbon liberated. The mineralogy confirmed that fine regrinding of flotation concentrate is required for organic carbon liberation.

**Figure 10-44: Black Shale carbon backscatter images**

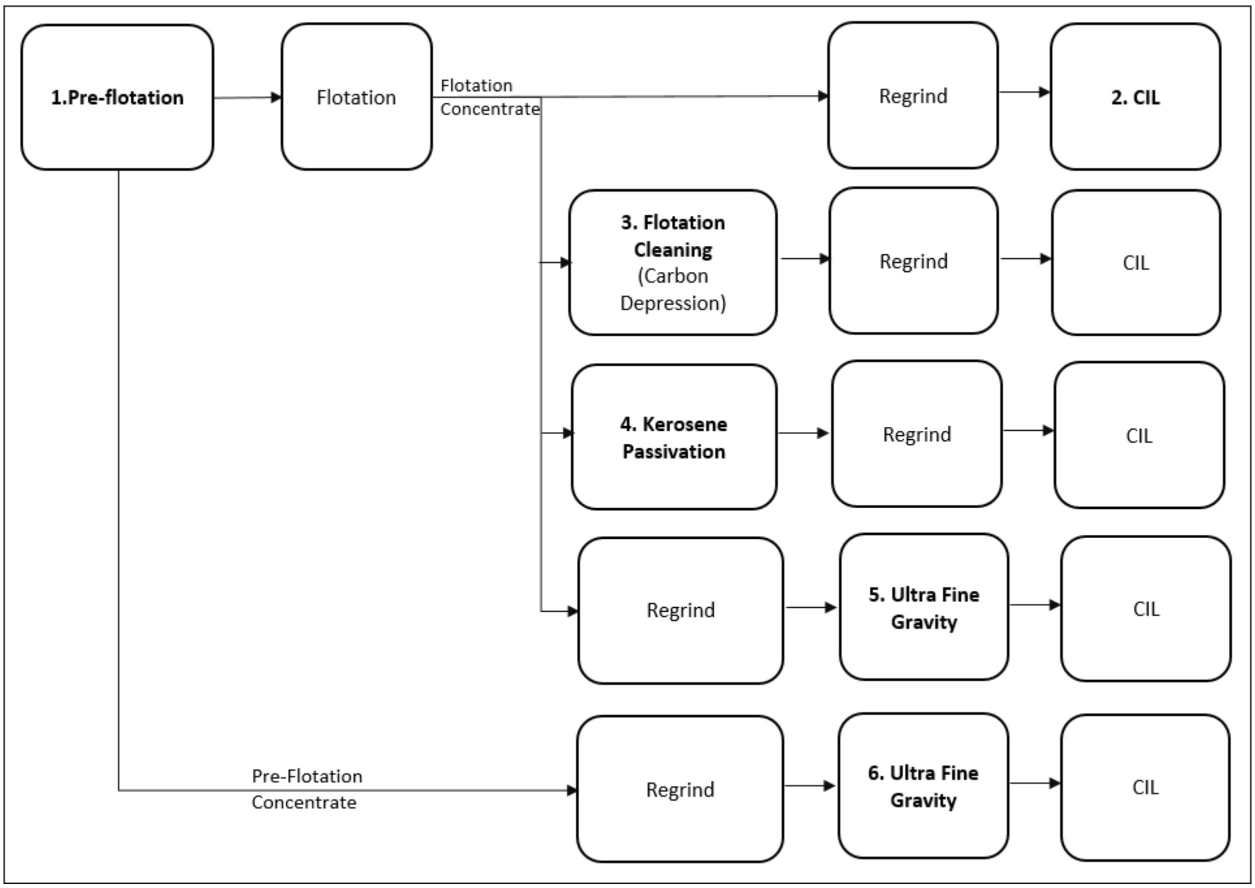



(Source: Bureau Veritas)

Test work in 2018 explored 2 paths to assess the potential for rejection or passivation of organic carbon:

1. Pre-flotation of organic carbon;
2. Organic carbon rejection with cleaner flotation;
3. Pre-leach organic carbon passivation with kerosene;
4. Ultra-fine density concentration – rejection of organic carbon to gravity tail;

**Figure 10-45: Black Shale carbon rejection exploratory testwork**




Pre-flotation produced an organic carbon concentrate using only a froth agent with no promoters or collectors), followed by full flotation to produce a gold and silver concentrate. The flotation concentrate was split and tested with flotation cleaning, kerosene passivation and ultra-fine gravity.

#### 10.12.3.1 Pre-flotation

Pre-flotation concentrated the organic carbon from a head grade of 1% $C_{org}$ to a pre-flotation concentrate grade of 10% $C_{org}$. Approximately half of the organic carbon was recovered pre-flotation concentrate with approximately 10% of the gold. This test confirmed that a significant portion of the organic carbon is liberated at the primary grind size and can be removed with pre-flotation.

Ultrafine gravity concentration uses the density differences between economic minerals and organic carbon to reject the organic carbon. A single rougher ultrafine gravity test on the pre-flotation concentrate after regrind to a P80 of 20 µm showed that organic carbon in the pre-flotation concentrate could be reduced in a rougher stage from 10% to 2% with a 73% gold recovery. It is reasonable to expect the organic carbon can be further reduced with a cleaning stage.

#### 10.12.3.2 CIL of Flotation concentrate

CIL leaching of the flotation rougher concentrate yielded a gold recovery of 44% and silver recovery of 70%.

#### 10.12.3.3 Cleaner Flotation

A portion of the gold and silver flotation rougher concentrate was then cleaned with Carboxymethyl Cellulose (CMC) to depress and reject organic carbon to cleaner tails. This was carried out before regrinding.

Cleaner concentrate had organic carbon reduced from 1% $C_{org}$ to 0.8% $C_{org}$ with cleaner tails containing 2% $C_{org}$

CIL leaching of the cleaner concentrate saw gold recovery increase to 59% for gold showing a 15% recovery increase compared to the CIL on rougher concentrate.

The successful depression of organic carbon is expected to be significantly improved if regrind is carried out before cleaner flotation.

#### 10.12.3.4 Kerosene passivation

A portion of the flotation rougher concentrate was pre-treated with kerosene. Kerosene fouls the organic carbon in the concentrate prior to CIL.

CIL recoveries were also 15% higher for gold compared to CIL on rougher concentrate.

The results confirm that kerosene is a suitable organic carbon foulant that can significantly increase gold recoveries.

#### 10.12.3.5 Ultra-Fine Gravity Concentration

Ultra-fine gravity concentration was also carried out on flotation rougher concentrate after regrind to a P80 of 15 µ. The laboratory ultrafine gravity concentrator is shown in Figure 10-47.

**Figure 10-46: Ultrafine gravity concentration of black shale at Metsolve laboratory**


The photo below shows the gravity concentrate a metallic (pyrite) colour in the concentrator bowl, with black carbon rich tailings in the bucket.

**Figure 10-47: Black Shale – gravity concentration of preflotation concentrate**

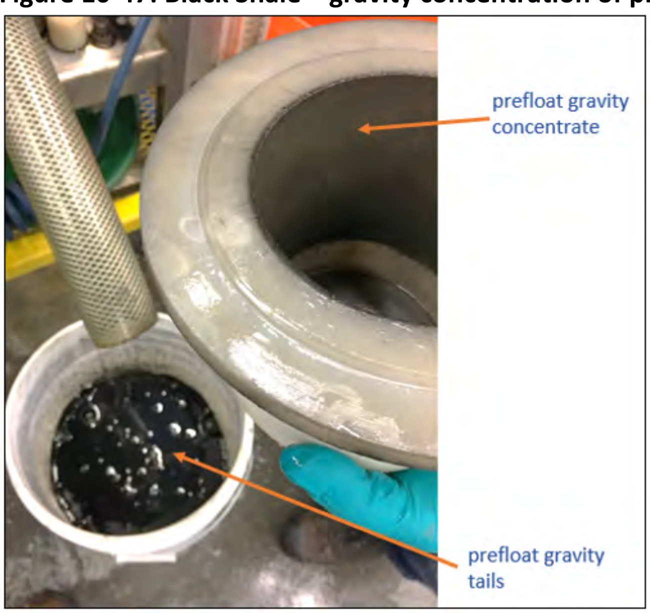


Figure 10-48 shows products from gravity on sulphide flotation concentrate. Gravity tails are dark gray compared to the metallic gravity concentrate showing the rejection of black organic carbon to gravity tails:

**Figure 10-48: Black Shale – gravity concentration of flotation rougher concentrate**

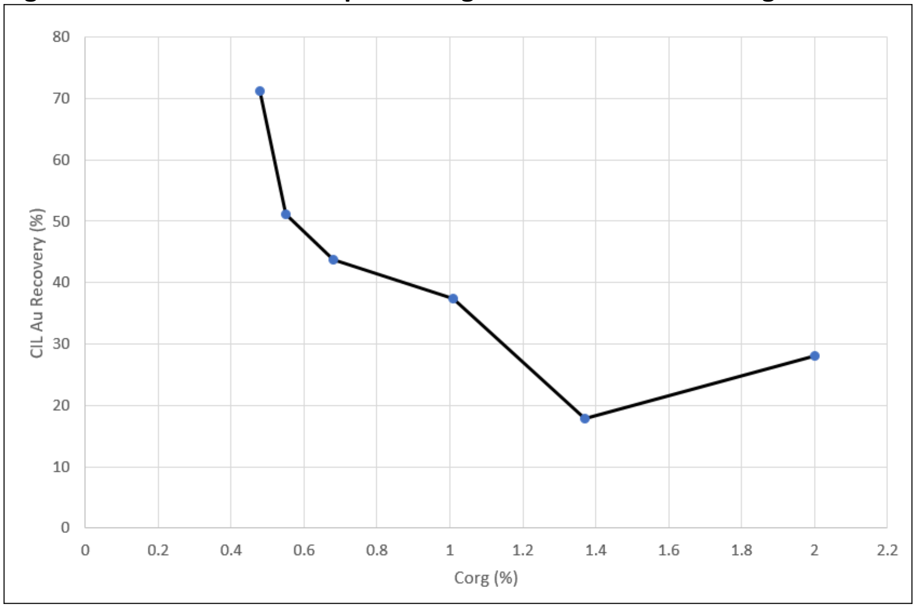

The results summarized in Table 10-21 show that 76% of the organic carbon was rejected to gravity tails with an 82% recovery of gold to gravity concentrate. Organic carbon in the gravity concentrate was reduced from a head grade of 1% $C_{org}$ to 0.55% $C_{org}$.

**Table 10-21 Ultrafine gravity concentration on flotation rougher concentrate**

| Products | Weight | | Assay | | | Distribution (%) | | |
|---|---|---|---|---|---|---|---|---|
| | (g) | (%) | Au (g/t) | Ag (g/t) | Corg (%) | Au (g/t) | Ag (g/t) | Corg (%) |
| UF Conc 1 | 345.6 | 14.10 | 12.88 | 859.7 | 0.48 | 48.5 | 30.7 | 6.7 |
| UF Conc 2 | 299.4 | 12.21 | 5.05 | 642.6 | 0.55 | 16.5 | 19.9 | 6.6 |
| UF Conc 3 | 240.4 | 9.81 | 4.13 | 578.8 | 0.56 | 10.8 | 14.4 | 5.4 |
| UF Conc 4 | 185.1 | 7.55 | 2.97 | 436.8 | 0.68 | 6.0 | 8.4 | 5.1 |
| **Total UF Conc** | **1,070.5** | **43.67** | **7.01** | **662.8** | **0.55** | **81.9** | **73.3** | **23.8** |
| UF Tails | 1,380.8 | 56.33 | 1.21 | 187.1 | 1.37 | 18.1 | 26.7 | 76.2 |
| **Calculated Head** | **2,451.3** | **100.00** | **3.74** | **394.8** | **1.01** | **100.0** | **100.0** | **100.0** |
| **Assayed Head** | | | 3.63 | 397.6 | 0.98 | | | |

Ultrafine gravity concentrates were leached with CIL individually to assess the relationship between gold recovery and organic carbon content. The graph in Figure 10-49 shows that CIL gold recovery increases steadily as organic carbon is reduced below 1%. Gold recovery increase becomes more significant as organic carbon is reduced to below 0.6% $C_{org}$.

**Figure 10-49: Black Shale impact of organic carbon content on gold recovery**




#### 10.12.3.6 Black Shale leach summary

Test work in 2018 has demonstrated that preg robbing in black shale can be overcome by rejection of organic carbon with cleaner flotation or ultrafine gravity concentration. Preg robbing can also be overcome by or passivation of organic carbon with a carbon foulant like kerosene. The optimum process solution will be verified with future optimization test work.

## 10.13 Leach Residue Detox

A leaching tails sample generated from the limestone agitated leach test was subject to a combined 21 detoxification tests to destroy cyanide using three commercially available technologies including:

- Caro's Acid;
- $SO_2$/Air;
- Combinox®;

The tests were carried out at the Cyanco Corporation's laboratory in Sparks, Nevada. Out of the three technologies, $SO_2$/Air and Combinox® were successful. The $SO_2$/Air process has been selected as the basis for the detox process at Ixtaca.

Detox testwork carried out at McClelland as a part of the 2018 program achieved targets $CN_{WAD}$ concentrations using the $SO_2$/Air process with sodium metabisulphite as the primary reagent.

## 10.14 Carbon Adsorption and Merrill-Crowe

Precious metal adsorption on activated carbon was tested in six tests at carbon concentration varying from 0.1 g/L up to 20 g/L. Merrill-Crowe was tested under four different ratios of Zn to precious metals ranging from Zn/PM=5 to Zn/PM=50., see selected final conditions in Table 10-22.

**Table 10-22 Carbon Loading and Merrill-Crowe tests**

| | PLS Au mg/L | PLS Ag mg/L | Carbon Concentration g/L | Carbon Loading Au g/t | Carbon Loading Ag g/t | Au %recovery | Ag %recovery |
|---|---|---|---|---|---|---|---|
| Carbon loading | 2.4 | 222.5 | 20 | 924 | 29,000 | 98.8 | 96.8 |
| Merrill-Crowe | 1.18 | 113.2 | | | | 97.5 | 99.9 |

Both Merrill-Crowe and carbon adsorption proved to be successful at recovering precious metals from the pregnant leach solution (PLS). Merrill-Crowe had a marginally better Ag recovery.

Carbon loading with a CIP circuit has been selected as the base case for the FS because the Rock Creek plant already includes a carbon circuit.

## 10.15 Settling tests and Filtration

Settling tests, flocculant screening and filtration test work has been carried out at Pocock Industrial (Pocock). Ceramic disc vaccum filtration tests were carried out at CEC mining systems. Metallurgical testwork samples representing tailings, flotation concentrate and leach residue were tested.

Both static and dynamic thickening tests were performed. These tests developed a general set of data for thickener design that included optimum flocculant type and dose requirements as well as the underflow and overflow characteristics that impact downstream operations. Viscosity tests performed on samples of underflow generated from the thickening tests evaluated the rheological properties of each material.

Results from the static and dynamic settling test are summarized in Table 10-23 and Table 10-24.

In dynamic testing, standard in-line flocculation produced acceptable flocculation efficiency and settling performance for all materials tested. Overflow clarities were generally very good.

Vacuum and pressure filtration tests performed on thickened underflow for horizontal belt vacuum filter and standard recessed plate type pressure filter design. The results from pressure filtration achieved approximately 14.5% moisture with good discharge and stacking properties at reasonable dry times. Vacuum tests designed for horizontal belt vacuum filters achieved 19% moisture with low production rates. Ceramic disc vacuum filtration achieved 16.5% moisture with a production rate of 0.36 dry t/h/$m^2$ with good discharge and stacking properties. Ceramic disc vacuum filtration has been selected as the preferred filtration method due to lower capital and operating costs.

**Table 10-23 Static Thickener Tests**

| Material Tested | Recommended Conventional Thickener Operating Parameter Ranges | | | | |
|---|---|---|---|---|---|
| | Flocculant Dose, Type, & Conc.(2) | Rise Rate & Unit Area at Specified Feed Solids Concentration and Underflow Density(3) | | | |
| | | Feed Solids Conc. (%) | Rise Rate ($m^3/m^2hr$) | Unit Area ($m^2$/MTPD) | Underflow Density |
| Limestone Flotation Tailings | 30 g/MT of SNF AN 905 SH added at 0.1 g/l | 15% | 9.42 | 0.158 | 63% |
| | | 20% | 3.92 | 0.213 | 63% |
| | | 25% | 1.76 | 0.317 | 63% |
| Volcanics Flotation Tailings | 35 g/MT of SNF AN 905 SH added at 0.1 g/l | 10% | 6.77 | 0.354 | 52% |
| | | 15% | 3.72 | 0.663 | 52% |
| | | 20% | 0.37 | 1.948 | 52% |
| Limestone Concentrate | 45 g/MT of SNF AN 905 SH added at 0.1 g/l | 15% | 9.60 | 0.241 | 53% |
| | | 20% | 3.65 | 0.364 | 53% |
| | | 25% | 0.18 | 1.171 | 53% |
| Limestone Overall Tailings | 40 g/MT of SNF AN 905 SH added at 0.1 g/l | 15% | 6.80 | 0.186 | 62% |
| | | 20% | 3.64 | 0.246 | 62% |
| | | 25% | 1.31 | 0.332 | 62% |

Table Notes:
(1) Recommended flocculant concentration prior to contact with the pulp.
(2) Unit Area includes a 1.25 scale-up factor. The range of unit areas provided corresponds to the range of feed solids concentration and underflow densities shown. **Typically, conventional thickener sizing of less than 0.125 $m^2$/MTPD is impractical due to rise rate limitations in full-scale industrially sized equipment.**
(3) Recommended thickener feed solids concentration range by weight.

*(Source: Pocock)*

**Table 10-24 Dynamic Thickener Tests**

| Material Tested | Recommended High Rate Thickener Operating Parameter Ranges | | | | | | |
|---|---|---|---|---|---|---|---|
| | Tested Feed Solids(1) (%) | Flocculant | | | Design Basis Net Feed Loading ($m^3/m^2hr$)(5) | Predicted Overflow TSS Conc. Range (mg/l)(6) | Predicted Underflow Density(7) |
| | | Type(2) | Dose(3) (g/MT) | Conc. (4) (g/l) | | | |
| Limestone Flotation Tailings | 18.7% | SNF AN 905 SH | 35 | 0.1 | 3.16 | 150 – 250 | 63% |
| Volcanics Flotation Tailings | 11.8% | SNF AN 905 SH | 40 | 0.1 | 2.58 | 150 – 250 | 52% |
| Limestone Concentrate | 15.3% | SNF AN 905 SH | 50 | 0.1 | 3.11 | 150 – 250 | 53% |
| Limestone Overall Tailings | 18.3% | SNF AN 905 SH | 45 | 0.1 | 3.24 | 150 – 250 | 62% |

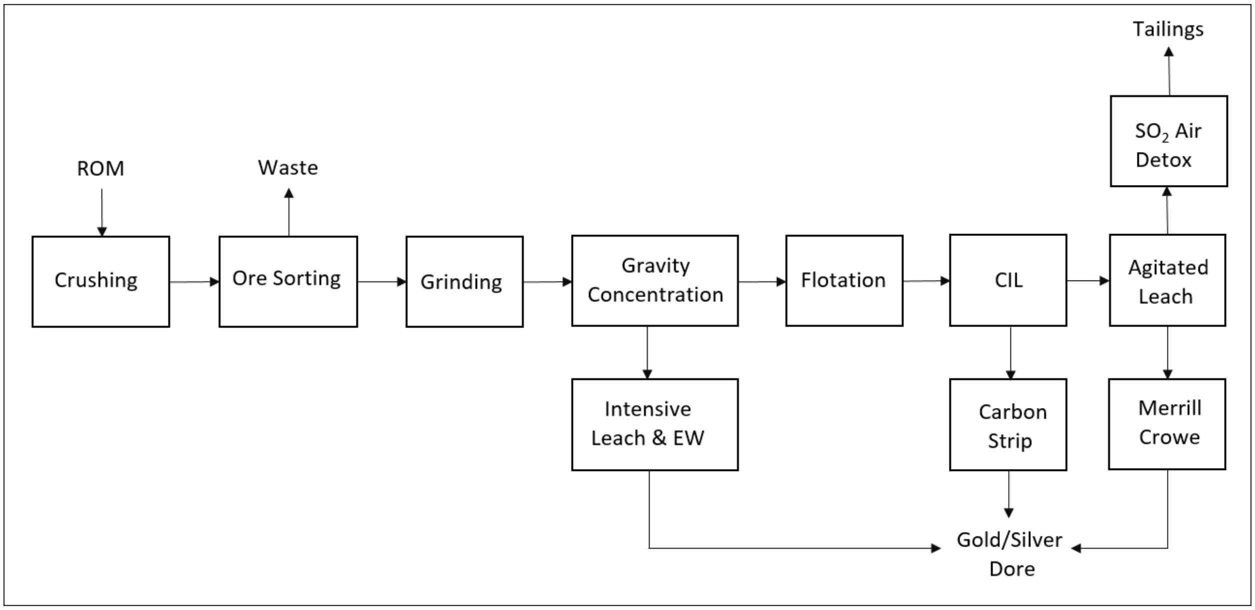
Table Notes:
(1) Feed solids concentration range required for thickener operation (wt. %) at maximum design Net Feed Loading Rate. Note: Maintaining feed solids concentration in the ranges shown is critical to thickener performance and operation at design rates shown.
(2) Flocculants from other manufacturers with similar specifications would also serve.
(3) Recommended flocculant dose in grams per metric ton (g/MT).
(4) Recommended flocculant concentration prior to contact with the pulp.
(5) Recommended design basis (net feed loading rate) in cubic meters of feed slurry per hour per square meter of thickener area ($m^3/m^2$ hr). This basis can be used to calculate the required thickener area based on the volumetric feed rate at the design solids concentration. The feed loading rates shown correspond to the feed solids concentrations shown in the table. Since hydraulic design bases are specified independent of solids tonnage, an operable feed solids concentration range is required to properly specify a thickener designed using hydraulic feed loading rate. ***Recommended design net feed loading rates are provided without scale-up or safety factors.***
(6) Overflow suspended solids conc. in milligrams per liter as measured using a 0.45m septum.
(7) Maximum underflow solids concentration recommended based on viscosity considerations and experience.

*(Source: Pocock)*

## 10.16 Recommended Flowsheet

The flowsheet recommended for treating Ixtaca ore is shown in Figure 10-50.

**Figure 10-50: Block Diagram of Recommended Ixtaca Flowsheet**




## 10.17 Metallurgical Performance Projections

Ore sort performance projections are summarized by ore type in Table 10-25.

**Table 10-25 Ixtaca ore Ore Sort Performance**

| | Waste Ejected From Run Of Mine | | | |
|---|---|---|---|---|
| **Ore Type** | **Yield** | **Au g/t** | **Ag g/t** | **Category** |
| Limestone | 36.5% | 0.24 | 12 | waste |
| Black Shale | 52.0% | 0.25 | 20 | waste |
| Volcanic | 52.9% | 0.80 | 10 | low grade stockpile |

Metallurgical performance projections for Limestone are shown in Table 10-26. Metallurgical performance projections for Volcanic and Black Shale are shown in Table 10-26. These performances are projected for mill feed (ore sort concentrate).

**Table 10-26 Limestone Process Plant Metallurgical Projections**

| Description | Head Grade | Recovery % |
|---|---|---|
| Gravity Au Recovery | n/a | 53.4 |
| Gravity Ag Recovery | n/a | 16.6 |
| ILR Au Recovery | n/a | 98 |
| ILR Ag Recovery | n/a | 97 |
| Gravity + Flotation Au Recovery | > 0.7 g/t Au | $1.7 + 93.966 * AU^{0.0158}$ |
| | < 0.7 g/t Au | $1.7 + 96.593 * AU^{\mathbf{0.0931}}$ |
| Gravity + Flotation Ag Recovery | > 60 g/t Ag | 93.0 |
| | < 60 g/t Ag | 91.6 |
| Leach Au Recovery | > 0.7 g/t Au | 2.4814*Au + 84.652 |
| | < 0.7 g/t Au | 37.911*Au + 58.742 |
| Leach Ag Recovery | > 60 g/t Ag | 94.6 |
| | 40 - 60 g/t Ag | 91.0 |
| | < 40 g/t Ag | 88.0 |
| Solution Losses AU | n/a | 0.4 |
| Solution Losses AU | n/a | 0.1 |

**Table 10-27 Volcanic and Black Shale Process Plant Metallurgical Projections**

| Description | Head Grade | Volcanic Recovery % | Black Shale Recovery % |
|---|---|---|---|
| Gravity Au Recovery | n/a | 29.2 | 18.0 |
| Gravity Ag Recovery | n/a | 8.0 | 6.0 |
| ILR Au Recovery | n/a | 80 | 80 |
| ILR Ag Recovery | n/a | 70 | 70 |
| Gravity + Flotation Au Recovery | > 0.7 g/t Au | $1.7 + 93.966 * AU^{0.0158}$ | $1.7 + 93.966 * AU^{0.0158}$ |
| | < 0.7 g/t Au | $1.7 + 96.593 * AU^{\mathbf{0.0931}}$ | $1.7 + 96.593 * AU^{\mathbf{0.0931}}$ |
| Gravity + Flotation Ag Recovery | > 60 g/t Ag | 93.0 | 93.0 |
| | < 60 g/t Ag | 91.6 | 91.6 |
| Leach Au Recovery | n/a | 57.8 | 50.0 |
| Leach Ag Recovery | n/a | 85.0 | 90.0 |
| Solution Losses AU | n/a | 0.4 | 0.4 |
| Solution Losses AU | n/a | 0.1 | 0.1 |

There are no known additional processing factors or deleterious elements that could have a significant effect on potential economic extraction other than the factors described above.

## 10.18 Aggregate test work on Ixtaca Limestone Waste Rock

Samples representative of barren limestone waste rock from Ixtaca were collected from drill core and tested for performance as an aggregate at Metro Testing laboratories in Burnaby, Canada.

The proposed methods to determine physical properties and composition were petrographic evaluation (petrographic number), density and absorption, expansive breakdown of clays on soaking ethylene-glycol, micro-deval and Los Angeles abrasion tests, followed by a chemical analysis and a detailed petrography using polished thin sections under a polarized light petrographic microscope.

The type of tests conducted, and the standards followed are summarized in Table 10-28.

**Table 10-28 Ixtaca limestone aggregate testing standards**

| STANDARD / *ESTÁNDAR* | TEST METHOD / *MÉTODO DE ENSAYO* |
|---|---|
| ASTM C295 | Standard Guide for Petrographic Examination of Aggregates for Concrete. *Guía Estándar para el Examen Petrográfico de Áridos para Hormigón.* |
| CRD-C 148 | Method of Testing Stone for Expansive Breakdown on Soaking in Ethylene Glycol. *Ensayo de Rotura Expansiva en Arcillas por Inmersión en Etilenglicol.* |
| CSA A23.2-12A | Relative density and absorption of coarse aggregate. *Densidad Relativa y Absorción de Árido Grueso.* |
| CSA A23.2-15A | Petrographic examination of aggregates. *Examen Petrográfico de Áridos.* |
| CSA A23.2-16A | Resistance to degradation of small-size coarse aggregate by abrasion and impact in the Los Angeles machine. *Resistencia a la Degradación de Árido Grueso de Pequeño Tamaño por Impacto y Abrasión en el Dispositivo Los Ángeles.* |
| CSA A23.2-29A | Test method for the resistance of coarse aggregate to degradation by abrasion in the Micro-Deval apparatus. *Resistencia a la Degradación por Abrasión en el Dispositivo Micro-Deval de Árido Grueso.* |
| CSA A23.2-2C | Making concrete mixes in the laboratory. *Preparación de Mezclas de Hormigón en Laboratorio.* |
| CSA A23.2-9C | Compressive strength of cylindrical concrete specimens. *Resistencia a la Compresión de Especímenes Cilíndricos (Probetas) de Hormigón.* |
| ICP-OES | Metal Analysis – Inductively Coupled Plasma - Optical Emission Spectrometry. *Análisis Metálico – Espectrometría de Emisión Óptica por Plasma de Acoplamiento Inducido.* |

The results of the aggregate testing are summarized in Table 10-29.

The test work concludes that Ixtaca limestone waste rock is suitable for many types of concrete use and other applications such as shotcrete, subgrade, asphalt aggregate or railroad ballast with little effort and processing. Concrete produced with Ixtaca limestone aggregate performed very well, achieving the 28-day design compressive strength of 30 MPa already at 7 days, and more than 40 MPa at 28 and 56 days.

Fine aggregate from crushing and grinding operations is also expected to perform in a similar way to the coarse aggregate. Chemical analysis of the fine aggregate indicates that it is also suitable as a raw material for the production of lime cement or Portland cement if properly processed and blended with suitable silica aluminates.

**Table 10-29 Ixtaca limestone testing of aggregate potential**

| STANDARD *ESTÁNDAR* | TEST *ENSAYO* | Values Range *Rango de Valores* | Average Value *Valor Medio* | Recommended Values* *Valores Recomendados** |
|---|---|---|---|---|
| ASTM C295 | Petrographic Examination *Examen Petrográfico* | See detailed report *Ver informe detallado* | Limestone with clay-rich alteration zone and veins *Caliza con zonas ricas en arcillas alteradas y venas.* | As per project requirements *Según necesidades del proyecto* |
| CRD-C 148 | Ethylene Glycol (Mass loss) *Etilenglicol (Pérdida de masa)* | 0.1 – 0.3 % | 0.2% | <3.0% |
| CSA A23.2-12A | Relative Density and Absorption *Densidad Relativa y Absorción* | 2661 – 2684 kg/m$^3$ 0.39 – 0.58 % | 2671 kg/m$^3$ 0.51 % | >2560 kg/m$^3$ <3.0% |
| CSA A23.2-15A | Petrographic Number *Índice Petrográfico* | 116 - 128 | 124 | <125 |
| CSA A23.2-16A | Los Angeles (Mass loss) *Los Ángeles (Pérdida de masa)* | 25.0 – 27.6 % | 26.7 % | <50% |
| CSA A23.2-29A | Micro-Deval (Mass loss) *Micro-Deval (Pérdida de masa)* | 10.8 – 13.1 % | 12.0 % | <18% |
| CSA A23.2-9C | Compressive Strength (28 days) of trial concrete *Resistencia a la Compresión (28 días)* | 43.4 – 45.1 MPa | 44.3 MPa | ≥ 30.0 MPa |

* Values based on the most demanding applications as per AASHTO, ASTM and CSA guidelines.
*Valores basados en las aplicaciones más exigentes según las directrices AASHTO, ASTM y CSA.*

# 11.0 Mineral Resource Estimates

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 11.1 Data Analysis

Almaden has supplied a total of 649 drillholes with 7,655 down hole surveys and 139,041 assays for gold and silver. Of these drillholes, 558 totalling 180,697 m outline the Ixtaca Main zone and NE Extension which are estimated in this resource. All drillholes are included in Appendix A with the holes intersecting the various mineralized solids highlighted. A total of 378 gaps were found in the from – to record. These gaps are explained as follows:

- Often the drillers need to tricone the tops of the holes (particularly those collared in volcanics which a lot of them are) until they get to more stable rock and set in casing. That's why there are gaps often at the tops of holes because no core samples could be collected.
- In 2011 the geologist who was logging took recovery very seriously. So if there was 10cm missing in the run he shortened the assay interval creating 10-30cm gaps.
- Lots of the geotechnical holes (GT) have sample gaps because samples could not be assayed where whole core geotechnical samples were collected.
- In earlier holes there are often 10m gaps to save on assaying costs. Also, there are large sample gaps in the exploration holes outside the immediate area to save on assaying costs.
- No recovery
- Some MET tests required whole core that could not be assayed (ie samples used for Ore Sorting).
- Approximately 20m of samples from holes GMET-17-01 and 02A have been removed from the database due to a lab prep issue. These are the only samples that have ever been removed from the database.

Almaden also supplied a series of geologic solids for the Ixtaca Zone, which outlined the following mineralized domains:

| Code | Description |
|---|---|
| **ASH** | A clay altered tuff overlying the mineralized carbonate rocks |
| **MHG** | The Main Ixtaca High Grade Mineralized Zone comprised of varying density of carbonate-quartz epithermal veining |
| **NHG** | The North Limb High Grade Mineralized Zone |
| **NEHG** | A North east trending extension of High Grade carbonate-quartz epithermal veining |
| **MLG** | A lower grade envelope around the Main High Grade Zone |
| **NLG** | A lower grade envelope around the North Limb High Grade Zone |
| **NELG** | A lower grade envelope around the Eastern North East High Grade Zone |
| **Waste** | All material between and outside of the 7 mineralized zones |

From this list, 3 dimensional solids for each domain have been created in Gemcom software by Almaden geologists, to constrain the estimation. Figure 11-1 is a plan view of the deposit showing all drill holes and the Volcanic Ash unit.

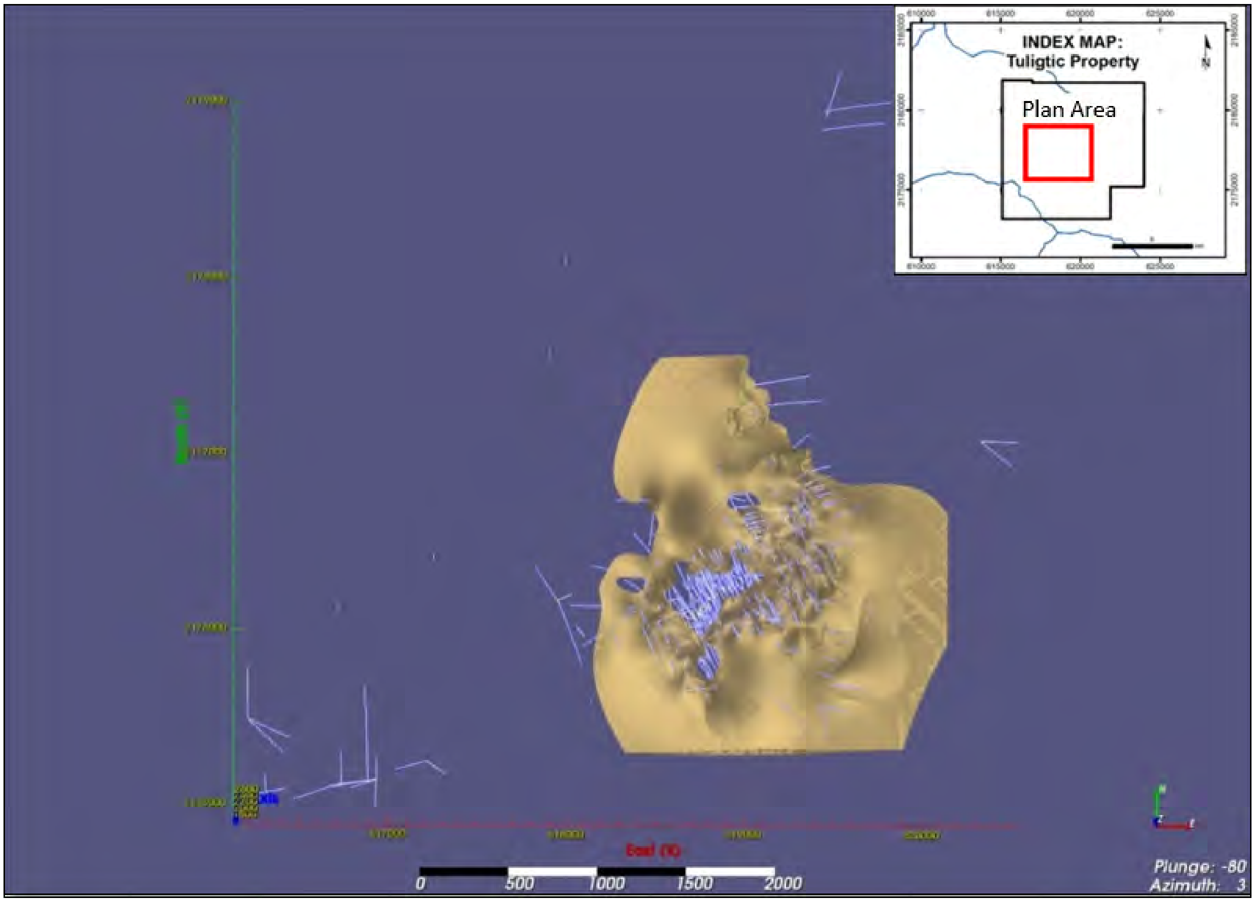



**Figure 11-1 Plan View Showing the Mineralized Volcanic Ash solid and all drill holes**

Figure 14-2 shows the same plan view with the three high grade zone solids.

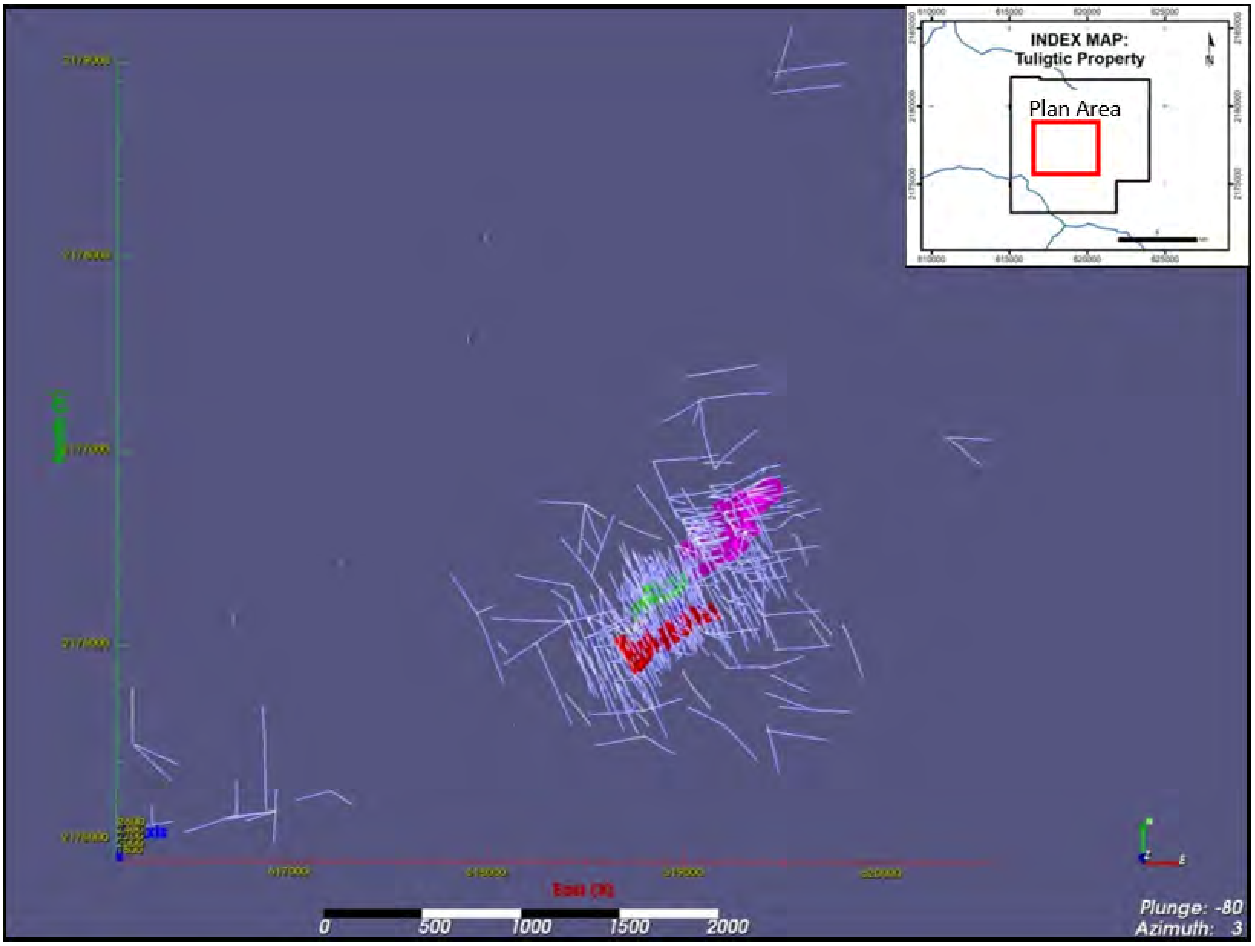



**Figure 11-2 Plan View Showing the Main HG zone in red, the North Limb HG zone in green and the North East HG zone in magenta.**

The main difference between this estimate and the previous one (J. Aarsen, et.al. May 17, 2017 , the "2017 Report") lies in how the low grade was treated. For this estimate low grade shells were constructed around the higher grade zones to constrain the lower grade envelopes. In previous estimates this material was included with internal waste between zones and as a result was diluted. The low grade shells surrounding the high grade zones are shown in Figure 14-3. The drill holes with intersections within the mineralized solids are highlighted in Appendix A. It is worth noting that because of the changes in the geologic solids this list of drill holes differs from the one included in the 2017 Report.

- 26 drill holes were included in the 2019 resource estimate but were not included in the 2017 resource estimate because these drill holes did not intersect the 2017 solids.
- 6 geochemical holes and 2 MET holes were "included" in the 2019 list of drill holes but not in the 2017 list of drill holes since these holes have no assays. They have no impact on the resource estimate.
- 3 drill holes were included in the 2017 resource estimate and not in the 2019 resource estimate because they did not intersect the 2019 solids.

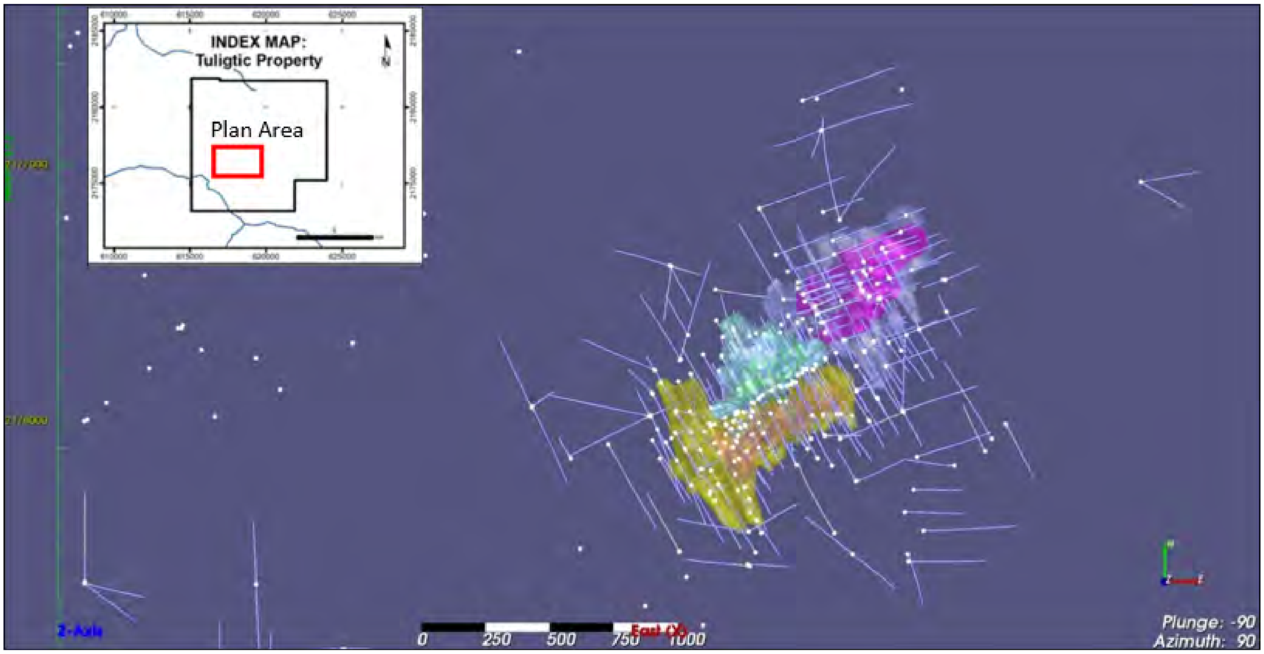



**Figure 11-3 Plan View Showing Main LG in yellow, North Limb LG in blue and NE LG in grey.**

For metallurgical reasons volcanic ash, limestone and black shale lithologies were also modelled.

Drillholes have then been compared to the solids and each assay has been tagged with a code. The statistics for gold and silver are tabulated in Table 11-1 below sorted by mineralized zone. Assays outside the mineralized solids are tagged as waste.

**Table 11-1 Assay Statistics for Gold and Silver Sorted by Mineralized Zone**

| Domain | Variable | Number of Assays | Mean Grade | Standard Deviation | Minimum Value | Maximum Value | Coefficient of Variation |
|---|---|---|---|---|---|---|---|
| ASH | Au (g/t) | 14,617 | 0.50 | 5.30 | 0.003 | 470.0 | 10.59 |
| | Ag (g/t) | | 9.13 | 55.34 | 0.25 | 4340.0 | 6.06 |
| MHG | Au (g/t) | 12,756 | 1.22 | 4.93 | 0.003 | 336.0 | 4.04 |
| | Ag (g/t) | | 76.83 | 214.49 | 0.25 | 9660.0 | 2.79 |
| MLG | Au (g/t) | 22,947 | 0.39 | 2.55 | 0.003 | 167.0 | 6.59 |
| | Ag (g/t) | | 22.16 | 110.49 | 0.25 | 5310.0 | 4.99 |
| NHG | Au (g/t) | 6,650 | 0.76 | 2.89 | 0.003 | 127.5 | 3.78 |
| | Ag (g/t) | | 57.01 | 238.24 | 0.25 | 7650.0 | 4.18 |
| NLG | Au (g/t) | 9,927 | 0.17 | 0.89 | 0.003 | 34.2 | 5.39 |
| | Ag (g/t) | | 19.21 | 107.82 | 0.25 | 4140.0 | 5.61 |
| NEHG | Au (g/t) | 5,629 | 0.77 | 2.68 | 0.003 | 96.4 | 3.47 |
| | Ag (g/t) | | 52.78 | 123.63 | 0.25 | 2720.0 | 2.34 |
| NELG | Au (g/t) | 16,479 | 0.16 | 1.31 | 0.003 | 94.0 | 8.05 |
| | Ag (g/t) | | 13.38 | 57.13 | 0.25 | 3140.0 | 4.37 |
| WASTE | Au (g/t) | 50,036 | 0.04 | 0.29 | 0.003 | 38.1 | 6.84 |
| | Ag (g/t) | | 2.03 | 12.98 | 0.25 | 1010.0 | 6.40 |

The grade distributions for gold and silver, within each mineralized domain, have been examined to determine if capping is required and if so, at what levels. Both elements show skewed distributions in all domains and have been converted to lognormal cumulative frequency plots. Each variable has been examined within each domain with thresholds selected for capping if required. (Table 11-2)

**Table 11-2 Capped Levels for Gold and Silver**

| Domain | Variable | Cap Level (g/t) | Number of Assays capped |
|---|---|---|---|
| ASH | Au | 38.0 g/t | 8 |
| | Ag | 860.0 g/t | 6 |
| MHG | Au | 50.0 g/t | 7 |
| | Ag | 2500.0 g/t | 11 |
| MLG | Au | 42.0 g/t | 13 |
| | Ag | 2050.0 g/t | 9 |
| NHG | Au | 43.0 g/t | 3 |
| | Ag | 3300.0 g/t | 4 |
| NLG | Au | 23.0 g/t | 3 |
| | Ag | 1900.0 g/t | 6 |
| NEHG | Au | 43.0 g/t | 7 |
| | Ag | 1900.0 g/t | 3 |
| NELG | Au | 18.0 g/t | 6 |
| | Ag | 1100.0 g/t | 8 |
| WASTE | Au | 10.0 g/t | 4 |
| | Ag | 530.0 g/t | 5 |

The effects of capping are shown in the following Table 11-3 with minor reductions in mean grade but significant reductions in standard deviations and coefficients of variation.

**Table 11-3 Capped Assay Statistics for Gold and Silver Sorted by Domain**

| Domain | Variable | Number of Assays | Mean Grade | Standard Deviation | Minimum Value | Maximum Value | Coefficient Of Variation |
|---|---|---|---|---|---|---|---|
| **ASH** | Au (g/t) | 14,617 | 0.42 | 1.34 | 0.003 | 38.0 | 3.18 |
| | Ag (g/t) | | 8.69 | 33.53 | 0.25 | 860.0 | 3.86 |
| **MHG** | Au (g/t) | 12,756 | 1.17 | 3.21 | 0.003 | 50.0 | 2.74 |
| | Ag (g/t) | | 75.49 | 184.03 | 0.25 | 2500.0 | 2.44 |
| **MLG** | Au (g/t) | 22,947 | 0.36 | 1.72 | 0.003 | 42.0 | 4.74 |
| | Ag (g/t) | | 21.67 | 95.27 | 0.25 | 2050.0 | 4.40 |
| **NHG** | Au (g/t) | 6,650 | 0.75 | 2.42 | 0.003 | 43.0 | 3.24 |
| | Ag (g/t) | | 55.07 | 191.74 | 0.25 | 3300.0 | 3.48 |
| **NLG** | Au (g/t) | 9,927 | 0.16 | 0.81 | 0.003 | 23.0 | 5.00 |
| | Ag (g/t) | | 18.76 | 95.93 | 0.25 | 1900.0 | 5.11 |
| **NEHG** | Au (g/t) | 5,629 | 0.75 | 2.24 | 0.003 | 43.0 | 2.97 |
| | Ag (g/t) | | 52.38 | 116.21 | 0.25 | 1900.0 | 2.22 |
| **NELG** | Au (g/t) | 16,479 | 0.15 | 0.57 | 0.003 | 18.0 | 3.84 |
| | Ag (g/t) | | 13.12 | 49.17 | 0.25 | 1100.0 | 3.75 |
| **WASTE** | Au (g/t) | 50,036 | 0.04 | 0.19 | 0.003 | 10.0 | 4.78 |
| | Ag (g/t) | | 2.00 | 11.32 | 0.25 | 530.0 | 5.66 |

## 11.2 Composites

Of the 89,005 assays, within the seven domains (not including waste), 88,721 or 99.7% are less than or equal to 3m in length. In addition the bench height is expected to be 6 m. As a result, a 3m composite length was selected. Down hole composites 3m in length are formed to honour the domain boundaries. Composite intervals at the domain boundaries that are less than 1.5m in length are combined with adjoining samples while those greater than or equal to 1.5m are left alone. As a result, the composites form a uniform support of 3±1.5m. Material outside the seven mineralized solids is considered waste. (See Table 11-4)

**Table 11-4 3m Composite Statistics for Gold and Silver Sorted by Mineralized Zone**

| Domain | Variable | Number of Assays | Mean Grade | Standard Deviation | Minimum Value | Maximum Value | Coefficient Of Variation |
|---|---|---|---|---|---|---|---|
| **ASH** | Au (g/t) | 6,470 | 0.35 | 0.78 | 0.003 | 21.1 | 2.25 |
| | Ag (g/t) | | 7.09 | 19.93 | 0.25 | 534.5 | 2.81 |
| **MHG** | Au (g/t) | 3,345 | 0.87 | 1.43 | 0.003 | 21.6 | 1.64 |
| | Ag (g/t) | | 55.94 | 82.00 | 0.25 | 1111.5 | 1.47 |
| **MLG** | Au (g/t) | 7,588 | 0.25 | 0.68 | 0.003 | 16.5 | 2.75 |
| | Ag (g/t) | | 14.20 | 38.50 | 0.25 | 844.3 | 2.71 |
| **NHG** | Au (g/t) | 2,211 | 0.51 | 1.12 | 0.003 | 17.4 | 2.22 |
| | Ag (g/t) | | 36.48 | 91.12 | 0.25 | 1720.3 | 2.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NLG** | Au (g/t) | 4,340 | 0.10 | 0.30 | 0.003 | 5.1 | 2.91 |
| | Ag (g/t) | | 10.05 | 34.82 | 0.25 | 911.0 | 3.47 |
| **NEHG** | Au (g/t) | 1,406 | 0.64 | 1.21 | 0.003 | 20.5 | 1.90 |
| | Ag (g/t) | | 45.18 | 65.90 | 0.47 | 817.6 | 1.46 |
| **NELG** | Au (g/t) | 5,380 | 0.12 | 0.33 | 0.003 | 8.9 | 2.67 |
| | Ag (g/t) | | 10.53 | 30.56 | 0.25 | 812.7 | 2.90 |
| **WASTE** | Au (g/t) | 21,246 | 0.03 | 0.11 | 0.003 | 10.0 | 3.59 |
| | Ag (g/t) | | 1.58 | 5.38 | 0.25 | 360.5 | 3.41 |

To determine if hard or soft boundaries are required between the geologic domains, a series of Contact Plots have been produced. These plots examine the contact area between two geologic domains and compare the average grade for the variable being examined as a function of distance away from this contact. Where large differences appear at the contact, a Hard Boundary should be used with samples from one side of the contact not allowed to influence blocks on the other side. If, on the other hand, the differences are minimal or gradational then a Soft Boundary can be set up with samples allowed to influence block grades from both sides of a contact.

The grades for gold across the contacts are sufficiently different for the ASH, MHG, NHG and NEHG boundaries to make these all Hard Boundaries.

In the case of the MLG-NLG, MLG-NELG and NLG-NELG contacts, the grades are similar for gold and silver across the contacts, which makes these Soft Boundaries.

## 11.3 Variography

Pairwise relative semivariograms were produced for gold and silver within each of the geologic domains. In all cases except for waste, a geometric anisotropy has been observed and nested spherical models are fit to the three principal directions. Due to the high correlation between Au and Ag in each of the domains, gold and silver show similar directions of anisotropy. (Table 11-5)

**Table 11-5 Pearson Correlation Coefficients for Au – Ag Geologic Domains**

| Au:Ag Correlation Coef. | ASH | MHG | NLHG | NEHG | MLG | NLLG | NELG | WASTE |
|---|---|---|---|---|---|---|---|---|
| | 0.7352 | 0.9187 | 0.8800 | 0.6335 | 0.8295 | 0.8470 | 0.7830 | 0.7759 |

Within the Main High Grade zone the longest direction of continuity for both Au and Ag is along azimuth 60° dip 0°. Anisotropy is also demonstrated for both gold and silver within the North High Grade zone with longest ranges along azimuth 60° dip 0° and azimuth 330° dipping -55°.

Similar directions of anisotropy are observed within both the Main Low Grade unit and the North Limb Low Grade unit that surround the Main High Grade and North Limb High Grade Zones.

For the North East extension High Grade mineralization, the longest horizontal ranges for both gold and silver are found along azimuth 20° Dip 0° and azimuth 290° dip -50°. The North East Low Grade Shell that surrounds the NE High Grade, shows longest ranges for both gold and silver along azimuth 20° dip 0°.

Within the Ash zone both gold and silver have been modelled with anisotropic models with longest ranges along azimuth 155° dip 0° and down dip along azimuth 245° dip -45°. However due to the emplacement of the Volcanic ash unit over pre-existing paleo-topography it has different dips in different quadrants (See Figure 14-4). For estimation purposes the semivariogram parameters and search ellipses for the different quadrants in Ash were adjusted to reflect the different slopes.

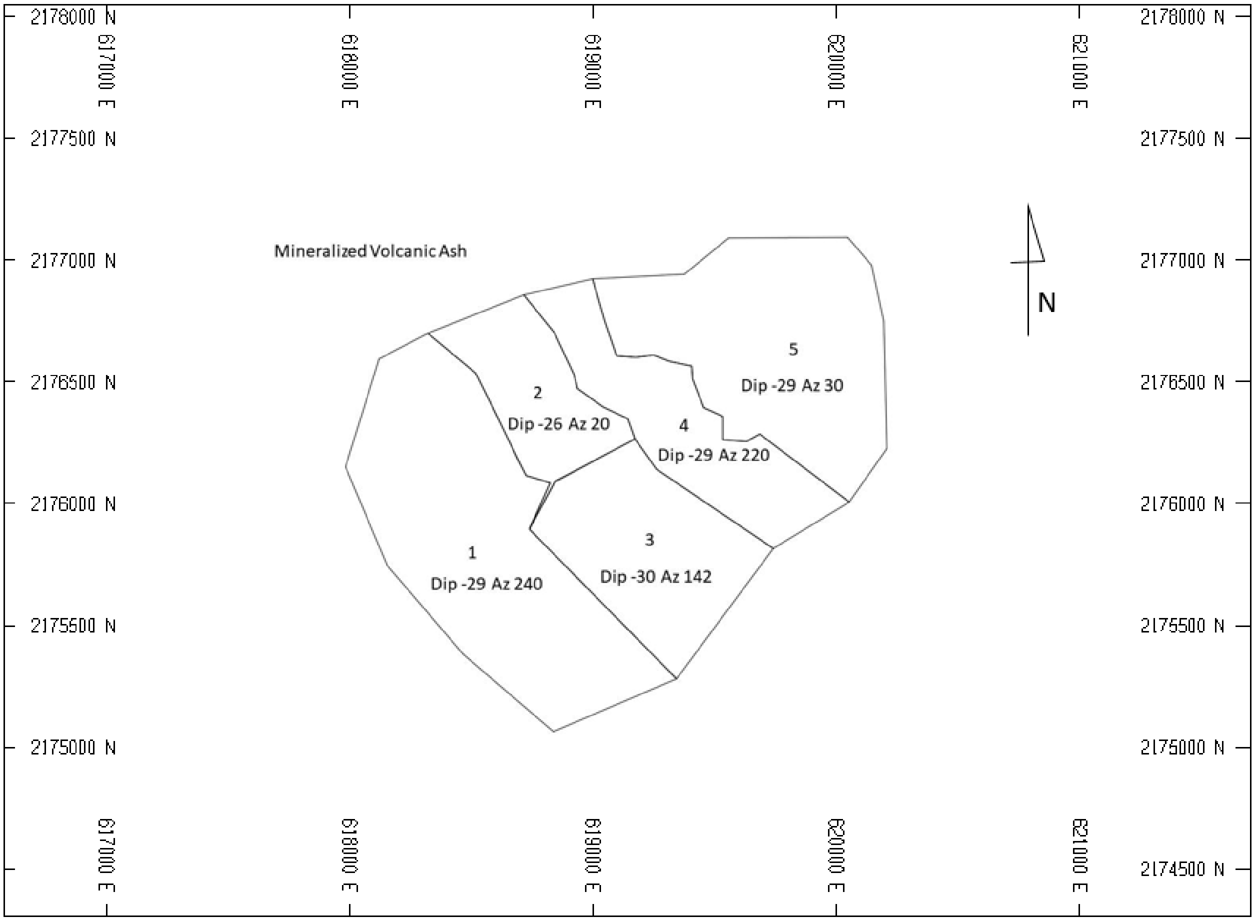



**Figure 11-4 Plan View of Mineralized Volcanic Ash showing the different quadrants for estimation.**
**Note: the entire figure is inside the Almaden claim boundary**

For all of these models nested anisotropic spherical models are applied. Within waste, both gold and silver show isotropic nested structures. The semivariogram parameters are tabulated in Table 14-6.

**Table 11-6 Semivariogram Parameters for Gold and Silver**

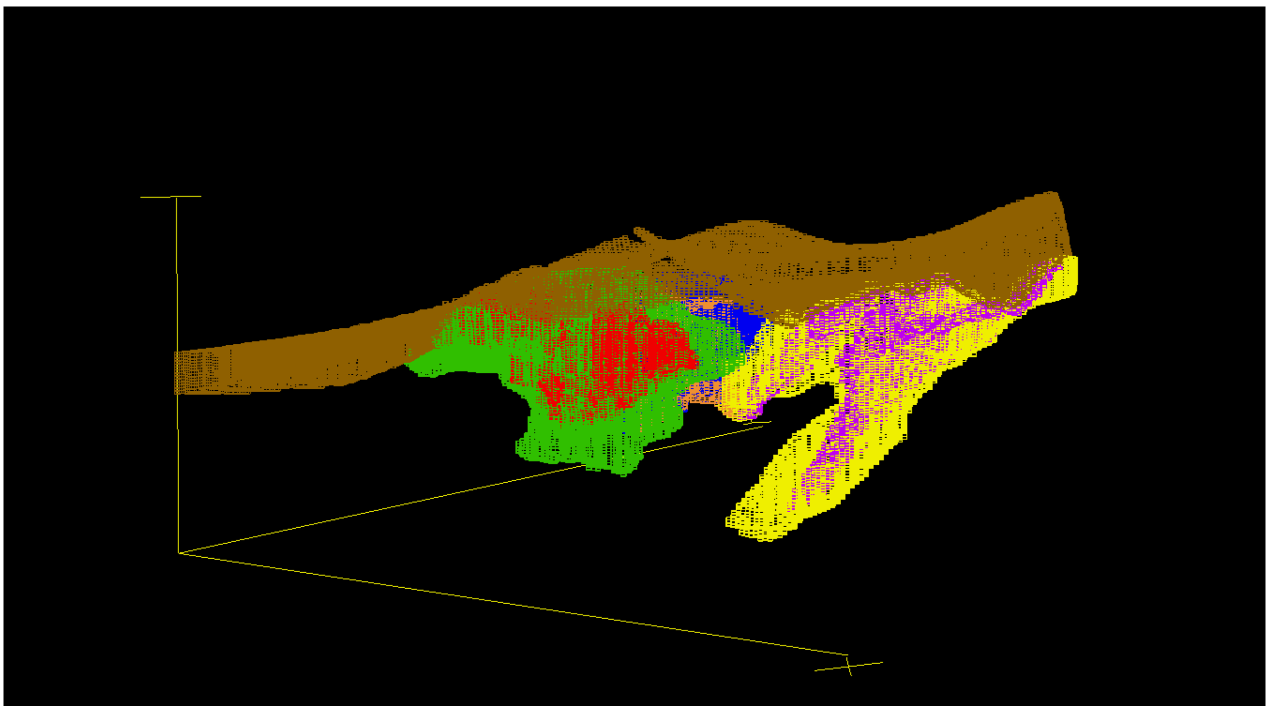
| Domain | Variable | Az/Dip | $C_0$ | $C_1$ | $C_2$ | Short Range (m) | Long Range (m) |
|---|---|---|---|---|---|---|---|
| MHG | Au | 60° / 0° | 0.40 | 0.47 | 0.15 | 20.0 | 120.0 |
| | | 330° / -55° | | | | 20.0 | 100.0 |
| | | 150° / -35° | | | | 20.0 | 100.0 |
| | Ag | 60° / 0° | 0.40 | 0.55 | 0.07 | 30.0 | 150.0 |
| | | 330° / -55° | | | | 20.0 | 120.0 |

| Domain | Variable | Az/Dip | $C_0$ | $C_1$ | $C_2$ | Short Range (m) | Long Range (m) |
|---|---|---|---|---|---|---|---|
| | | 150° / -35° | | | | 20.0 | 120.0 |
| **NLHG** | **Au** | 60° / 0° | 0.40 | 0.44 | 0.17 | 15.0 | 80.0 |
| | | 330° / -55° | | | | 20.0 | 90.0 |
| | | 150° / -35° | | | | 15.0 | 30.0 |
| | **Ag** | 60° / 0° | 0.45 | 0.40 | 0.18 | 15.0 | 80.0 |
| | | 330° / -55° | | | | 18.0 | 80.0 |
| | | 150° / -35° | | | | 15.0 | 30.0 |
| **ASH** | **Au** | 155° / 0° | 0.15 | 0.40 | 0.40 | 50.0 | 140.0 |
| | | 65° / -45° | | | | 30.0 | 80.0 |
| | | 245° / -45° | | | | 30.0 | 90.0 |
| | **Ag** | 155° / 0° | 0.20 | 0.20 | 0.42 | 40.0 | 120.0 |
| | | 65° / -45° | | | | 25.0 | 80.0 |
| | | 245° / -45° | | | | 30.0 | 78.0 |
| **MLG** | **Au** | 60° / 0° | 0.38 | 0.38 | 0.14 | 20.0 | 100.0 |
| | | 330° / -55° | | | | 15.0 | 80.0 |
| | | 150° / -35° | | | | 20.0 | 70.0 |
| | **Ag** | 60° / 0° | 0.40 | 0.35 | 0.15 | 15.0 | 100.0 |
| | | 330° / -55° | | | | 15.0 | 100.0 |
| | | 150° / -35° | | | | 20.0 | 120.0 |
| **NLLG** | **Au** | 60° / 0° | 0.35 | 0.27 | 0.14 | 20.0 | 80.0 |
| | | 330° / -55° | | | | 22.0 | 100.0 |
| | | 150° / -35° | | | | 20.0 | 60.0 |
| | **Ag** | 60° / 0° | 0.40 | 0.32 | 0.18 | 15.0 | 100.0 |
| | | 330° / -55° | | | | 18.0 | 100.0 |
| | | 150° / -35° | | | | 25.0 | 90.0 |
| **NEHG** | **Au** | 20° / 0° | 0.30 | 0.35 | 0.23 | 18.0 | 120.0 |
| | | 290° / -50° | | | | 30.0 | 150.0 |
| | | 110° / -40° | | | | 25.0 | 80.0 |
| | **Ag** | 20° / 0° | 0.35 | 0.20 | 0.24 | 10.0 | 80.0 |
| | | 290° / -50° | | | | 20.0 | 120.0 |
| | | 110° / -40° | | | | 3.0 | 50.0 |
| **NELG** | **Au** | 20° / 0° | 0.30 | 0.30 | 0.11 | 30.0 | 100.0 |
| | | 290° / -50° | | | | 10.0 | 100.0 |
| | | 110° / -40° | | | | 40.0 | 60.0 |
| | **Ag** | 20° / 0° | 0.38 | 0.28 | 0.24 | 15.0 | 100.0 |
| | | 290° / -50° | | | | 15.0 | 48.0 |
| | | 110° / -40° | | | | 36.0 | 60.0 |
| **WASTE** | **Au** | Omni Directional | 0.15 | 0.35 | 0.26 | 34.0 | 150.0 |
| | **Ag** | Omni Directional | 0.15 | 0.30 | 0.24 | 34.0 | 150.0 |

## 11.4 Block Model

A rotated block model with blocks 10 m NE-SW, 10 m NW-SE and 6m high has been superimposed over the mineralized solids. This differs from previous models which used 5 m high blocks. The model is rotated 30° counter clockwise to line up with drill sections and line up with the mineralized structures. Within each block, the percentage below surface topography and the percentage inside each mineralized solid are recorded. These percentages are checked to assure there is no overlap. The block model origin shown in Figure 11-5 is as follows:

| | | |
|---|---|---|
| Lower Left Corner | | |
| 618578 E | Column size = 10m | 180 columns |
| 2175235 N | Row size = 10m | 150 rows |
| | | |
| Top of Model | | |
| 2604 Elevation | Level size = 6m | 169 levels |
| Rotation 30° counter clockwise | | |



*Note: ASH in brown, MHG in red, MLG in green, NHG in orange, NLG in blue, NEHG in purple and NELG in yellow*

**Figure 11-5 Isometric View Looking NW Showing Mineralized Blocks.**

## 11.5 Bulk Density

A total of 425 specific gravity determinations have been collected on a routine basis across the Ixtaca mineralized zone on cross sections 250E (western border of Ixtaca), 550E (central part of zone) and 1150E (eastern section of zone).

- Section 250E: Drillholes TU-11-030, TU-11-033, TU-11-040, TU-11-045, TU-11- 074 and TU-11-075.

- Section 550E: Drillholes TU-10-011, TU-10-013, TU-11-016, TU-11-019, TU-11- 059, TU-11-066 and TU-11-078.
- Section 1150E: Drillholes TU-11-041, TU-11-046, CA-11-002 and CA-11-003.

The measurements have been made on drill core samples using the Archimedes (weight in air-weight in water) method. The relative number of analysis is shown in the Table below:

**Table 11-7 Specific Gravity Determinations Sorted by Cross Section**

| Cross Section | Number of Samples | Minimum SG | Maximum SG | Average SG |
|---|---|---|---|---|
| 550 E | 223 | 1.33 | 3.28 | 2.57 |
| 250 E | 88 | 1.42 | 2.69 | 2.41 |
| 1150 E | 114 | 1.43 | 3.21 | 2.60 |
| **Total** | **425** | **1.33** | **3.28** | **2.55** |

The data is also sorted by lithology.

**Table 11-8 Specific Gravity Determinations Sorted by Lithology**

| Lithology Code | Lithology | Number of Samples | Average SG |
|---|---|---|---|
| **Ash** | Ash unit | 33 | 1.67 |
| **Bx/Lm** | Breccia / Limestone | 3 | 2.45 |
| **Df** | Felsic Dyke | 71 | 2.46 |
| **Dm** | Mafic Dyke | 7 | 2.70 |
| **Dp** | Porphyritic Dyke | 25 | 2.59 |
| **Lch** | Limestone/chert | 58 | 2.65 |
| **Lg** | Lime < 10% mud | 10 | 2.67 |
| **Lm** | Lime Mudstone | 72 | 2.67 |
| **Lp** | Lime Packstone | 37 | 2.59 |
| **Ls** | Limestone undifferentiated | 2 | 2.65 |
| **Lw** | Lime wackestone | 2 | 2.58 |
| **Min** | Mineralized qtz. veining | 7 | 2.96 |
| **Pp** | Principal Porphyry | 2 | 2.58 |
| **ShB** | Shale | 56 | 2.61 |
| **ShG** | Green Shale | 3 | 2.44 |
| **Skn** | Skarn | 20 | 2.89 |
| **Slt** | Siltstone | 17 | 2.71 |

Table 11-8 summarizes specific gravity values for all lithologies studied in all three sections. Values in the Table have been averaged for each lithology. Values from these lithologies have then been averaged within the various geologic domains to produce the following specific gravities for converting volumes to tonnes:

- The ash domain has an average specific gravity of 1.67
- The low grade limestone (LGLM) domain has an average specific gravity of 2.66
- The main high grade (MHG) domain has an average specific gravity of 2.63 (this unit contains about 20% Felsic Dyke)

- The main high grade zone (NHG) North limb has an average specific gravity of 2.60 (this north limb contains about 40% Felsic Dyke and 40% Mafic Dyke)
- The low grade shale (LGSHW & LGSHE) domains have an average specific gravity of 2.61
- The North East extension high grade (NEHG) domain has an average specific gravity of 2.65

## 11.6 Grade Interpolation

Grades for gold and silver have been interpolated into the blocks by Ordinary Kriging. Each kriging run has been completed in a series of passes with the search ellipse orientation and dimension a function of the semivariogram for the domain and variable being estimated. The first pass uses search dimensions equal to ¼ the semivariogram range in the three principal directions. A minimum of four composites are required to estimate a block with a maximum of three from any given drillhole. In this manner, all blocks are estimated with a minimum of two drillhole. For blocks not estimated in pass 1, a second pass using ½ the semivariogram range has been completed. A third pass using the full range and a fourth pass using twice the range has followed. Finally because there were many blocks containing multiple domains, a fifth pass has often been required to ensure all domains were estimated. In all passes the maximum number of composites used is twelve and if more were found in any search, the closest twelve are used.

As mentioned in Section 14.3 the volcanic ash was subdivided into 5 separate domains with the search ellipse modified for each subdomain to reflect pre-deposition topography. As a result each subdomain in ash was estimated separately (see Table 14-9).

Once all domains are completed, estimated blocks containing some percentage outside the mineralized domains are estimated in a similar manner using composites from outside the mineralized domains (waste). Finally blocks completely in waste are estimated using composites from outside the mineralized solids.

For all blocks along the contacts, containing multiple domains, a weighted average grade for gold and silver is produced. The search parameters for gold within each domain and the number of blocks estimated in each pass are tabulated in the following Table 14-9.

**Table 11-9 Kriging Parameters for Gold in Each Domain**

| Domain | Pass | Number Estimated | Az /Dip | Dist. (m) | Az /Dip | Dist. (m) | Az /Dip | Dist. (m) |
|---|---|---|---|---|---|---|---|---|
| MHG | 1 | 11,263 | 60 / 0 | 30.0 | 330 / -55 | 25.0 | 150 / -35 | 25.0 |
| | 2 | 3,349 | 60 / 0 | 60.0 | 330 / -55 | 50.0 | 150 / -35 | 50.0 |
| | 3 | 61 | 60 / 0 | 120.0 | 330 / -55 | 100.0 | 150 / -35 | 100.0 |
| NLHG | 1 | 2,009 | 60 / 0 | 20.0 | 330 / -55 | 22.5 | 150 / -35 | 7.5 |
| | 2 | 5,891 | 60 / 0 | 40.0 | 330 / -55 | 45.0 | 150 / -35 | 15.0 |
| | 3 | 1,441 | 60 / 0 | 80.0 | 330 / -55 | 90.0 | 150 / -35 | 30.0 |
| | 4 | 21 | 60 / 0 | 160.0 | 330 / -55 | 180.0 | 150 / -35 | 60.0 |
| NEHG | 1 | 6,721 | 20 / 0 | 30.0 | 290 / -50 | 37.5 | 110 / -40 | 20.0 |
| | 2 | 5,292 | 20 / 0 | 60.0 | 290 / -50 | 75.0 | 110 / -40 | 40.0 |
| | 3 | 237 | 20 / 0 | 120.0 | 290 / -50 | 150.0 | 110 / -40 | 80.0 |
| MLG | 1 | 15,145 | 60 / 0 | 25.0 | 330 / -55 | 20.0 | 150 / -35 | 17.5 |
| | 2 | 36,285 | 60 / 0 | 50.0 | 330 / -55 | 40.0 | 150 / -35 | 35.0 |
| | 3 | 7,635 | 60 / 0 | 100.0 | 330 / -55 | 80.0 | 150 / -35 | 70.0 |
| | 4 | 183 | 60 / 0 | 200.0 | 330 / -55 | 160.0 | 150 / -35 | 140.0 |
| NLLG | 1 | 7,319 | 60 / 0 | 20.0 | 330 / -55 | 25.0 | 150 / -35 | 15.0 |
| | 2 | 17,039 | 60 / 0 | 40.0 | 330 / -55 | 50.0 | 150 / -35 | 30.0 |
| | 3 | 4,433 | 60 / 0 | 80.0 | 330 / -55 | 100.0 | 150 / -35 | 60.0 |
| | 4 | 4 | 60 / 0 | 160.0 | 330 / -55 | 200.0 | 150 / -35 | 120.0 |
| NELG | 1 | 11,630 | 20 / 0 | 25.0 | 290 / -50 | 25.0 | 110 / -40 | 15.0 |
| | 2 | 34,653 | 20 / 0 | 50.0 | 290 / -50 | 50.0 | 110 / -40 | 30.0 |
| | 3 | 11,354 | 20 / 0 | 100.0 | 290 / -50 | 100.0 | 110 / -40 | 60.0 |
| | 4 | 2,158 | 20 / 0 | 200.0 | 290 / -50 | 200.0 | 110 / -40 | 120.0 |
| ASH 1 | 1 | 1,131 | 155 / 0 | 35.0 | 65 / -6 1 | 20.0 | 245 / -29 | 22.5 |
| | 2 | 6,718 | 155 / 0 | 70.0 | 65 / -6 1 | 40.0 | 245 / -29 | 45.0 |
| | 3 | 12,983 | 155 / 0 | 140.0 | 65 / -6 1 | 80.0 | 245 / -29 | 90.0 |
| | 4 | 15,780 | 155 / 0 | 280.0 | 65 / -6 1 | 160.0 | 245 / -29 | 180.0 |
| ASH 2 | 1 | 1,800 | 335 / -26 | 35.0 | 245 / -45 | 20.0 | 65 / -45 | 22.5 |
| | 2 | 2,330 | 335 / -26 | 70.0 | 245 / -45 | 40.0 | 65 / -45 | 45.0 |
| | 3 | 2,789 | 335 / -26 | 140.0 | 245 / -45 | 80.0 | 65 / -45 | 90.0 |
| | 4 | 5,835 | 335 / -26 | 280.0 | 245 / -45 | 160.0 | 65 / -45 | 180.0 |
| ASH 3 | 1 | 1,888 | 155 / -30 | 35.0 | 65 / -45 | 20.0 | 245 / -45 | 22.5 |
| | 2 | 12,897 | 155 / -30 | 70.0 | 65 / -45 | 40.0 | 245 / -45 | 45.0 |
| | 3 | 21,616 | 155 / -30 | 140.0 | 65 / -45 | 80.0 | 245 / -45 | 90.0 |
| | 4 | 12,892 | 155 / -30 | 280.0 | 65 / -45 | 160.0 | 245 / -45 | 180.0 |
| ASH 4 | 1 | 9,113 | 155 / 0 | 35.0 | 65 / -61 | 20.0 | 245 / -29 | 22.5 |
| | 2 | 13,058 | 155 / 0 | 70.0 | 65 / -61 | 40.0 | 245 / -29 | 45.0 |
| | 3 | 17,856 | 155 / 0 | 140.0 | 65 / -61 | 80.0 | 245 / -29 | 90.0 |
| | 4 | 18,597 | 155 / 0 | 280.0 | 65 / -61 | 160.0 | 245 / -29 | 180.0 |
| ASH 5 | 1 | 1,788 | 155 / 0 | 35.0 | 65 / -29 | 20.0 | 245 / -61 | 22.5 |
| | 2 | 7,711 | 155 / 0 | 70.0 | 65 / -29 | 40.0 | 245 / -61 | 45.0 |
| | 3 | 13,258 | 155 / 0 | 140.0 | 65 / -29 | 80.0 | 245 / -61 | 90.0 |
| | 4 | 8,521 | 155 / 0 | 280.0 | 65 / -29 | 160.0 | 245 / -61 | 180.0 |
| WASTE | 1 | 123,586 | Omni Directional | | | 37.5 | | |
| | 2 | 367,449 | Omni Directional | | | 75.0 | | |
| | 3 | 788,542 | Omni Directional | | | 150.0 | | |

## 11.7 Classification

Based on the study herein reported, delineated mineralisation of Ixtaca is classified as a resource according to the following definitions from SEC Disclosure by Registrants engaged in Mining Operations:
The terms Measured, Indicated and Inferred are defined as follows:
"Mineral resource is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled.

**Inferred Mineral Resource**

"Inferred mineral resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve."

**Indicated Mineral Resource**

**"**Indicated mineral resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve."

**Measured Mineral Resource**

"Measured mineral resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a qualified person to apply modifying factors, as defined in this section, in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve."

**Modifying Factors**

**"**Modifying factors are the factors that a qualified person must apply to indicated and measured mineral resources and then evaluate in order to establish the economic viability of mineral reserves. A qualified person must apply and evaluate modifying factors to convert measured and indicated mineral resources to proven and probable mineral reserves. These factors include, but are not restricted to: Mining; processing; metallurgical; infrastructure; economic; marketing; legal; environmental compliance; plans, negotiations, or agreements with local individuals or groups; and governmental factors. The number, type and specific characteristics of the modifying factors applied will necessarily be a function of and depend upon the mineral, mine, property, or project."

At Ixtaca, the geologic continuity has been established through surface mapping and drillhole interpretation. This has resulted in a multi domain interpretation that has been used to constrain the Resource Estimate. For this estimate the volcanic ash unit has been further subdivided into 5 subdomains to better reflect pre-deposition topography. The grade continuity within each domain has been quantified by semivariogram analysis. The semivariograms have been used to determine the search directions and distances for each pass in the kriging procedure. Using the semivariogram range to estimate blocks would allow classification as follows:

- Blocks estimated in Pass 1 for both Au and Ag using ¼ of the semivariogram range are considered Measured.
- Blocks estimated in Pass 2 using ½ of the semivariogram range are considered Indicated
- All other blocks would be classified as Inferred.

A range of cut-offs are presented to demonstrate the sensitivity of the deposit to grade variations.

The Resource Tables are shown below using gold equivalent cut-offs where:

Gold –price of $1250 / oz
Silver –price of $18 / oz

Metallurgy has shown roughly equivalent metal recoveries for Au and Ag so for now the Au Equivalent equation is:

$$AuEq = Au + (Ag * 18 / 1250)$$

In the author's judgement and experience the resource stated has reasonable prospects of economic extraction. A cut-off of 0.30g/t AuEq has been highlighted as a possible cut-off for open pit mining based on studies described in later sections of this report where an NSR based cut-off is determined and the resource present within an optimized pit shell is tabulated.

**Table 11-10 Measured Resource for Total Blocks**

| AuEq Cut-off (g/t) | Tonnes > Cut-off (tonnes) | Grade>Cut-off | | | Contained Metal x1000 | | |
|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| 0.10 | 60,990,000 | 0.47 | 27.59 | 0.87 | 918 | 54,100 | 1,698 |
| 0.20 | 50,740,000 | 0.55 | 32.19 | 1.01 | 894 | 52,510 | 1,649 |
| 0.25 | 46,850,000 | 0.58 | 34.25 | 1.08 | 878 | 51,580 | 1,621 |
| **0.30** | **43,380,000** | **0.62** | **36.27** | **1.14** | **862** | **50,590** | **1,591** |
| 0.40 | 37,340,000 | 0.69 | 40.35 | 1.27 | 826 | 48,440 | 1,523 |
| 0.50 | 32,530,000 | 0.75 | 44.27 | 1.39 | 788 | 46,300 | 1,454 |
| 0.60 | 28,490,000 | 0.82 | 48.04 | 1.51 | 749 | 44,010 | 1,383 |
| 0.70 | 25,080,000 | 0.88 | 51.71 | 1.63 | 711 | 41,700 | 1,312 |
| 0.80 | 22,270,000 | 0.94 | 55.17 | 1.74 | 675 | 39,500 | 1,244 |
| 1.00 | 17,870,000 | 1.06 | 61.69 | 1.95 | 608 | 35,440 | 1,118 |

**Table 11-11 Indicated Resource for Total Blocks**

| AuEq Cut-off (g/t) | Tonnes > Cut-off (tonnes) | Grade>Cut-off | | | Contained Metal x1000 | | |
|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| 0.10 | 138,060,000 | 0.30 | 15.67 | 0.53 | 1,341 | 69,540 | 2,344 |
| 0.20 | 104,990,000 | 0.37 | 19.18 | 0.65 | 1,256 | 64,740 | 2,187 |
| 0.25 | 92,080,000 | 0.41 | 20.91 | 0.71 | 1,202 | 61,910 | 2,093 |
| **0.30** | **80,760,000** | **0.44** | **22.67** | 0.77 | **1,145** | **58,870** | **1,994** |
| 0.40 | 62,160,000 | 0.51 | 26.34 | 0.89 | 1,027 | 52,640 | 1,787 |
| 0.50 | 48,220,000 | 0.59 | 30.13 | 1.02 | 913 | 46,710 | 1,586 |
| 0.60 | 37,820,000 | 0.67 | 33.94 | 1.15 | 809 | 41,270 | 1,402 |
| 0.70 | 29,980,000 | 0.74 | 37.79 | 1.29 | 715 | 36,430 | 1,240 |
| 0.80 | 24,150,000 | 0.82 | 41.53 | 1.42 | 635 | 32,240 | 1,099 |
| 1.00 | 16,730,000 | 0.96 | 47.94 | 1.65 | 516 | 25,790 | 888 |

**Table 11-12 Inferred Resource for Total Blocks**

| AuEq Cut-off (g/t) | Tonnes > Cut-off (tonnes) | Grade>Cut-off | | | Contained Metal x1000 | | |
|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| 0.10 | 106,910,000 | 0.20 | 9.10 | 0.33 | 670 | 31,270 | 1,121 |
| 0.20 | 66,800,000 | 0.25 | 12.51 | 0.44 | 546 | 26,860 | 934 |
| 0.25 | 51,470,000 | 0.29 | 14.69 | 0.50 | 473 | 24,310 | 822 |
| **0.30** | **40,410,000** | **0.32** | **16.83** | **0.56** | **412** | **21,870** | **726** |
| 0.40 | 25,830,000 | 0.37 | 21.19 | 0.68 | 310 | 17,600 | 564 |
| 0.50 | 16,920,000 | 0.44 | 25.43 | 0.80 | 237 | 13,830 | 436 |
| 0.60 | 11,290,000 | 0.51 | 29.30 | 0.93 | 184 | 10,640 | 337 |
| 0.70 | 7,760,000 | 0.57 | 33.80 | 1.06 | 142 | 8,430 | 264 |
| 0.80 | 5,570,000 | 0.64 | 37.80 | 1.18 | 114 | 6,770 | 211 |
| 1.00 | 3,040,000 | 0.79 | 43.64 | 1.42 | 77 | 4,270 | 139 |

**Table 11-13 Measured + Indicated Resource for Total Blocks**

| AuEq Cut-off (g/t) | Tonnes > Cut-off (tonnes) | Grade>Cut-off | | | Contained Metal x1000 | | |
|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | AuEq (g/t) | Au (oz) | Ag (oz) | AuEq (oz) |
| 0.10 | 199,050,000 | 0.35 | 19.32 | 0.63 | 2,259 | 123,640 | 4,038 |
| 0.20 | 155,730,000 | 0.43 | 23.42 | 0.77 | 2,148 | 117,250 | 3,835 |
| 0.25 | 138,930,000 | 0.47 | 25.41 | 0.83 | 2,082 | 113,490 | 3,716 |
| **0.30** | **124,140,000** | **0.50** | **27.42** | **0.90** | **2,008** | **109,450** | **3,584** |
| 0.40 | 99,500,000 | 0.58 | 31.60 | 1.04 | 1,855 | 101,080 | 3,311 |
| 0.50 | 80,750,000 | 0.66 | 35.82 | 1.17 | 1,701 | 93,000 | 3,040 |
| 0.60 | 66,310,000 | 0.73 | 40.00 | 1.31 | 1,558 | 85,280 | 2,786 |
| 0.70 | 55,060,000 | 0.81 | 44.13 | 1.44 | 1,427 | 78,130 | 2,551 |
| 0.80 | 46,410,000 | 0.88 | 48.07 | 1.57 | 1,310 | 71,730 | 2,344 |
| 1.00 | 34,600,000 | 1.01 | 55.04 | 1.80 | 1,124 | 61,230 | 2,006 |

*Where Total Blocks means one would mine complete 10 x 10 x 6 m blocks taking in dilution around the edges of the mineralized solids.*

## 11.8 Block Model Verification

To check the results, level plans have been produced on about 50m intervals through the deposit. Estimated block grades have been checked against composite grades above and below the bench level. The results matched reasonably well with no bias indicated. Example bench levels are shown in Figure 11-6 to Figure 11-7 for bench levels 2202 and 2100 (Note only mineralized domains are shown and waste blocks are left out).

Another check on the results has been completed by comparing the average composite grade for each domain with the average kriged grades for that domain (Table 11-14). Again no bias is indicated.

**Table 11-14 Comparison of Composite Mean Au Grade to Block Mean Au Grade**

| Domain | Variable | Number of Composites | Mean Grade Composites | Number of Blocks | Mean Grade Blocks |
|---|---|---|---|---|---|
| **ASH** | Au (g/t) | 6,470 | 0.35 | 190,636 | 0.17 |
| | Ag (g/t) | | 7.09 | | 4.67 |
| **MHG** | Au (g/t) | 3,345 | 0.87 | 14,673 | 0.86 |
| | Ag (g/t) | | 55.94 | | 56.40 |
| **NLHG** | Au (g/t) | 2.211 | 0.51 | 9,362 | 0.45 |
| | Ag (g/t) | | 36.48 | | 32.81 |
| **NEHG** | Au (g/t) | 1,406 | 0.64 | 12,250 | 0.73 |
| | Ag (g/t) | | 45.18 | | 39.54 |
| **MLG** | Au (g/t) | 7,588 | 0.25 | 59,248 | 0.25 |
| | Ag (g/t) | | 14.20 | | 12.94 |
| **NLLG** | Au (g/t) | 4,340 | 0.10 | 28,795 | 0.10 |
| | Ag (g/t) | | 10.05 | | 9.68 |
| **NELG** | Au (g/t) | 5,380 | 0.12 | 59,795 | 0.14 |
| | Ag (g/t) | | 10.53 | | 11.17 |
| **WASTE** | Au (g/t) | 21,246 | 0.03 | 1,196,652 | 0.02 |
| | Ag (g/t) | | 1.58 | | 1.66 |

The following legend can be used to show the levels of gold found in the Figures below:

- Au >= 0.0 < 0.2g/t is shown in black
- Au >= 0.2 < 0.4g/t is shown in blue
- Au >= 0.4 < 0.6g/t is shown in green
- Au >= 0.6 < 0.8g/t is shown in orange
- Au >= 0.8 < 1.0g/t is shown in red
- Au >= 1.0g/t is shown in pink
- Composites are shown 6m above and below bench.

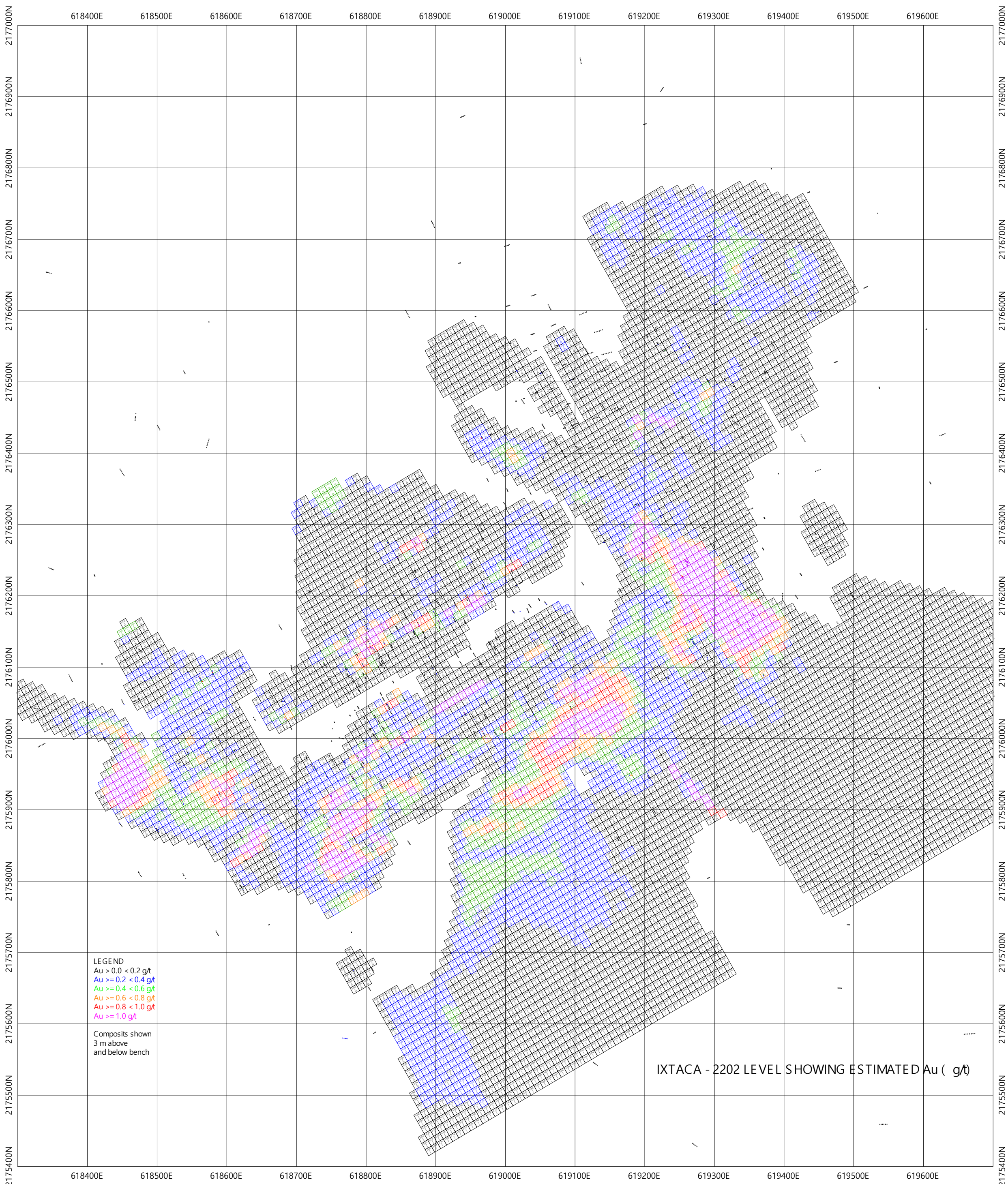



**Figure 11-6 Ixtaca 2202 Level Plan Showing Estimated Gold in Blocks**

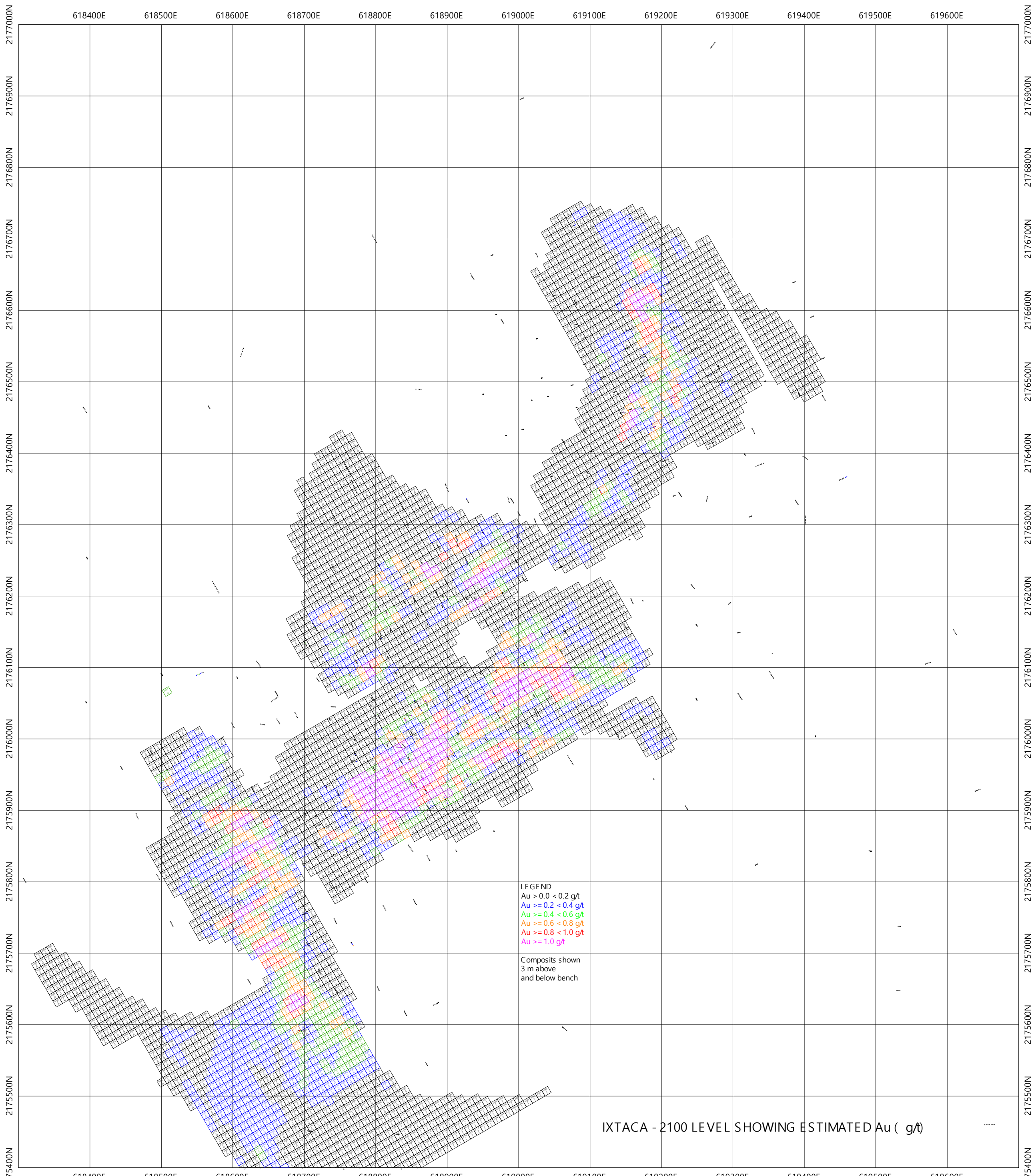



**Figure 11-7 Ixtaca 2100 Level Plan Showing Estimated Gold in Blocks**

# 12.0 Mineral Reserve Estimates

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

Detailed pit designs are engineered from the results of the Lerchs-Grossman (LG) analysis, and the contents of these designed pits are run with the following cut-offs and loss and dilution factors.

## 12.1 Cut-Off Grade

The multiple metals along with varying gold/silver grade ratios and process recoveries require that an economic cut-off grade is used for ore/waste definition. Net-Smelter-Return (NSR) values ($/t) are calculated for each mineralized block in the resource model using Base Case Net Smelter Prices (NSP). NSP is based on the market price and applies refining and transport costs to arrive at an internal price value. The NSP is used along with the metal grades and process recoveries to calculate the $/t value (NSR) of each mineralized block. NSP values used in the cut-off grade calculation are shown in the table below:

**Table 12-1 Metal Prices and NSP**

| | Metal Price ($/oz) | NSP ($/oz) | NSP ($/gram) |
|---|---|---|---|
| Au | $1,300 | $1,286 | $41.36 |
| Ag | $17 | $15.23 | $0.49 |

The process recoveries used in the NSR calculation are shown in the Table below:

**Table 12-2 Process Recoveries for Block Model NSR coding**

| Rock-Type | Au recovery | Ag recovery |
|---|---|---|
| Volcanic | 50% | 90% |
| Limestone | 90% | 90% |
| Shale | 50% | 90% |

NSR is calculated for each block as follows:

NSR($/t) = [NSP(Au) * Au(g/t) * Recovery(Au)] + [NSP(Ag) * Ag(g/t) * Recovery(Ag)]

Where:

- NSP(Au) = Net Smelter Price for gold ($/gram)
- NSP(Ag) = Net Smelter Price for silver ($/gram)
- Au(g/t) = Gold grade of the block in grams/tonne
- Ag(g/t) = Silver grade of the block in grams/tonne
- Recovery(Au) = Process Recovery for gold (%)
- Recovery(Ag) = Process Recovery for silver (%)

A cut-off grade of NSR>=$14/tonne is used for Mineral Reserve calculations.

## 12.2 Loss and Dilution

A mining recovery of 95% is applied to in-situ material.

Dilution is applied to in-situ material with dilution grades varying by rock-type according to

Table 12-3.

**Table 12-3 Dilution Grades**

| | | Dilution Grades | | |
|---|---|---|---|---|
| **Rock-Type** | **Dilution %** | **Au – g/t** | **Ag – g/t** | **NSR - $/t** |
| Volcanic | 6% | 0.42 | 9.70 | 13 |
| Limestone | 4% | 0.19 | 13.35 | 13 |
| Shale | 6% | 0.22 | 19.26 | 13 |

Dilution tonnes are added to mining recovered tonnes to calculate run-of-mine (ROM) tonnes delivered to the crusher.

## 12.3 Mineral Reserves

A mineral reserve according to the SEC Disclosure by Registrants engaged in Mining Operations is defined as follows:

A Mineral reserve is an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.
The terms Proven and Probable are defined as follows:

A probable mineral reserve is the economically mineable part of an indicated and, in some cases, a measured mineral resource.

Proven mineral reserve is the economically mineable part of a measured mineral resource and can only result from conversion of a measured mineral resource.

Only Measured and Indicated Resource Class materials are included in the Mineral Reserves. All Inferred Resource Class material is treated as waste in calculating economic pit limits and in subsequent reserves reporting, scheduling and economics.

Proven and Probable Reserves are derived from the Measured and Indicated Resource Class blocks within the designed pits and are summarized in the following Table 12-4. Mineral Reserves are stated as Run Of Mine (ROM) and represent mined ore delivered to the mill.

**Table 12-4 Mineral Reserves**

| | ROM Tonnes | Diluted Average Grades | | Contained Metal | |
|---|---|---|---|---|---|
| | (millions) | Au (g/t) | Ag (g/t) | Au - '000 ozs | Ag - '000 ozs |
| **Proven** | 31.6 | 0.70 | 43.5 | 714 | 44,273 |
| **Probable** | 41.4 | 0.51 | 30.7 | 673 | 40,887 |
| **TOTAL** | 73.1 | 0.59 | 36.3 | 1,387 | 85,159 |

*Notes to Mineral Reserve table:*

- *Mineral Reserves have an effective date of November 30, 2018.The qualified person responsible for the Mineral Reserves is Jesse Aarsen, P.Eng of Moose Mountain Technical Services.*
- *The cut-off grade used for ore/waste determination is NSR>=$14/t*
- *All Mineral Reserves in this table are Proven and Probable Mineral Reserves. The Mineral Reserves are not in addition to the Mineral Resources but are a subset thereof. All Mineral Reserves stated above account for mining loss and dilution.*
- *Associated metallurgical recoveries (gold and silver, respectively) have been estimated as 90% and 90% for limestone, 50% and 90% for volcanic, 50% and 90% for black shale.*
- *Reserves are based on a US$1,300/oz gold price, US$17/oz silver price and an exchange rate of US$1.00:MXP20.00.*
- *Reserves are converted from resources through the process of pit optimization, pit design, production schedule and supported by a positive cash flow model.*
- *Rounding as required by reporting guidelines may result in summation differences.*

# 13.0 Mining Method

The information in this section was drawn from the most recent major study prepared entitled “The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study” dated January 24$^{th}$ 2019 and updated October 3, 2019.

## 13.1 Introduction

A mine plan, mine production schedule, and mine capital and operating costs have been developed for the Project. The following section describes the results of the mine planning completed for this study, including: ultimate pit limits, pit phasing and designs, haul road and Rock Storage Facility (RSF) designs, mine production scheduling, mine operations planning, and mine fleet selection.

The mine engineering in this study has been done with the MineSight® suite of programs. The mining model considers whole block tonnes and grades.

## 13.2 Mining Study Basis

### 13.2.1 Mine Planning Datum

Topography is based on a survey done using WorldView2 satellite with 50cm resolution in stereo. One metre contour lines generated from this survey are used to form the topography surface used for Mineral Reserve and volume calculations.

### 13.2.2 Resource Classes

Only Measured and Indicated Resources are included in the Ixtaca mine plan. Inferred Resources are treated as waste.

### 13.2.3 Metallurgical Recovery for Mine Planning

Metallurgical recoveries from mill feed are used for pit optimization and cut-off grade estimation. Recoveries vary by rock-type and are shown in the Table below.

**Table 13-1 Metallurgical Recovery Assumptions**

| Rock-Type | Au Recovery | Ag Recovery |
|---|---|---|
| Volcanic | 50% | 90% |
| Limestone | 90% | 90% |
| Shale | 50% | 90% |

### 13.2.4 Cut-off Grade

Based on the multiple metals, varying metal grade ratios and varying process recoveries, an economic value for each block is calculated. The NSR ($/t) value takes in-situ grades, off-site prices, and process recoveries into account and is described in Section 12. The cut-off grade used is NSR>=$14.

### 13.2.5 Mining Dilution and Loss

Mining recovery and dilution are applied to pit reserves. The in-situ resource estimate already includes internal dilution as whole block grades are considered. Additional mining dilution is added to the in-situ resources to account for the waste that is mined along the waste/ore contact edge. The greater number of waste contacts an ore block has, the higher amount of mining dilution expected. The dilution study performed calculates the total dilution percentages and grades by rock-type. Dilution grades calculated in the dilution study are shown in Section 12.

Mining recovery includes mining losses along the ore/waste boundary and plus other losses during material handling. Mining recovery is 95% for all rock-types.

#### 13.2.5.1 Mining Recovery of Low-Grade Material

An elevated cut-off grade is used in the early parts of the mining schedule to improve the project economics. Marginally economic material is placed in a stockpile and reclaimed at various times throughout the mining schedule.

## 13.3 Economic Pit Limits

The economic pit limit is determined using the Lerchs Grossman (LG) algorithm. The algorithm considers the grades and tonnages for each block in the 3D block model and compares the expected costs to extract and process the block to the potential revenue from processing the block (if the block has grade in it). Each block is assigned with a net value (either positive or negative). Pit wall angle inputs determine which upper blocks need to be mined to extract lower economic blocks. The routine uses input economic and engineering parameters and expands upwards and outwards until the net value sum of all the blocks extracted reach break-even economics.

In this study, various cases or pit shells are generated by varying the input gold price and comparing the resultant waste and mill feed tonnages along with gold grades for each pit shell. Additional cases are included in the analysis to evaluate the sensitivities of resources to process costs, mining cost, and recoveries.

By varying the economic parameters while keeping inputs for metallurgical recoveries, pit slopes, and processing costs constant, successively larger pit cases are evaluated to determine where the incremental pit shells produce marginal or negative economic returns. The change from positive to negative economic returns results from increasing strip ratios and higher mining costs associated with larger and deeper pit shells. The economic margins from the expanded cases are evaluated on a relative basis to test for payback on capital and return for the project. At some point, further expansion does not add significant value. An ultimate pit limit can then be chosen that has a suitable economic return. The chosen pit shell is used as the basis for more detailed design and mine scheduling.

### 13.3.1 LG Cost Inputs

Potential block revenues are calculated based on the gold and silver price, metallurgical recoveries and gold/silver grades within each block. For this analysis a Net Smelter Return (NSR) value in $/tonne is used which considers the Net Smelter Price (NSP), process recoveries and metal grades. NSP and NSR are described in Section 12.

The following operating costs are used in the LG algorithm against the block NSR value to generate pit shells.

**Table 13-2 LG Operating Cost Inputs**

| Activity | Cost ($/tonne) |
|---|---|
| Base Mining Cost | $1.70 |
| Process Cost | $12.50 $/tonne mill feed |

The pit rim is selected at the south end of the deposit where the primary crusher is located and is at 2250m elevation.

Process cost includes conveyance from the primary crusher and ore sorter at the pit rim to the mill.

### 13.3.2 LG Slope Inputs

Geotechnical parameters are provided for the Ixtaca open pit. These parameters prescribe bench face angles, berm widths and inter-ramp slope angles for different azimuths and rock types within the potential open pit.

The following tables show pit slope inputs used for generating the Ixtaca LG pit shells.

**Table 13-3 Bench Face Angles**

| **Azimuth Start (°)** | **000** | **070** | **075** | **110** | **115** |
|---|---|---|---|---|---|
| **Azimuth End (°)** | **070** | **075** | **110** | **115** | **360** |
| Volcanic | 70° | 70° | 70° | 70° | 70° |
| Limestone/Shale | 72° | 72° | 72° | 72° | 72° |

**Table 13-4 Inter-Ramp Angles (Final)**

| **Azimuth Start (°)** | **000** | **040** | **100** |
|---|---|---|---|
| **Azimuth End (°)** | **040** | **100** | **360** |
| Volcanic | 43° | 43° | 43° |
| Limestone | 48° | 48° | 48° |
| Shale | 48° | 45° | 48° |

#### 13.3.3 **LG Sensitivity Cases**

The economic pit limits are based on the estimated costs and current metal price assumptions but are applied to approximately 15 years of mine life. Since these economic parameters are estimates, especially gold price, the sensitivity of the ultimate economic pit limits has been evaluated. This is done by varying the economic parameters in a series of cases. The pit shells generated from these cases are also used to evaluate potential pit pushbacks or phases.

For this analysis the input gold price is varied from $390 USD/oz to $1,690 USD/oz while silver price is varied from $5.10 USD/oz to $22.10 USD/oz. The operating costs are kept constant in this analysis. This is not a price sensitivity, as cut-off grades are not varied when calculating the contents of the resultant pit shells.

Mining recovery and dilution is not included at the LG level of design since it is determined that these factors do not have an impact on the ultimate pit limit selection.

Only Measured and Indicated Resource classes are used in the LG economics. Inferred Resource class is considered as waste.

The figure below shows the generated LG pit shells for Ixtaca. Pit resources are generated for each price case using a cut-off grade of NSR>=$12.50 (process cost).

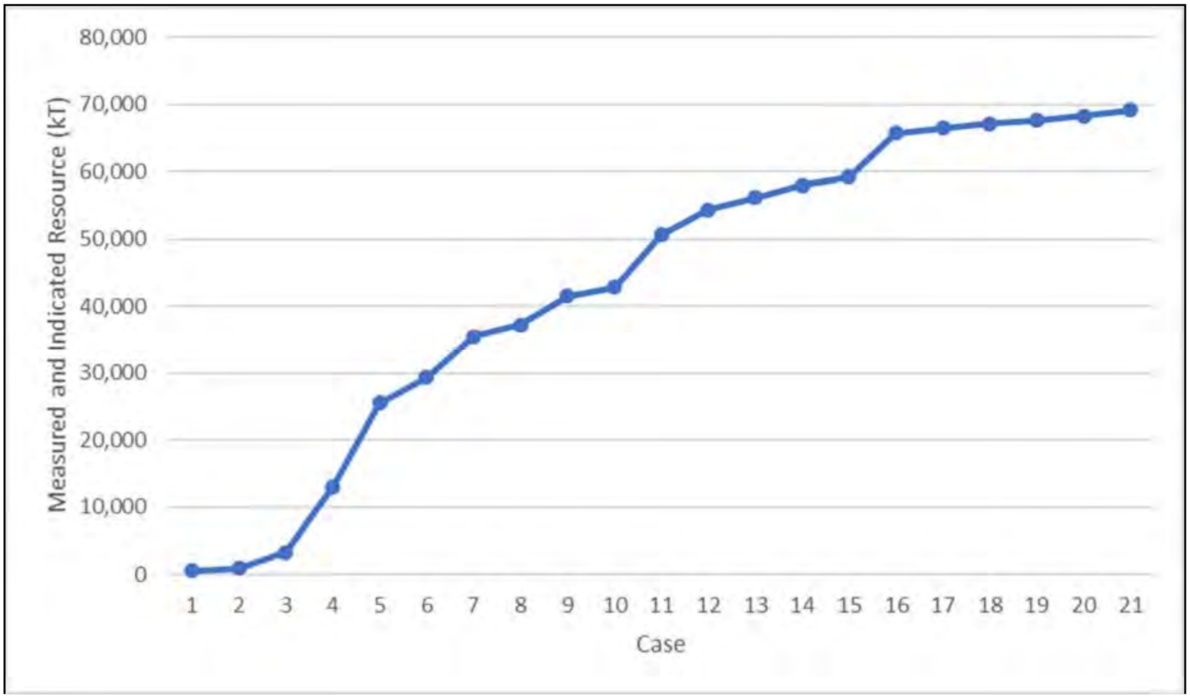



**Figure 13-1 Ixtaca Pit Shell Resource Contents by Case**

LG shells selected to represent approximate mining phases were scheduled to determine potential NPV using typical mining and processing costs. The results of the discounted cashflow (DCF) analysis are shown in the figure below.

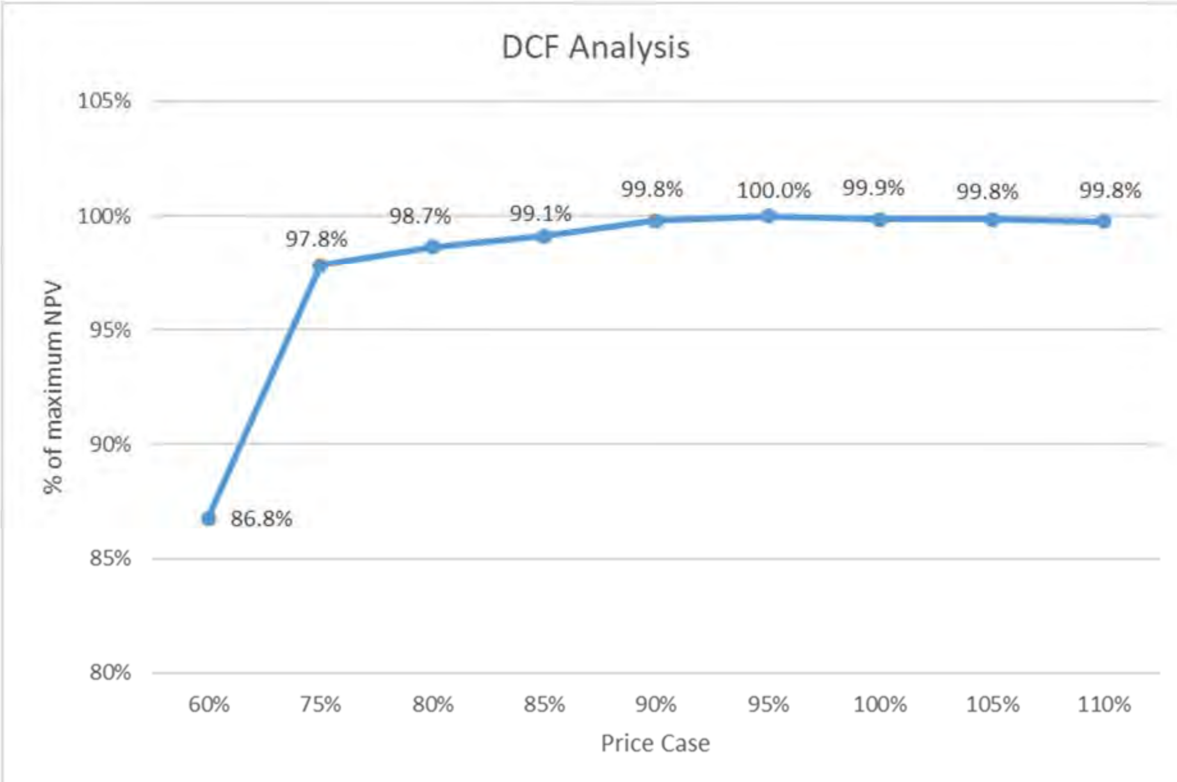



**Figure 13-2 Discounted Cashflow by Price Case**

The NPV is relatively consistent anywhere between the 85% price case and the 110% price case.The pit shell generated from Case 15 (100%) is selected as the ultimate pit limit for Ixtaca to maximize resources, and is used as the basis for detailed pit designs which include berms and ramps. The LG pit limited resource for Ixtaca is shown in the table below:

**Table 13-5 Ixtaca Ultimate Pit Limit Contents (NSR>=$12.50)**

| Price Case | 100% | |
|---|---|---|
| Mill Feed | 85,029 | kT |
| Gold grade | 0.578 | g/t |
| Silver grade | 34.24 | g/t |
| Waste | 304,455 | kT |
| Strip ratio | 3.58 | |

The following figure shows a plan view of Case 15 pit shell.

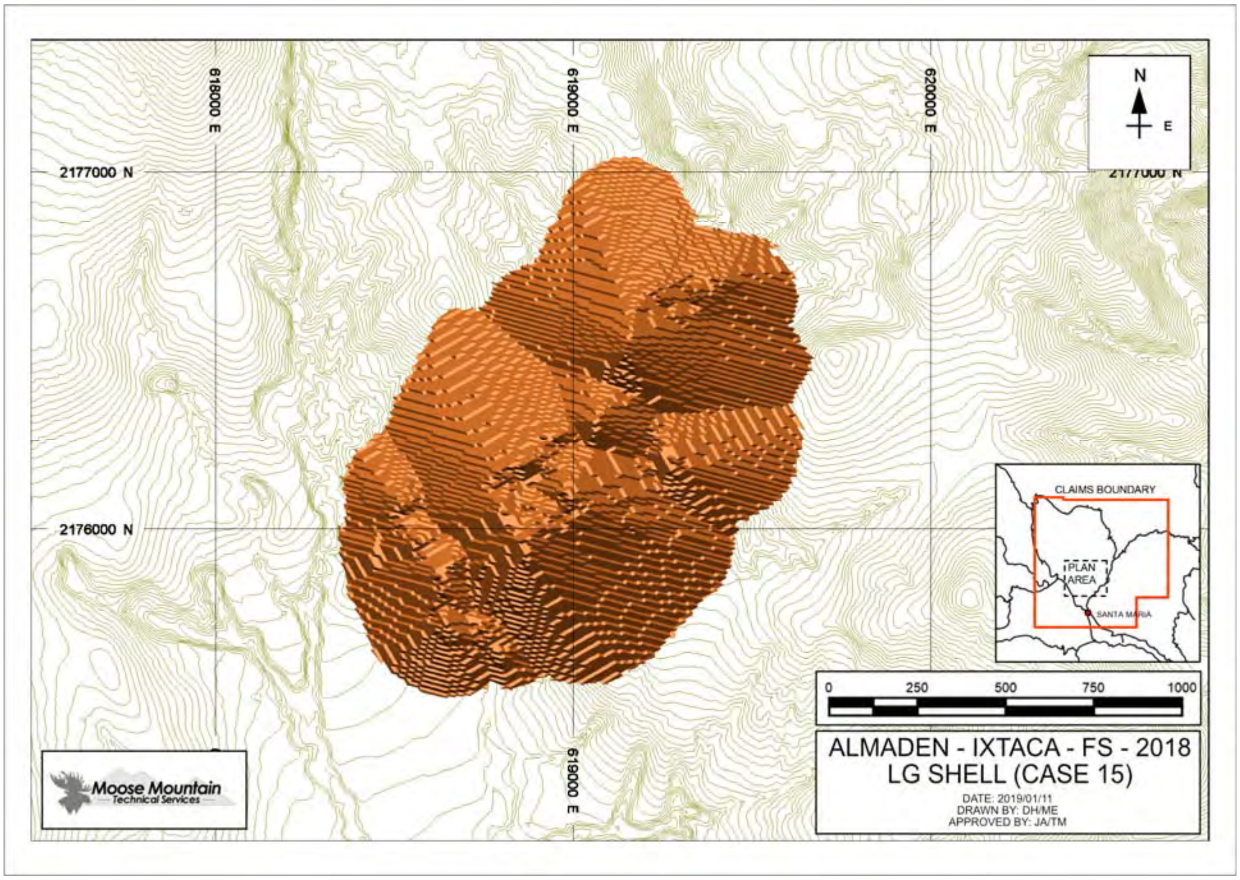



**Figure 13-3 Plan view of selected LG shell (Case 15)**

## 13.4 Detailed Pit Designs

MMTS has completed pit designs using standards for road widths and minimum mining widths, based on efficient operation for the size of mining equipment chosen for the project. Pits are designed that demonstrate the viability of accessing and mining the Ixtaca deposit.

### 13.4.1 Pit Phase Selection

The ultimate pit limit is split into phases or pushbacks to target higher economic material earlier in the mine life.

### 13.4.2 Pit Design Slope Inputs and Bench Configuration

Pit designs are configured on 12m bench heights with berms every two benches.

Maximum inter-ramp slope height (bench stack height) is 150 m. A ramp or geotechnical bench with a minimum width of 20 m is required between bench stacks. Inter-ramp slope angles may be used up to a pit slope height of 150 m. Maximum overall slope heights are on the order of 400 to 420 m with recommended overall slope angles of 40° to 43°. Overall wall stability is governed by inter-ramp slope angles of 45° to 48° in the shale domain (a function of wall orientation) 43° in the ash tuff volcanic domain and 48° in the limestone domain. Inter-ramp and overall slope angles are listed in Table 13-6. These angles are for depressurized conditions, assuming that the pit wall can be effectively drained of groundwater.

**Table 13-6 Ixtaca Pit Recommended Slope Angles – Final Walls**

| Design Sectors | Maximum Overall Slope Angle (Degrees) | Maximum Inter-ramp Slope Angle (Degrees) |
|---|---|---|
| Minimum Factor of Safety (FoS) | 1.3 | 1.3 |
| Volcanic Ash Tuff | 40 | 43 |
| Limestone | 45 | 48 |
| Shale NE Wall (Dip Direction 220-280) | 42 | 45 |
| Shale (All other wall orientations) | 45 | 48 |

The final pit design meets the large open pit stability criteria with a minimum FoS of 1.3 using 30$^{th}$ percentile strengths for the rock mass. A 30$^{th}$ percentile strength value was chosen, as opposed to a mean value, primarily as a function of the variability of the weak rock mass in both the shale and the volcanic ash tuff where the strength distributions are quite wide. Kinematic bench stability was analyzed using S-block. A pseudo-static analysis was run to determine the effect on stability of an earthquake event. The FoS are all acceptable under an earthquake loading event. The minimum FoS is 1.19 on the overall slope through the shales. An analysis section in the ash tuff slopes has a minimum FoS of 1.1 (for the 30$^{th}$ percentile strength value) for the earthquake event, which exceeds seismic slope stability criteria.

Slope angle recommendations are for depressurized conditions. Horizontal drains and pit dewatering measures may be required to depressurize the pit wall ranging from 60 to 200 m behind the pit wall.

The slope design parameters include variable bench face angles, berm widths and inter-ramp slope angles for each rock-type as specified in Table 13-3 and Table 13-4.

### 13.4.3 Haul Road Design Parameters

Two-way haul roads of 22.4 m width are designed for all in-pit haul roads. This width allows the efficient passing of trucks. Access ramps are not designed for the bottom two benches of each phase on the assumption that the bottom ramp segments will be mined out using retreat mining techniques. The lowest two benches of ramp segments left in the pit bottoms are designed using a one-way width of 16.3m since bench volumes are small and traffic flow will be reduced in these areas. Ramp grades are limited to a maximum of 10%.

### 13.4.4 Pit Design Results

The following section describes the pit designs including figures showing plan views. Reserves for the ultimate pit are in Section 12 of this Technical Report.

#### 13.4.4.1 Phase 1

Phase 1 targets approximately1¼ yrs of mill feed in the Main zone of the Ixtaca deposit.

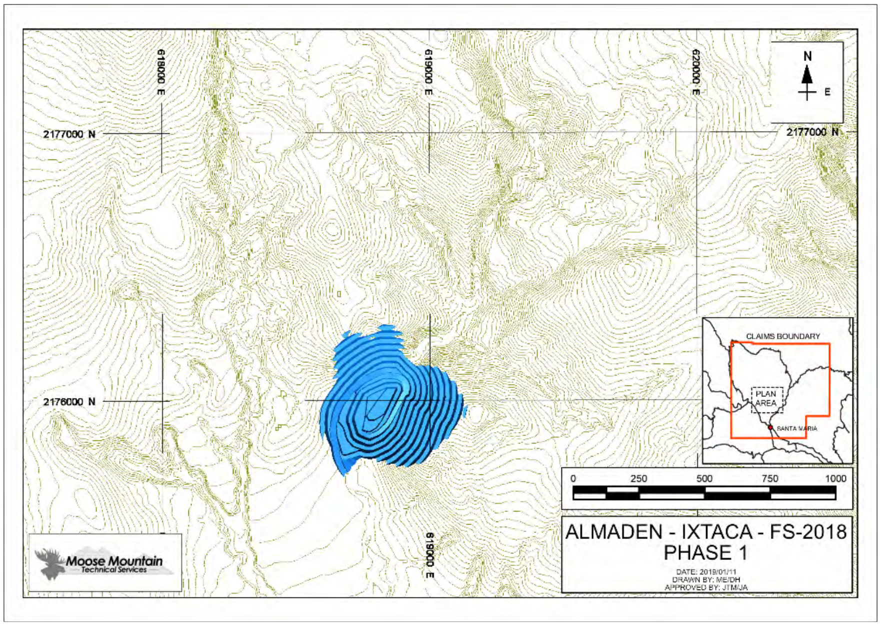



**Figure 13-4 Phase 1**

13.4.4.2 **Phase 2**

Phase 2 is a pushback to the East.

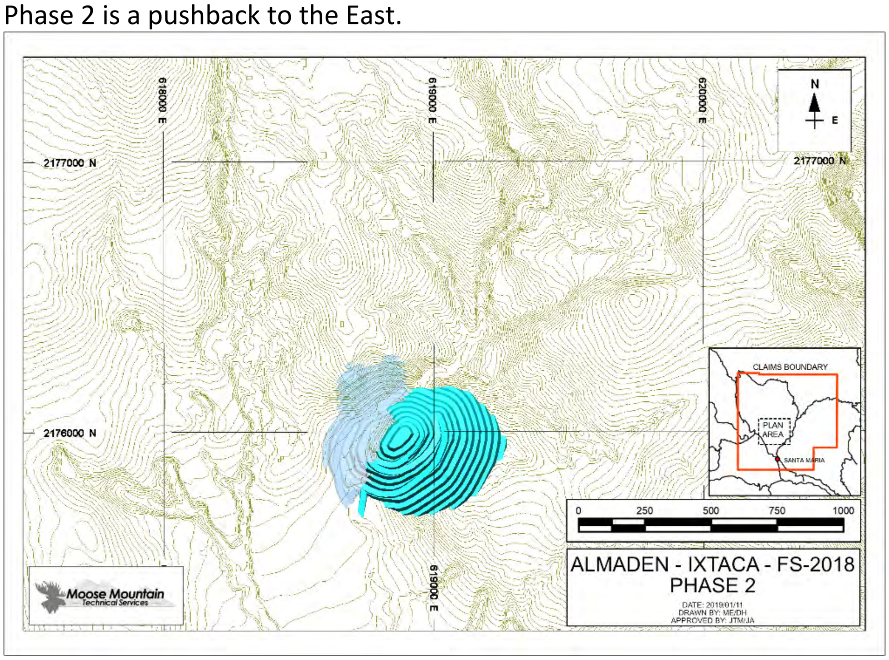



**Figure 13-5 Phase 2**

13.4.4.3 **Phase 3**

Phase 3 is a pushback to the East.

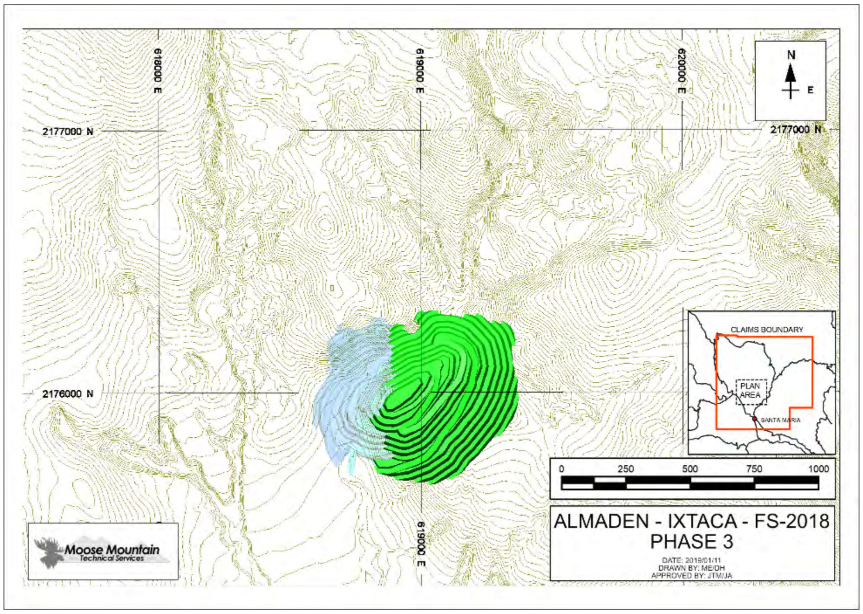



**Figure 13-6 Phase 3**

### 13.4.4.4 **Phase 4**

Phase 4 is a pushback to the West.

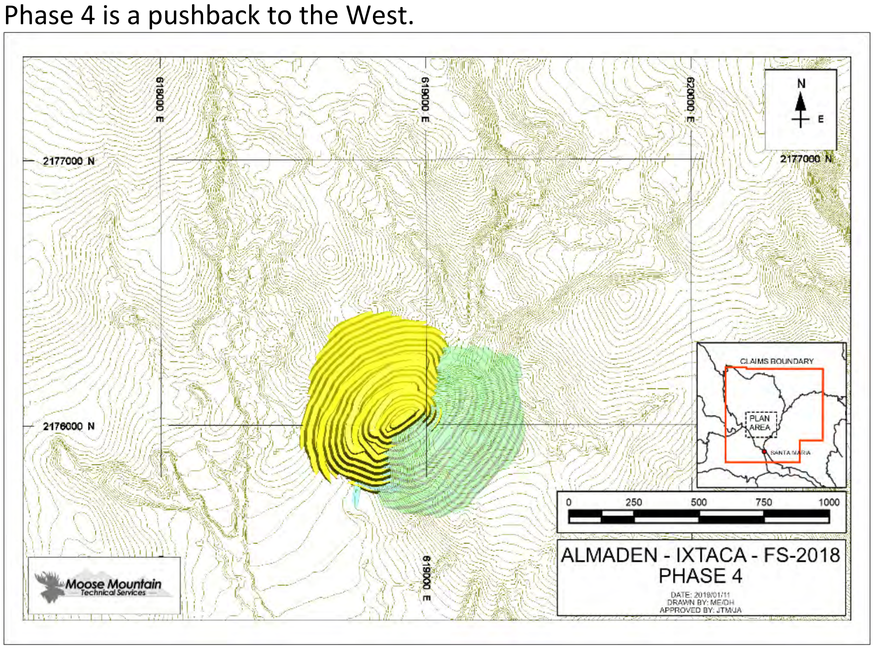



**Figure 13-7 Phase 4**

### 13.4.4.5 **Phase 5**

Phase 5 is a pushback to the final East wall.

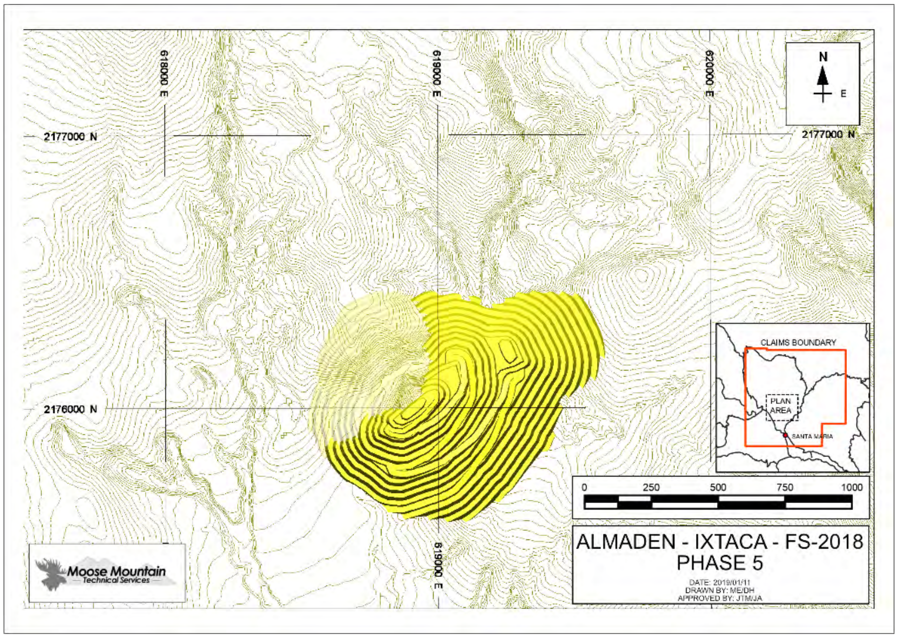



**Figure 13-8 Phase 5**

#### 13.4.4.6 **Phase 6**

Phase 6 is a pushback to the final West wall and pit bottom in the Main and North zones of the Ixtaca deposit.

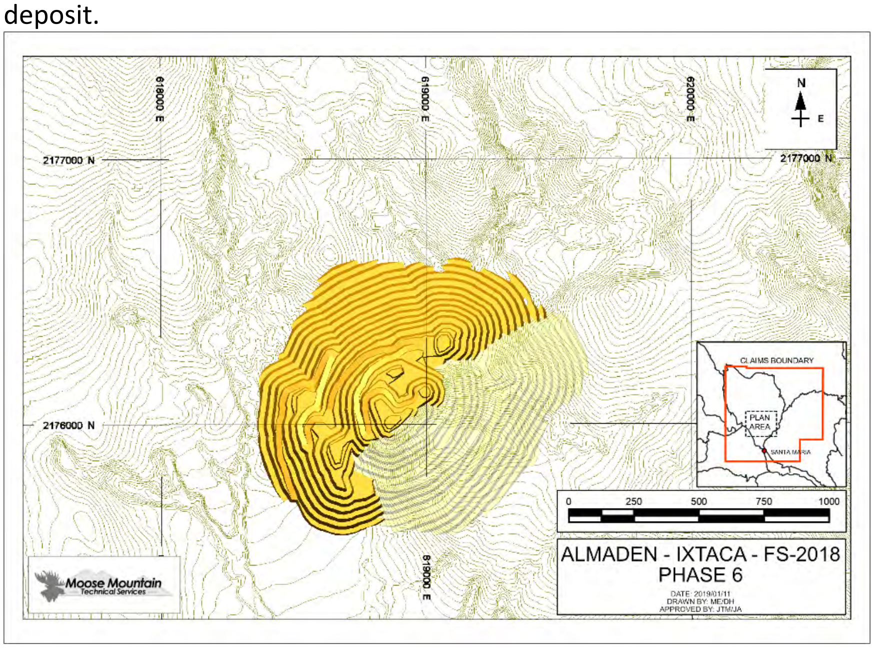



**Figure 13-9 Phase 6**

#### 13.4.4.7 **Phase 7**

Phase 7 is the final pushback to the North and pit bottom in the NE zone of the Ixtaca deposit.

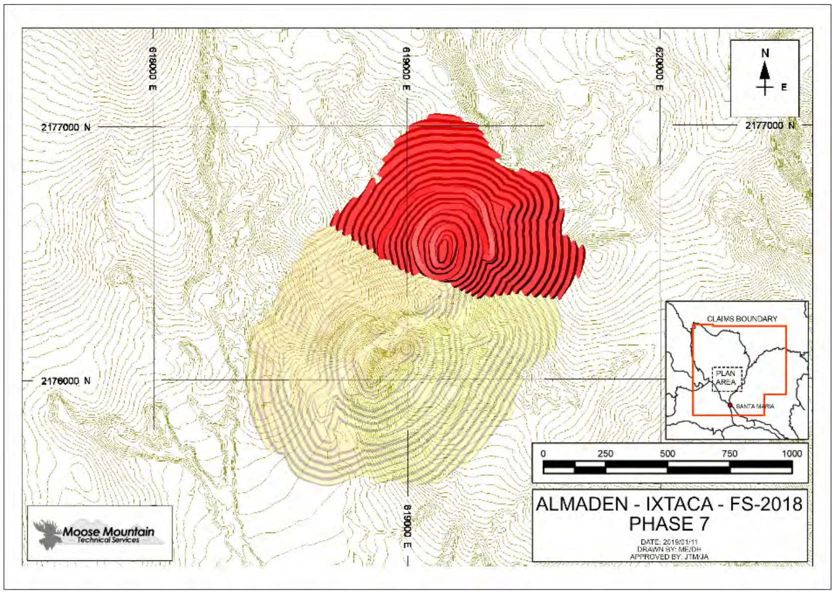



**Figure 13-10 Phase 7**

## 13.5 Rock Storage Facilities

Material that does not meet economic cut-off grade will be stored in Rock Storage Facilities (RSFs) to the South and West of the ultimate pit limit. A backfill location is also utilized for storage of Phase 7 un-economic material.

The RSF located west of the open pit is the West Tailings and Rock Storage Facility (West T/RSF), which is a tailings and waste rock “Co-disposal” facility and is discussed separately in Section 15.5.

Two other RSFs will be utilized: the South RSF located south of the pit to keep haul distances to a minimum, and a pit backfill. The proposed West T/RSF and South RSF have capacity to store 141 and 24 $Mm^3$ of material, respectively. The proposed West-T/RSF has a maximum height of 160 m and will be constructed at 1.3H:1V benched slopes with a 3H:1V overall slope angle below 2,350m elevation and 2H:1V overall slope angle above 2,350m elevation. The South RSF has a maximum height of 120 m. The overall slope of the lower portion is 2.1H:1V with bench face slopes of 1.3H:1V.

Geochemical characterization of site materials to date indicates that waste rock is not expected to be net acid producing.

### 13.5.1 RSF Design Inputs

The following inputs are used as design criteria for the RSFs:

- Max lift height – 50m
- Face angle for each lift – 37 degrees (angle of repose)
- West T/RSF - Maximum overall slope angle below 2350m – 18.4 degrees (3H:1V)
- West T/RSF - Maximum overall slope angle above 2350m – 26.6 degrees (2H:1V)
- South RSF – Maximum overall slope angle – 26.6 degrees (2H:1V)

- Volcanic in-situ default density – 1.72 tonnes/BCM
- Limestone/Shale in-situ default density – 2.64 tonnes/BCM
- Average Swell factor – 25%
- Maximum ramp grade – 10%

Foundation preparation for the South Rock Storage Facility will include removal of trees, clearing and grubbing of vegetation, and removal of topsoil. Topsoil will be stockpiled south of the Open Pit for use in facility reclamation. After topsoil removal is complete, unsuitable foundation materials including alluvial and colluvial soils, and unconsolidated tuff deposits will also be removed to an estimated depth of 5 m. The approximate extent of the unsuitable foundation materials is shown on Figure 16-10.

An underdrainage collection system will be provided for the South RSF (See Figure 16-12) that will capture perched groundwater below the facility thus preventing increased pore pressures at the foundation/ rock interface. The underdrainage collection system will consist of bench drains placed at approximately 25 m centers. The bench drains will drain to either the perimeter of the facility or one of the internal existing drainages and consist of perforated polyethylene Pipe (CPEP). The CPEP will be wrapped in limestone drain rock and surrounded by non-woven geotextile. In addition, underlying existing drainages will be filled with coarse limestone waste rock to facilitate drainage. Water from the underdrainage system will be directed to the West Sediment Pond. The typical South RSF underdrainage system is shown on Figure 16-11.

#### 13.5.2 **South RSF Surface Water Management**

Diversion channels are located upstream and around the South RSF (SRSF) to manage upstream stormwater and runoff from the facility sideslopes and are designed to convey the 100-year, 24-hour storm event. The SRSF Upstream channel will minimize seepage under the facility; flow from this channel will continue in the SRSF North Channel and to the SRSF Sediment Pond located at the west toe of the facility. The SRSF North Channel will also convey water from the Pit East Channel for mine years 1 and 2, after which the pit mines out a portion of the Pit East Channel, and will continue to collect runoff from SRSF sideslopes. The SRSF South channel intercepts upstream runoff that would otherwise seep under the facility and collects runoff from SRSF sideslopes and directs it to the SRSF sediment pond to settle sediment prior to release downstream of the Project.

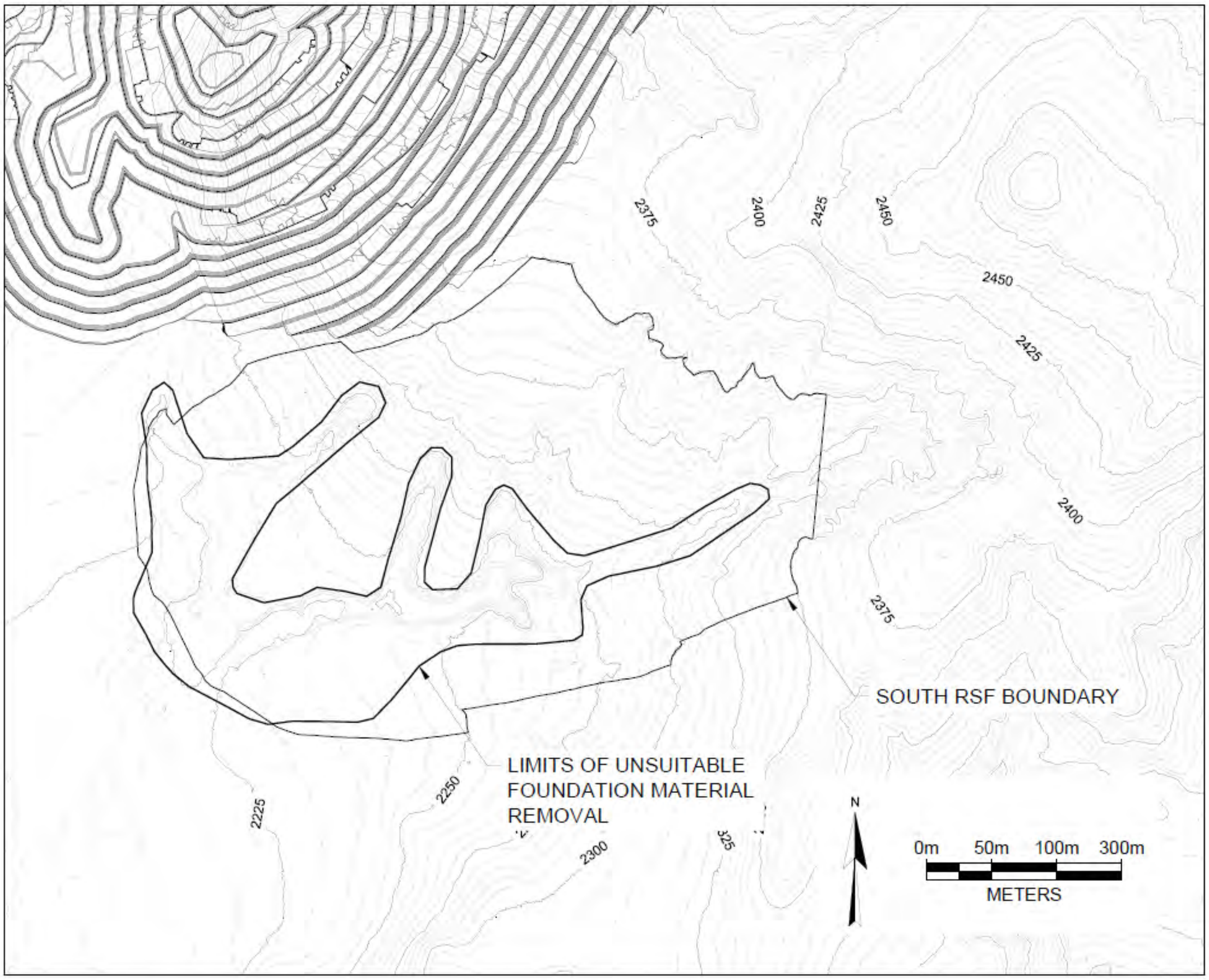



**Figure 13-11 Extent of South RSF Unsuitable Material Removal.**
*Note: Entire Drawing is inside the Ixtaca Claim Boundary*

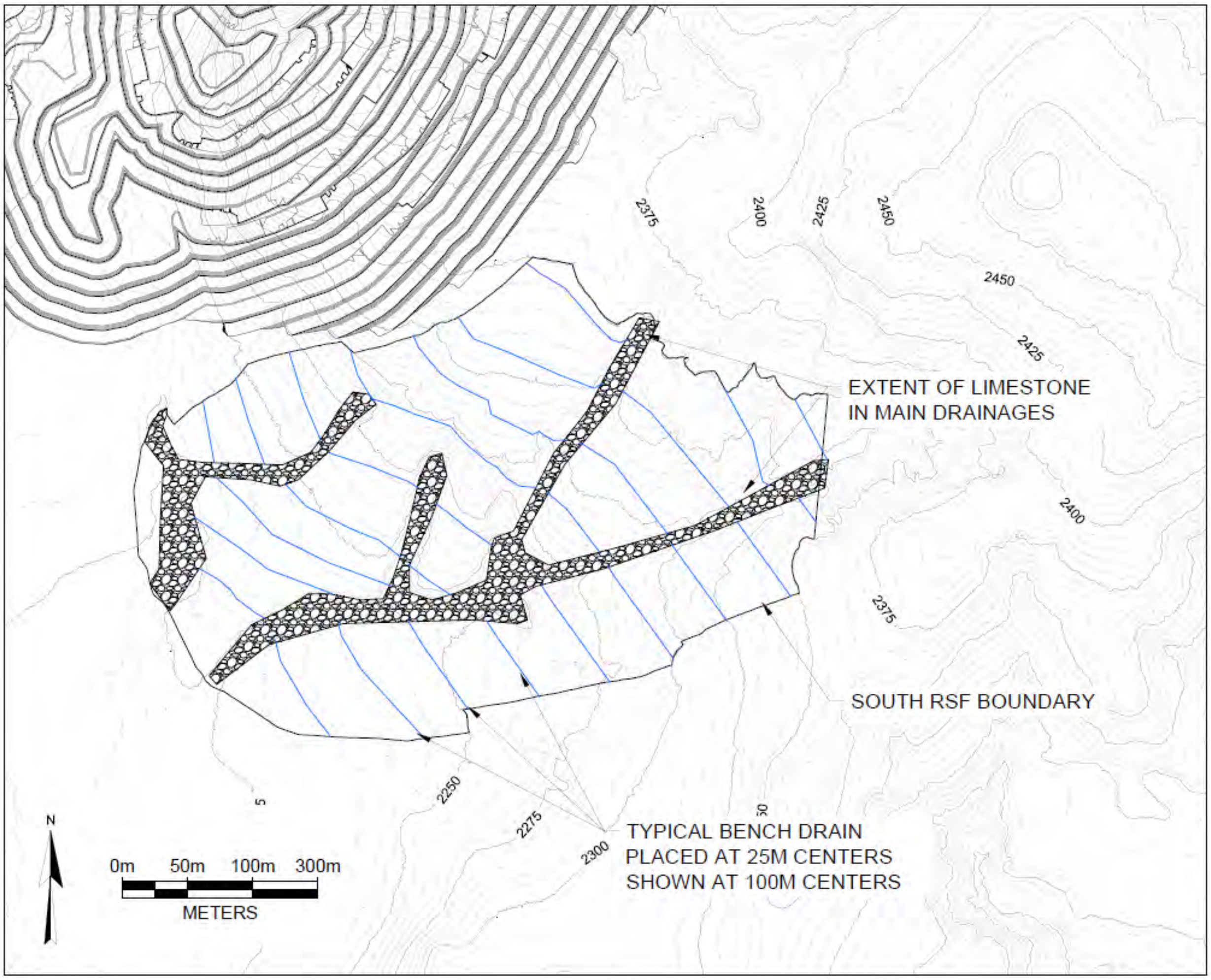



**Figure 13-12 South RSF Underdrainage Collection System.**
*Note: Entire Drawing is inside the Ixtaca Claim Boundary*

The location and designed capacities of the RSFs are as follows:

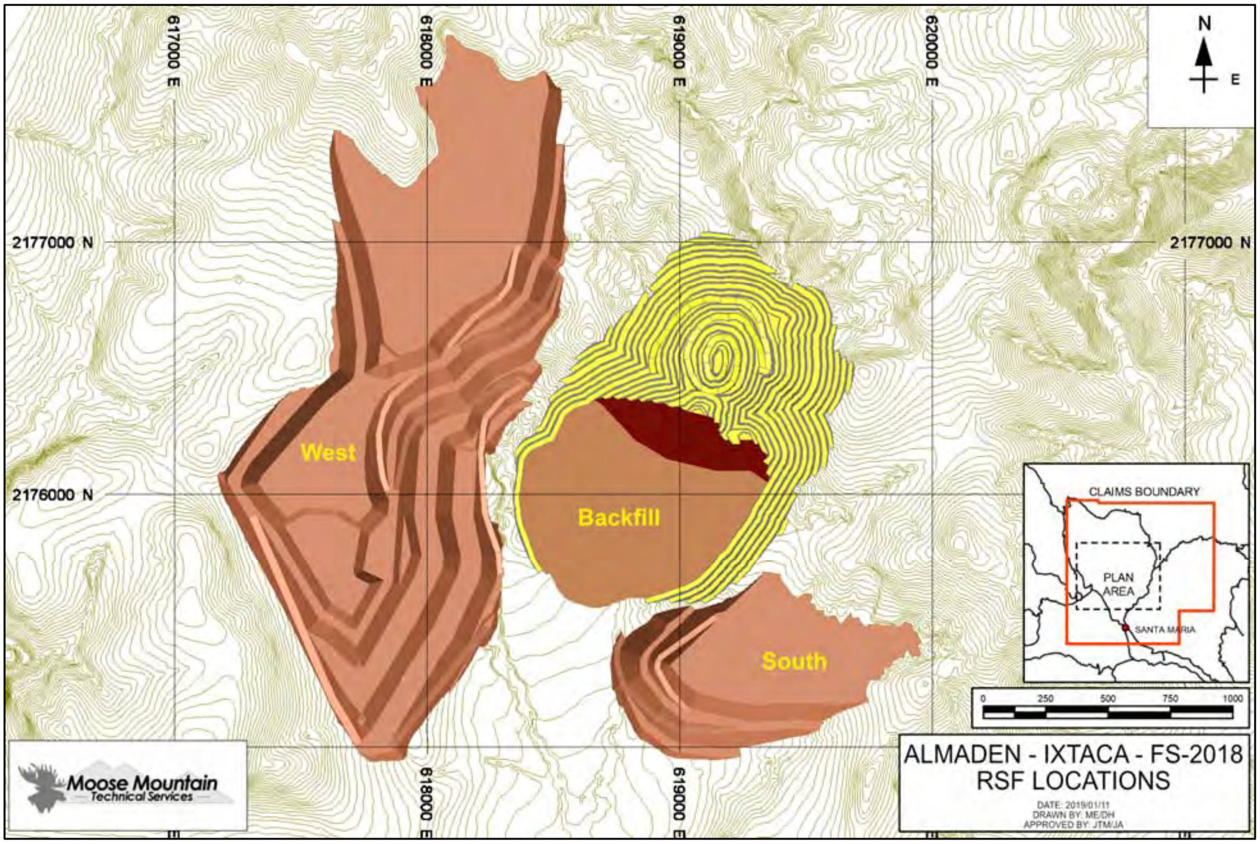



**Figure 13-13 RSF Locations**

**Table 13-7 RSF Capacities**

| | Designed Capacity '000 $m^3$ |
|---|---|
| **South** | 23,900 |
| **West** | 140,500 |
| **Backfill** | 71,750 |
| **TOTAL** | **236,150** |

## 13.6 Mine Haul Road Designs

Mine haul roads external to the open pit are designed to haul ore and waste materials from the open pit to the scheduled destinations. The haul roads are designed with the following inputs:

- 22.4m width to incorporate dual lane running width and a berm on the outside edge (where applicable)
- 10% maximum grade
- Balanced cut and fill areas built by excavators, dozers and graders
- Road capping using sinter rock or crushed limestone

## 13.7 Ore Stockpiles

When ore is mined from the pit it will either be delivered to the primary crusher or the ore stockpile. The grade of the material sent to the ore stockpile each year is dependent on the best economics determined by the mine scheduling program. Ore is stockpiled on the upper lift of the South RSF. The maximum stockpile size is 22.7M tonnes and occurs in Year 6 of operations. The ore stockpile is fully reclaimed at the end of the mine life.

## 13.8 Mine Production Schedule

The mine production schedule for Ixtaca is developed with MineSight Strategic Planner (MSSP), a long range schedule optimizing tool. It is typically used to produce a life-of-mine schedule that will maximize the Net Present Value of a property subject to specified conditions and constraints. Inputs include production requirements, mine operating considerations, product prices, recoveries, destination capacities, equipment performance, haul cycle times and operating costs. From this the program develops an optimal production schedule from the given pit phase reserves.

The open pit mine production schedule is based on the following parameters:

- One year of pre-production and pre-stripping
- Mill feed of 7,650tpd for Years 1-4, ramping up to 15,300tpd from Year 5 onwards
- Phased pit bench reserves are used as input to the mine production schedule
- Maximum 12 benches mined from a single phase in one year (1 bench per month)
- Maximum of 3 partial benches mined in a single period
- Ore tonnes mined in excess of the mill capacity is stockpiled
- Volcanic material crusher throughput is 34% higher than Limestone (due to the soft nature of Volcanic material)
- Shale material crusher throughput is 27% higher than Limestone

The mine production schedule is shown in the following tables and graphs. Note that all gold and silver grades shown in the tables and graphs are diluted. Gold equivalent grade is calculated using the ratio of the base case metal prices ($1,300/oz for gold and $17/oz for silver – results in ~76:1 silver to gold ratio). Ore is reported using a cut-off grade of Diluted NSR>=$14/tonne.

## Table 13-8 Production Schedule Summary

| | | TOTAL | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Waste** | | | | | | | | | | | | | | |
| Volcanic | kT | **156,220** | 7,720 | 26,253 | 15,695 | 21,532 | 26,913 | 12,113 | 6,262 | 36,006 | 3,725 | 0 | 0 | 0 |
| Rock | kT | **169,137** | 618 | 10,516 | 21,005 | 18,049 | 16,351 | 25,365 | 37,087 | 7,591 | 29,491 | 3,062 | 0 | 0 |
| Total | kT | **325,357** | 8,338 | 36,769 | 36,700 | 39,581 | 43,265 | 37,479 | 43,349 | 43,598 | 33,216 | 3,062 | 0 | 0 |
| **Pit To Crusher** | | | | | | | | | | | | | | |
| Ore | kT | **39,970** | 0 | 3,639 | 4,590 | 4,480 | 4,298 | 4,778 | 7,306 | 3,564 | 5,536 | 1,779 | 0 | 0 |
| Au | g/t | **0.789** | 0 | 0.864 | 1.040 | 0.858 | 1.181 | 0.732 | 0.667 | 0.772 | 0.385 | 0.819 | 0 | 0 |
| Ag | g/t | **49.57** | 0 | 61.48 | 64.38 | 55.62 | 51.18 | 44.42 | 43.67 | 39.28 | 45.07 | 40.62 | 0 | 0 |
| Au Eq | g/t | **1.44** | 0 | 1.668 | 1.882 | 1.585 | 1.850 | 1.313 | 1.238 | 1.286 | 0.974 | 1.350 | 0 | 0 |
| **Pit to Stockpile** | | | | | | | | | | | | | | |
| Ore | kT | **33,396** | 233 | 4,527 | 6,165 | 4,837 | 5,197 | 4,095 | 4,621 | 1,957 | 1,763 | 0 | 0 | 0 |
| Au | g/t | **0.352** | 0.497 | 0.292 | 0.391 | 0.319 | 0.486 | 0.378 | 0.291 | 0.272 | 0.242 | 0 | 0 | 0 |
| Ag | g/t | **20.31** | 13.94 | 23.40 | 21.40 | 23.15 | 16.48 | 15.37 | 18.67 | 25.37 | 23.04 | 0 | 0 | 0 |
| Au Eq | g/t | **0.62** | 0.679 | 0.598 | 0.671 | 0.622 | 0.701 | 0.579 | 0.535 | 0.604 | 0.543 | 0 | 0 | 0 |
| **Stockpile to Crusher** | | | | | | | | | | | | | | |
| Ore | kT | **33,396** | 0 | 1 | 0 | 108 | 460 | 4,496 | 1,897 | 5,578 | 1,733 | 7,967 | 7,364 | 3,792 |
| Au | g/t | **0.352** | 0 | 1.767 | 0.000 | 0.862 | 0.537 | 0.457 | 0.359 | 0.334 | 0.285 | 0.252 | 0.340 | 0.483 |
| Ag | g/t | **20.31** | 0 | 5.00 | 0.00 | 22.67 | 29.63 | 26.78 | 24.18 | 21.70 | 19.85 | 19.47 | 15.37 | 19.00 |
| Au Eq | g/t | **0.62** | 0 | 1.833 | 0.000 | 1.159 | 0.924 | 0.807 | 0.675 | 0.617 | 0.544 | 0.506 | 0.541 | 0.732 |
| **Volcanic Ore Sort Rejects to Crusher (*)** | | | | | | | | | | | | | | |
| Ore | kT | **1,601** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,601 | 0 | 0 | 0 |
| Au | g/t | **0.800** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.800 | 0 | 0 | 0 |
| Ag | g/t | **10.00** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.00 | 0 | 0 | 0 |
| Au Eq | g/t | **0.93** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.931 | 0 | 0 | 0 |
| **Total Crusher Feed** | | | | | | | | | | | | | | |
| Ore | kT | **74,967** | 0 | 3,639 | 4,590 | 4,588 | 4,757 | 9,274 | 9,203 | 9,142 | 8,870 | 9,747 | 7,364 | 3,792 |
| Au | g/t | **0.595** | 0 | 0.864 | 1.040 | 0.858 | 1.119 | 0.599 | 0.604 | 0.504 | 0.440 | 0.355 | 0.340 | 0.483 |
| Ag | g/t | **35.69** | 0 | 61.47 | 64.38 | 54.84 | 49.10 | 35.87 | 39.65 | 28.56 | 33.82 | 23.33 | 15.37 | 19.00 |
| Au Eq | g/t | **1.06** | 0 | 1.668 | 1.882 | 1.575 | 1.761 | 1.068 | 1.122 | 0.878 | 0.882 | 0.660 | 0.541 | 0.732 |

*Note: ` Volcanic ore is crushed and sorted. Ore sort rejects are then returned to the crusher and bypass the ore sorter in Year 8.*

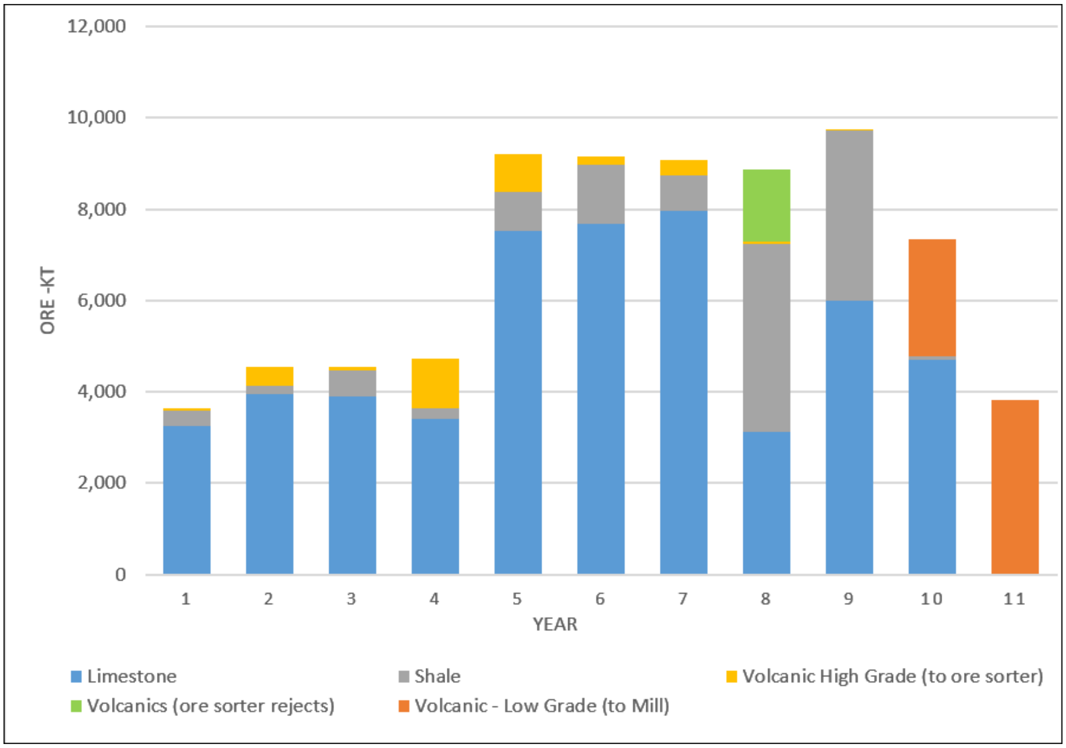



**Figure 13-14 Crusher Feed Summary by Rock Type**

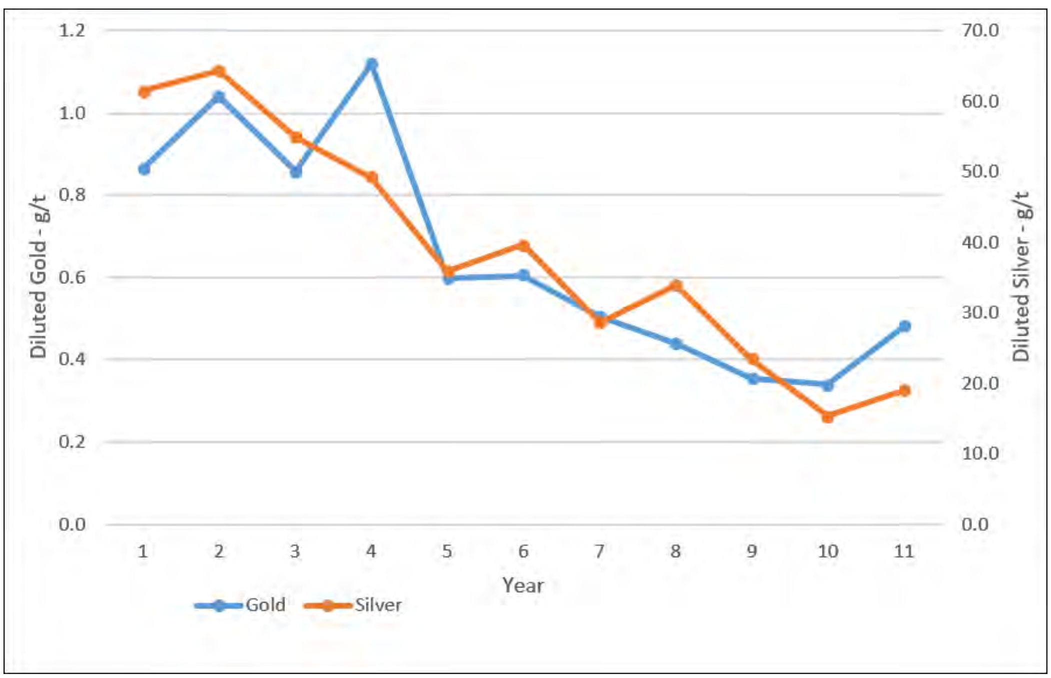



**Figure 13-15 Crusher Feed Gold and Silver Grades by Year**

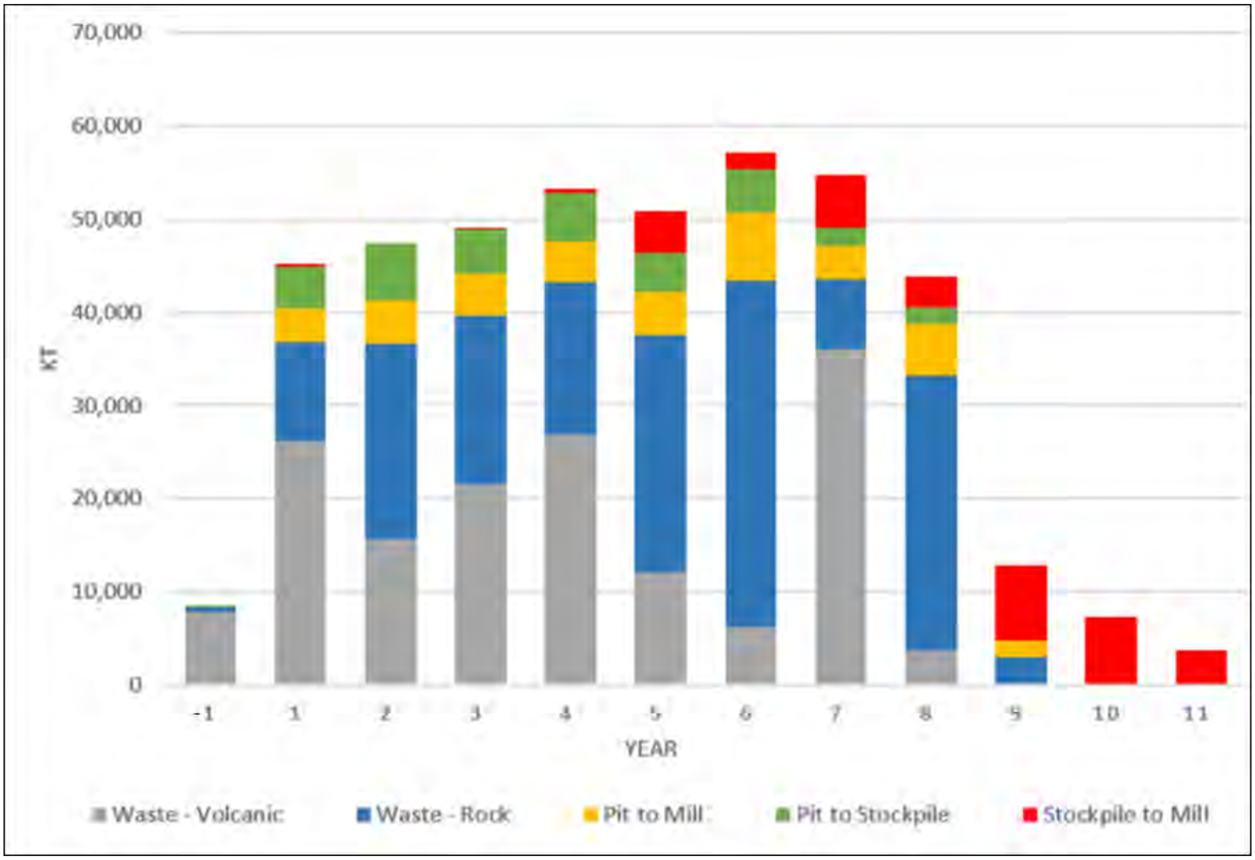



**Figure 13-16 Material Movement by Year**

#### 13.8.1 End of Period Maps

The following figures show End of Period (EOP) maps at Year -1, 1, 5 and 11. The end of Year 11 is also referred to as Life of Mine (LOM).

#### 13.8.2 Pre-Production Mine Operations (Year -1)

Pre-production at Ixtaca includes the following tasks which will take approximately 1 year.

- Clearing and grubbing of areas for ex-pit haul roads, RSF footprints, topsoil storage, infrastructure locations, phase 1 pit area and dams
- Removal and stockpiling of topsoil from pit, RSF and road areas
- Construction of by-pass roads and ex-pit haul roads
- Construction of Water Storage Dam and Lower Fresh Water Dam (rock for these dams is sourced from local borrow areas)
- Mining down to 2298 m elevation in Phase 1 and 2370 m elevation in Phase 2 (rock is stored in South RSF and ore is stockpiled near the primary crusher)
- Construction of primary crusher pad and conveyor to the mill

The following figure illustrates the mine operations configuration after the pre-production period, and at the start of mill operations.

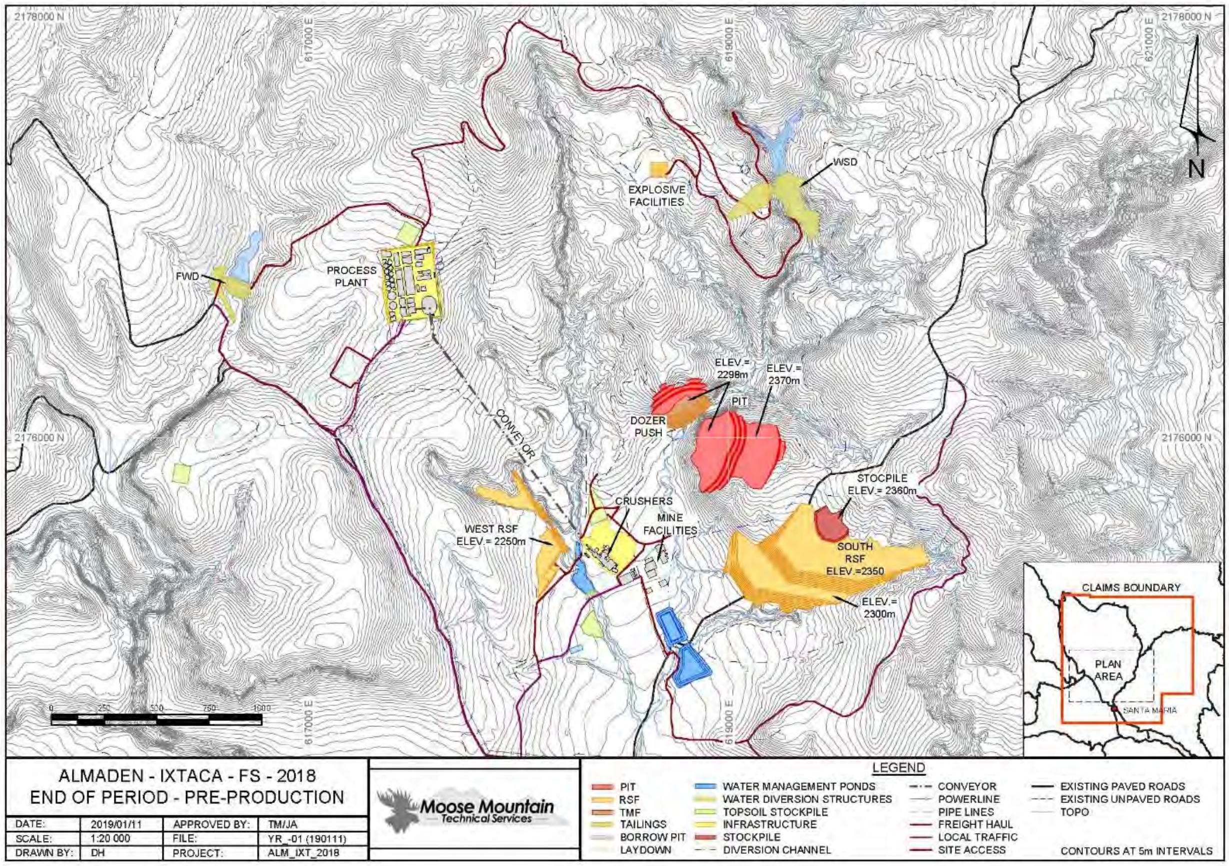



**Figure 13-17 End of Pre-Production Period**

#### 13.8.2.1 **End of Year 1**

- Phase 1 is mined down to 2154m elevation
- Phase 2 is mined down to 2226m elevation
- At the end of Year 1 there is 4,760kT of ore in stockpile
- Waste material is stored in the South RSF and the south portion of the West T/RSF.

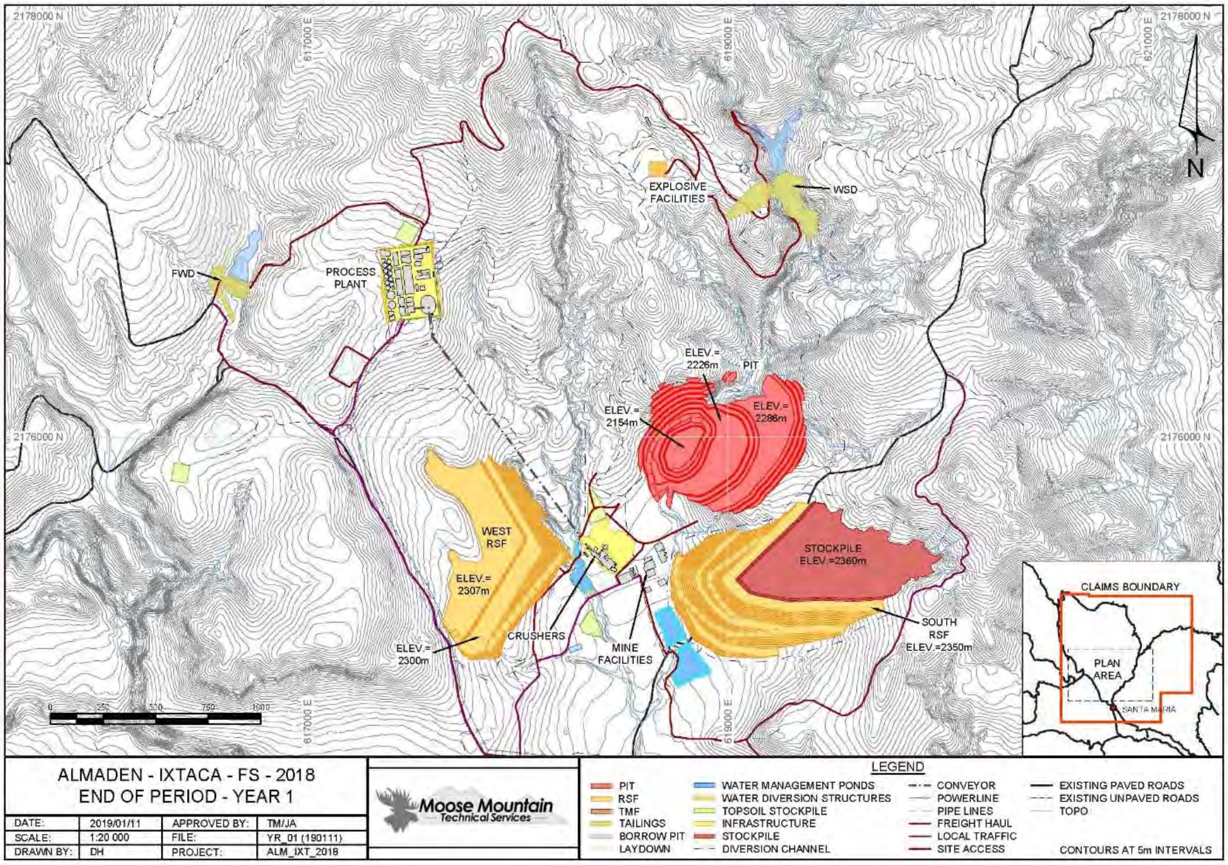



**Figure 13-18 End of Year 1**

#### 13.8.2.2 End of Year 2

- Phases 1 and 2 are mined to completion
- Phase 3 is mined down to 2154m elevation
- Phase 4 is mined down to 2238m elevation
- Phase 5 is mined down to 2406m elevation
- The South RSF is filled
- Waste material is hauled to the north and south portions of the West T/RSF
- At the end of Year 2 there is 10,925kT of ore in stockpile

#### 13.8.2.3 End of Year 3

- Phase 3 is mined to completion
- Phase 4 is mined down to 2094m elevation
- Phase 5 is mined down to 2274m elevation
- Phase 6 is mined down to 2334m elevation
- Waste material is hauled to the north and south portions of the West T/RSF

- At the end of Year 3 there is 15,653kT of ore in stockpile

#### 13.8.2.4 **End of Year 4**

- Phase 4 is mined to completion
- Phase 5 is mined down to 2130m elevation
- Phase 6 is mined down to 2262m elevation
- The north and south portions of the West T/RSF are joined
- At the end of Year 4 there is 20,391kT of ore in stockpile

#### 13.8.2.5 **End of Year 5**

- Phases 1-4 are mined to completion
- Phase 5 is mined down to 1986m elevation
- Phase 6 is mined down to 2190m elevation
- Waste material is hauled to the West T/RSFs
- At the end of Year 5 there is 19,990kT of ore in stockpile

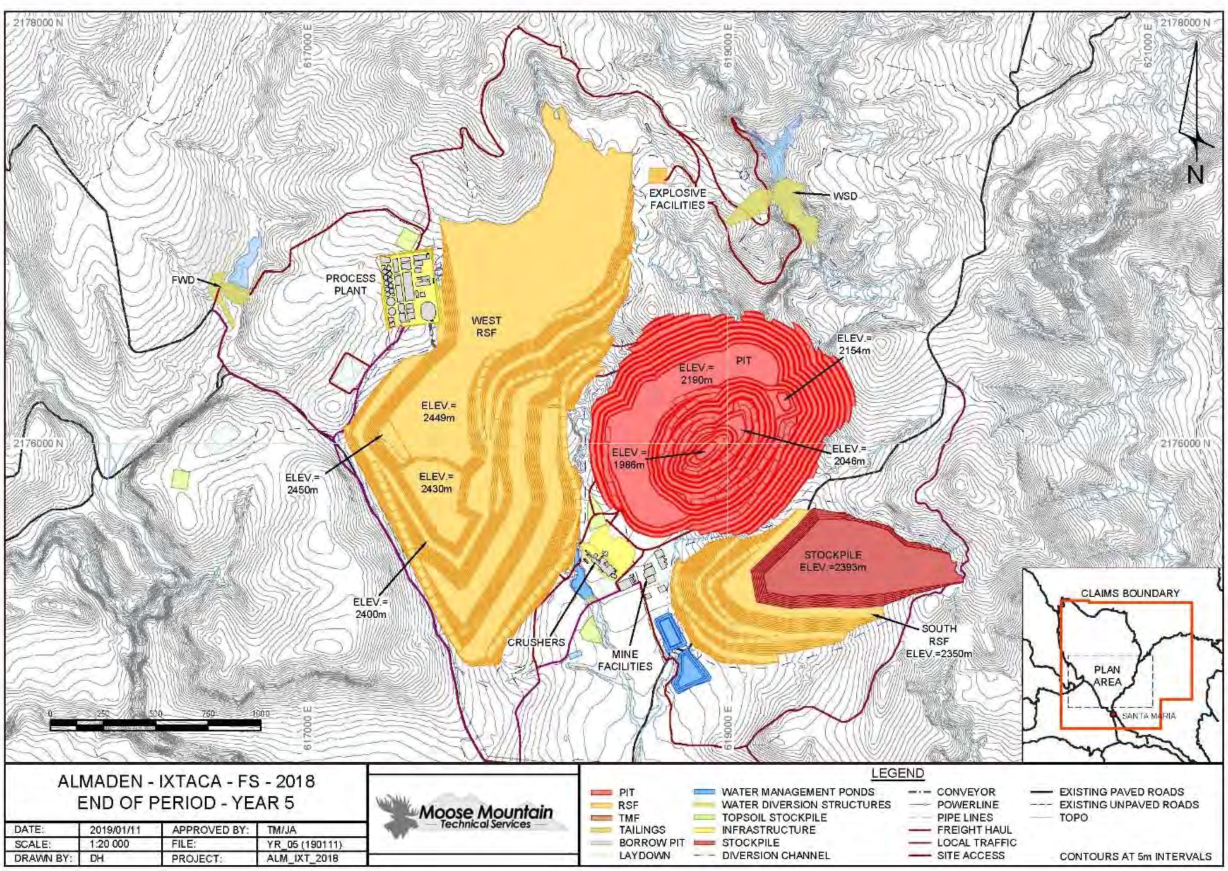



**Figure 13-19 End of Year 5**

#### 13.8.2.6 End of Year 10

- All phases are mined to completion
- Ore is sourced from the stockpile
- The West T/RSF is full and filtered tailings are hauled to the Backfill
- At the end of Year 10 there is 3,792kT of ore in stockpile

#### 13.8.2.7 End of Year 11(LOM)

- The ore stockpile is fully reclaimed

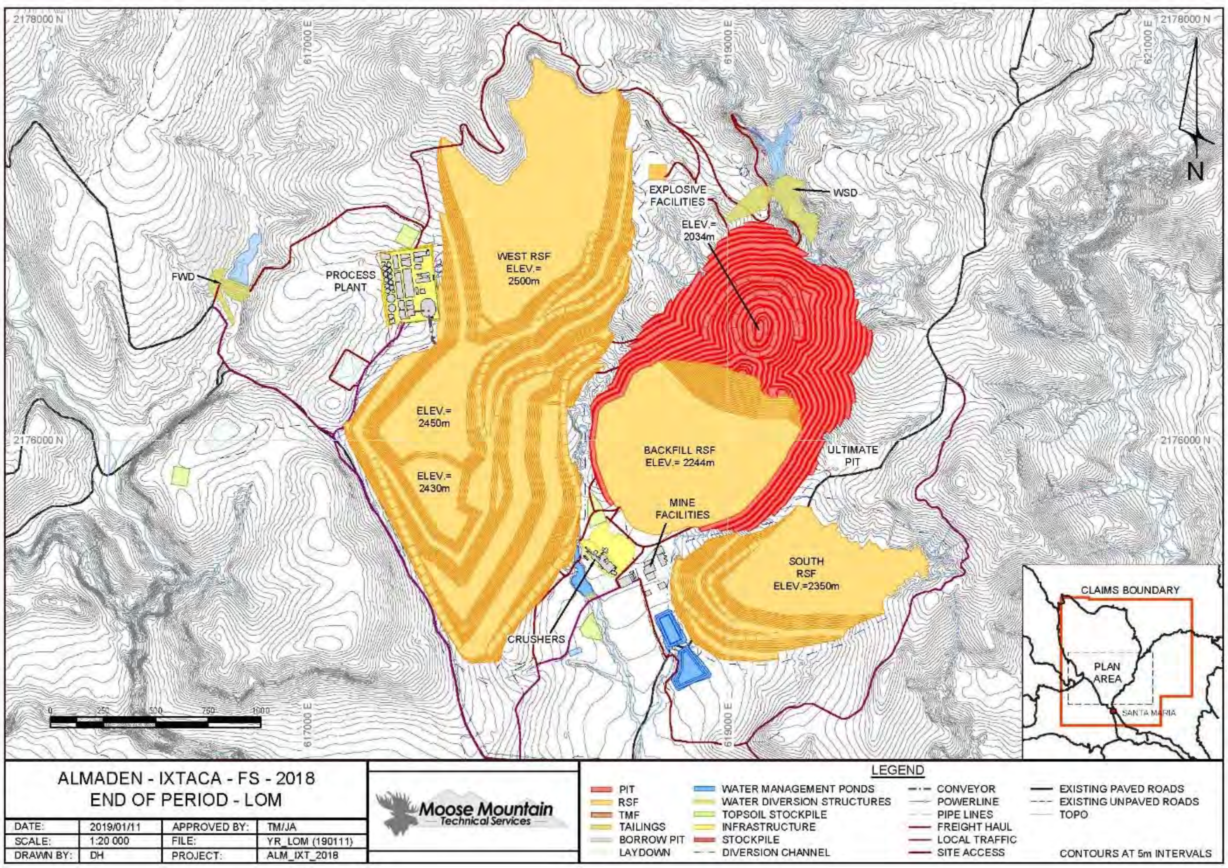



**Figure 13-20 End of Year 11 (Life of Mine)**

## 13.9 Mine Operations

The mine operations are planned to be typical of similar small scale open pit operations and are organized into two areas: Direct Mining and General Mine Expense (GME).

Direct Mining includes the equipment operating costs and operating labour for the following:

- Grade Control Drilling
- Production Drilling
- Blasting
- Loading

- Hauling
- Pit Services
- Mine Maintenance

Each unit operation accounts for all equipment consumables and parts, manpower required (both operating and maintenance) and all material costs (blasting). This also includes the distributed mine maintenance items such as maintenance labour and repair parts plus off-site repairs which contribute to the hourly operating cost of the equipment.

GME includes the supervision for the direct mining activities. GME also includes technical support requirements from Mine Engineering and Geology functions. More detailed descriptions of the mine organization and unit mining activities follows.

In this study Direct Mining and Mine Maintenance is planned as Contract mining operations. The contract mining company will be responsible for all equipment mob/demob, operating, and labour costs as well as maintenance of the mining equipment. Blasting unit operations will be performed by a specific blasting company contractor. Supervision, geology and mine planning will be done by the Owner.

### 13.9.1 **Direct Mining Unit Operations (Contractor)**

Direct mining activities will be done by a contract mining company. Estimates received from different Mexican-based contractors confirm the mining equipment sizes assumed for this study.

#### 13.9.1.1 **Ore Control Drilling**

An ore control system (OCS) is planned to provide field control for the loading equipment to define the ore/waste boundary as well as selectively mine low/medium/high grade ore for stockpiling.

Variable angle reverse circulation (RC) drilling will be done on alternating benches throughout the mineralized areas of the deposit. Sampling will be done on the angled drill holes to determine various grade cut-off boundaries. Sample results will be used to build a short range mine planning model to be used for dig limit calculations.

Ore control drilling will be supervised by the Owner and sampling will be performed by the Owner. The sampling program has only been estimated at this point for the FS and will need more detailed evaluation in future studies.

#### 13.9.1.2 **Production Drilling**

The ore and waste rock at Ixtaca will require drilling and blasting. The Volcanic material is generally softer than the Limestone and Shale material and will have a higher drilling penetration rate. Production drilling will be carried out with 273mm (10 ¾”) diesel hydraulic rotary drills. Estimated effective penetration rates range from 28m/hr (Limestone and Shale) up to 43m/hr (Volcanics).

The production drills will also be adequate for drilling the pre-shear and buffer blast holes on the ultimate pit highwall. The assumed drill productivity for highwall drilling activity is the same as the primary drilling fleet productivity.

#### 13.9.1.3 **Production Blasting**

A powder factor of 0.15kg/tonne is assumed for volcanic material and 0.21kg/tonne for Limestone and Shale material based on results from a blasting study performed by MMTS in 2015. Production blasting will be done with ANFO where possible or emulsion if the holes are too wet (during the rainy season or in pit bottoms).

The blasting activities are planned to fall under a contract service agreement with a local explosives supplier, including supply of explosives, direct labour and blast-hole loading trucks. The Owner will provide an on-site explosives storage facility (silos), perimeter fencing around the storage facility and portable offices. The Owner will also pit supervision and planning for blasting operations.

#### 13.9.1.4 **Loading**

The mine production plan requires a maximum of seven 12m$^3$ bucket hydraulic excavators which are sized to handle 90 tonne payload haul trucks. The hydraulic excavators are specified to handle the bulk excavation from the pits including all identified mineralized zones and waste rock in those mineralized zones. An excavator-type configuration will allow for greater flexibility in separation of ore into grade bins for stockpiling.

The excavator size is chosen based on its ability to minimize losses and dilution for the proposed ore control operations, as well as its proven reliability and equipment ownership by various contract mining groups. The chosen excavator can work in a 6m split bench configuration for greater ore selectivity as well as full 12m bench operations.

#### 13.9.1.5 **Hauling**

Ore and waste rock haulage will be handled with 90 tonne payload haul trucks. Some of the haul trucks will be equipped with side-boards to allow full weight capacity when hauling volcanic material, since the density of this material is low. Haul profiles are estimated from each bench centroid to each potential dumping location. The following hauler productivity parameters are applied to calculate the cycle times.

**Table 13-9 Hauler Cycle Time Assumptions**

| | |
|---|---|
| Maximum Haul Grade | 10% |
| Rolling Resistance on Hauls | 3% |
| Rolling Resistance near shovels and on RSF surfaces | 5% |
| Truck Speed Limit | 50 km/hr |
| Operator Efficiency | 90% |
| Loading + Spot + Waiting Time | 3.42 minutes |

#### 13.9.1.6 **Primary Mining Equipment**

A summary of the major mining equipment fleet is presented in the table below.

**Table 13-10 Primary Mining Fleet Schedule For Key Periods**

| | Y -1 | Y5 | Y8 | Y10 |
|---|---|---|---|---|
| **Drilling** | | | | |
| Primary Drill - 270 mm | 1 | 3 | 2 | 0 |
| **Loading** | | | | |
| Hydraulic Shovel - 12 m3 | 2 | 7 | 5 | 2 |
| **Hauling** | | | | |
| Haul Truck - 90 tonne payload | 3 | 42 | 17 | 4 |

#### 13.9.1.7 Pit Services

Pit services include:

- Haul road maintenance
- Pit floor and ramp maintenance
- RSF maintenance
- Ditching
- Dewatering
- Lighting
- Transporting personnel and operating supplies

The following table summarizes the equipment chosen to handle these pit service functions.

**Table 13-11 Mine Operations Support Equipment For Key Periods**

| | | Y -1 | Y5 | Y10 |
|---|---|---|---|---|
| Blasthole Loader | Blast hole stemmer | 1 | 2 | 1 |
| Dozer - 306 kW | General Support (shovels, RSFs, utility) | 2 | 3 | 1 |
| Fuel/Lube Truck | 4000 litres | 2 | 4 | 1 |
| Water Truck | Haul Roads - 4000 gallons | 2 | 2 | 1 |
| Grader - 221 kW | Road Grading | 2 | 2 | 1 |
| FEL - 373 kW | Multi-tool, tire changing, cable reeler | 1 | 1 | 1 |
| Compactor | Road maintenance | 1 | 1 | 1 |
| Excavator - 301 kW | Utility Excavator | 1 | 2 | 1 |
| Mobile Screening Plant | Road Crush | 1 | 1 | 0 |
| Jaw Crusher | Road Crush | 1 | 1 | 0 |
| Forklift | 10 tonnes | 1 | 1 | 1 |
| Light Plant | 20 kW | 3 | 7 | 4 |
| Mobile Crane | 130 tonnes | 0 | 1 | 1 |
| Passenger Bus | 47 passenger | 1 | 2 | 1 |
| Warehouse Truck | 1 tonne | 1 | 1 | 1 |
| Crew Cab Pickup | Crew Cabs, Supervisor trucks | 8 | 13 | 8 |
| Service Truck | maintenance + overhauls | 1 | 1 | 1 |
| Welding Truck | Welding Truck | 1 | 2 | 1 |
| Portable Air Compressor | Mine Maintenance | 1 | 2 | 1 |
| Portable Welding Unit | Mine Maintenance | 1 | 1 | 1 |
| Mine Rescue Vehicle | First Aid/Mine Rescue | 1 | 1 | 1 |

*Haul Road Maintenance*
The grader is used to maintain the haul routes for the haul trucks and other equipment within the pits and on all routes to various RSF locations and the primary crusher. The grader ensures the haul roads are free of debris and that they conform to the design parameters of the routes for cross-section and grade.

The water truck is outfitted with a water tank to spray the width of the haul roads to control dust that creates both visibility (productivity) and environmental issues. The water truck will also spray the active in-pit areas and the active RSF areas.

*RSF Maintenance*
Up to 3 track dozers (306kW) are included to handle rock that is dumped at the RSFs. The dozer will push free dumped piles over the dump face edge as well as keep berms along the dump face edge and ensure the dumping area is clean and free of large boulders that would cause damage to haul truck tires.

*Pit Dewatering*
Water will be collected on active benches and directed to in-pit sumps where it can be pumped from the pit. Bench floors can be sloped slightly to facilitate drainage of water away from the working face(s). All surface water and precipitation in the pit will be handled by submersible pumps installed in each active pit bottom.

#### 13.9.1.8 **Mine Fleet Maintenance**

Mine fleet maintenance activities will be generally performed in the maintenance facility located near the pit rim. Maintenance activities will be the responsibility of the contract mining group.

Expected maintenance of the mining equipment will include break-down maintenance, field maintenance and repairs, regular PMs, component change-outs and field fuel, lube and tire change-outs. Fuel, lube and maintenance support in the pit will be by mobile service truck. The mobile maintenance fleet is included as a category under direct mining unit operations.

### 13.9.2 **GME and Technical (Owner)**

Mine GME will include mine operations supervision. The General Manager will assume responsibility for the entire project and will have an Administrative Assistant to help with logistics, communications, planning and reporting. A Production Supervisor will oversee and direct the contract mining group and a Technical Services Manager will direct the technical services group.

The Technical Services department includes engineers (mining and environmental) and geologists. The mine planning engineer will be responsible for directing the short and long-range scheduling and destination of materials (stockpile, crusher, RSF location, TMF, etc.). The ore grade technicians will work in the field to help ensure that ore is sent to the correct destination. Ore grade technicians will also perform surveying activities in the field to ensure that contract mining group is following the mine plan. The Technical Services department will provide reconciliation of material movement volumes against the numbers supplied by the contract mining group. The Mine Geologist will be responsible for ore control planning and provide guidance on construction of the short range geology model using sampling inputs. The geologist and sampler will be responsible for collecting samples from the Ore Control Drilling program and feeding assay results back into the geology and mine planning model.

### 13.9.3 Mine Operations Organizational Chart

The following Organizational Chart illustrates the structure of the planned mining department staff and contract companies.

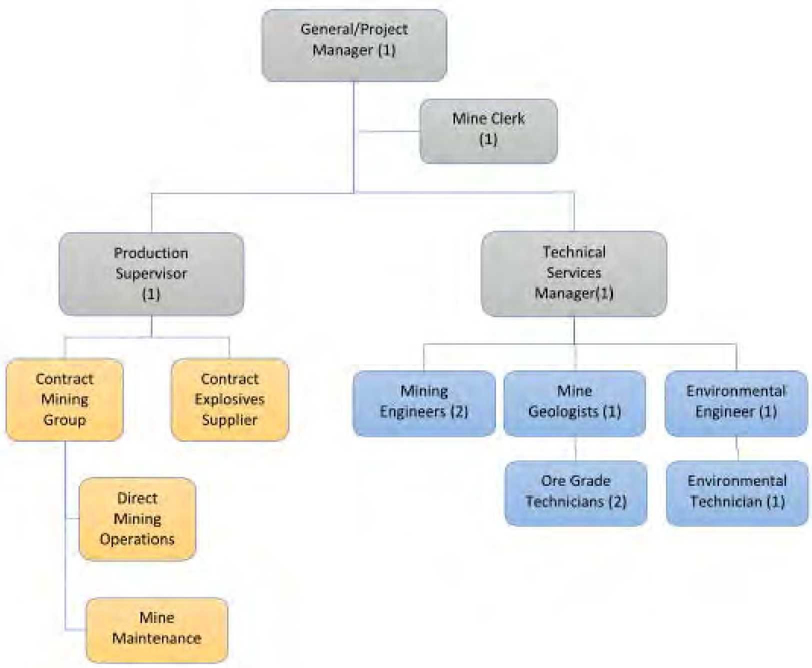



**Figure 13-21 Org Chart**

# 14.0 **Processing and Recovery Methods**

The information in this section was drawn from the most recent major study prepared entitled “The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study” dated January 24th 2019 and updated October 3, 2019.

## 14.1 Process Flowsheet

Metallurgical test work results discussed in Section 10 confirm that ROM ore from the Ixtaca deposit can be processed using:

- Crushing;
- Pre-concentration with XRT Ore sorting;
- Grinding;
- Gravity concentration;
- Intensive leaching;
- Flotation;
- Carbon-in-Leach (CIL);
- Carbon elution and Electro-winning;
- Agitated leach with Merrill Crowe;
- Cyanide destruction with the $SO_2$/Air process;
- Tailings filtration;

Design of the Ixtaca flowsheet summarized in Figure 17-1 is based on the results from the metallurgical testwork, and includes input from process equipment suppliers and PMICSA, a local Mexican based construction company with experience in similar operations.

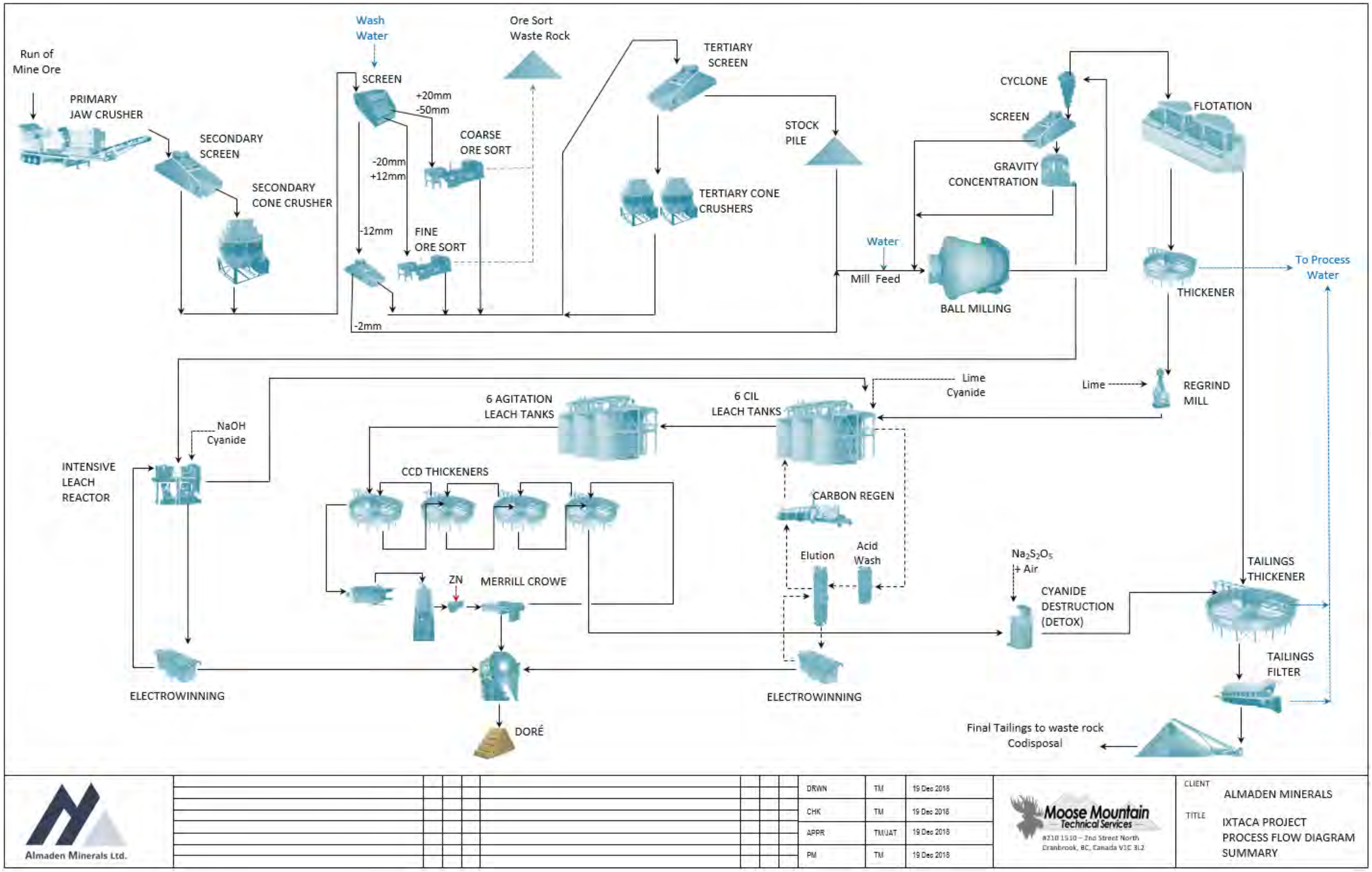



**Figure 14-1 Summarized flowsheet for Ixtaca – Block Flow Diagram**

## 14.2 Acquisition of the Rock Creek Processing Plant

Almaden has acquired the processing facilities from the Rock Creek mine in Alaska. The majority of the Rock Creek major process components are suitable for use in the proposed Ixtaca mine and the equipment is good condition.

Dismantling of the Rock Creek plant was completed in 2018 and the plant was moved to a storage area near the port of Nome, Alaska

Design of the major unit process includes consideration of the equipment available from the Rock Creek plant.

## 14.3 Process Design Criteria

The Ixtaca process plant is designed to initially process 2,300,000 tpa or 344 tph of limestone using an overall plant availability of 93%. The crushing plant will operate at 73% availability. Where possible equipment has been adapted from the Rock Creek mine. The process is expanded in Year 5 to double the throughput to 5,600,000 tpa or 688 tph

The process initial design criteria are summarized in Table 14-1

**Table 14-1 Summary of Process Initial Design Criteria**

| Description | Unit | Value |
|---|---|---|
| **Crusher Feed Throughput** | tpa | 4,410,000 |
| **Ore Sort Reject Throughput** | tpa | 1,610,000 |
| **Mill Feed Throughput** | tpa | 2,800,000 |
| **Operations** | | |
| Crusher Availability | % | 73 |
| Plant Availability | % | 93 |
| Plant Daily Throughput | tpd | 7,650 |
| Plant Hourly Capacity | tph | 344 |
| **Average ROM Feed Au Grade** | g/t | 1.11 |
| **Max ROM Feed Au Grade** | g/t | 1.83 |
| **Crushing** | | |
| Crusher Work Index | kWh/t | 8 |
| Primary | type | Jaw: Fuller-Traylor® TST 1400 |
| Secondary | type | Cone: Raptor XL400 |
| Tertiary | type | Cone: Raptor XL400 (x2) |
| Ore Sorting | type | XRT Dual |
| Fine Ore Stockpile Live Capacity | Tonnes | 7,500 |
| **Grinding** | | |

| Description | Unit | Value |
|---|---|---|
| Bond work index | kWh/t | 12.9 |
| Ball Mill 1 Dimensions | Dia ft x EGL ft | 18.43 x 25.63 |
| Ball Mill 1 Power | kW | 4,000 |
| Ball Mill 2 Dimensions | Dia ft x EGL ft | 12 x 14 |
| Ball Mill 2 Power | kW | 671 |
| Mill Feed Particle Size $F_{80}$ | mm | 9.5 |
| Mill Product Particle Size $P_{80}$ | µm | 75 |
| Mill Classification | type | Cyclones |
| **Gravity Concentration** | | |
| Gravity Concentration | type | Sepro SB5200 |
| Gravity Concentrate Leaching | type | SLR6000 Leach Reactor |
| **Flotation** | | |
| Residence Time | min | 66 |
| Number of Cells | number | 7 |
| Cell Volume | $m^3$ | 160 |
| Concentrate Thickener Diameter | m | 16 |
| Concentrate Regrind Mill | type | Vertical |
| Concentrate Regrind Mill Power | kW | 900 |
| **CIL and Carbon Desorption** | | |
| Residence Time | Hours | 24 |
| Number of Tanks | number | 6 |
| Tank Diameter | m | 7.6 |
| Tank Height | m | 9.6 |
| Carbon Concentration | g/L | 15-20 |
| Carbon Loading | Au g/t | 950 |
| Elution Strip Rate | # Strips/per week | 7 |
| **Agitated Leach and Merrill Crowe** | | |
| Residence Time | Hours | 48 |
| Number of Tanks | number | 4 |
| Tank Diameter | m | 10.6 |
| Tank Height | m | 15.0 |
| CCD Thickener Diameter | m | 16 |
| Number of CCD Thickeners | number | 4 |
| **Cyanide Destruction** | | |
| Method | type | $SO_2$ Air |
| Reagent | type | $Na_2S_2O_5$ |
| Reagent addition | kg/t mill feed | 1.5 |
| Final Cyanide Target (WAD) | mg/L | < 0.2 |
| **Tailings Thickener** | | |
| Thickener U/F density | % | 65% |

| Description | Unit | Value |
|---|---|---|
| Thickener Diameter | m | 30 |
| **Tailings Filtration** | | |
| Filter Type | type | Ceramic Vacuum Disc |
| Model | model | CX12-204 |
| Design rate | dry t/h/m$^2$ | 0.35 |
| Target Moisture | % | 16.5 |
| Availability | % | 85 |
| Number Of Filters | units | 6 |

## 14.4 Process Description

### 14.4.1 **General**

The site general arrangement shown in Figure 13-20 includes crushing and ore sorting adjacent to the pit. An overland coarse ore conveyor transports crushed rock to the plant site located adjacent to the west site of the waste rock storage area. The plant site general arrangement layout includes allowance for expansion to be completed by Year 5.

Access to the crushing and ore sort area will use the mine access road, while a separate road on the west side of the mine will be used to access the plant site.

### 14.4.2 **Crushing and Ore Sorting**

The crushing circuit will use all the Rock Creek equipment and remain in the original configuration of a three-stage crushing circuit at a capacity of 690 tph and availability of 73%. Ore passing the secondary crushing stage is sent to ore sorting for pre-concentration.

Dust control throughout the crushing circuit will use water sprays.

Run of mine ore will be hauled to the primary crusher using 90 tonne trucks. The trucks will dump onto a static grizzly. The primary jaw crusher will operate in open circuit with a closed size setting (CSS) of 127 mm. A tramp magnet removes steel from the primary crushed ore conveyor before the secondary crushing stage.

The secondary cone crushing station operates in open circuit with a CSS of 40 mm and a pre-classification screen.

Product from the secondary crushing stage is conveyed to a triple deck washing screen for ore sort size classification to coarse (+20mm), mid-size (12 to 20 mm), and fine (-12mm) fractions.

Coarse ore will be sorted by 6 XRT ore sort machine to eject waste rock. Mid-size ore will be sorted by 2 XRT ore sort machines.

Fine ore bypasses ore sorting with the less than 2mm fraction being pumped to the mill while the greater than 2mm fraction is conveyed to the mill feed stockpile.

Ore sort product is conveyed to the tertiary crushing stage which operates in close-circuit using two cone crusher stations with pre-classification vibrating screens.

Final crushing product size is $P_{80}$ of 9.5 mm.

The crushing and ore sort layout is shown in Figure 14-2.

### 14.4.3 **Fine Ore Stockpile**

Ore from the crushing circuit is transported to the fine ore stockpile by a 1,250 m overland conveyor.

The stockpile is approximately 26 m high and 37 m diameter with a live capacity of 7500 tonnes.

Ore from the stockpile is reclaimed by 3 vibrating feeders. The Layout of the stockpile is shown in Figure 14-3.

### 14.4.4 **Processing Plant**

The grinding, gravity concentration, flotation, leaching, thickening areas are located outdoors. Intensive cyanidation, elution, Merrill Crowe, refinery and reagent preparation, offices, electrical rooms and control rooms and maintenance facilities are located indoors.

The Layout of the processing plant area is shown in Figure 14-4. Allowance for the planned Year 5 expansion has been made in the plant layout and are depicted by the grey areas on the layout drawings.

#### 14.4.4.1 **Grinding and Gravity Concentration**

Grinding from an $F_{80}$ of 9.5 mm to $P_{80}$ of 75 µm is carried out with two ball mills in a closed circuit with cyclones. The grinding circuit can process a nominal 7,650 tpd at 344 tph and 93% availability and 250% recirculating load. Grinding includes two ball mills in parallel. The first ball mill is the Rock Creek 18.43 feet diameter x 25.63 feet length mill with two 2,000 kW fixed speed motors. The second mill is a 12 feet diameter x 14 feet length mill with a 671 kW motors. The combined mill power is 4,671 kW.

Cyclone underflow is screened on a 6' X 16' single deck screen. Screen undersize (-2mm) feeds two semi batch gravity concentrators. Screen oversize is returned to the ball mills. Gravity tails flows back to the mill and gravity concentrate flows to an intensive leach reactor on the ground floor. Pregnant leach solution (PLS) from the intensive leach reactor is pumped periodically to a dedicated tank in the refining area. Leach reactor tailings are pumped to concentrate regrinding.

A general arrangement section of the grinding and gravity area is shown in Figure 14-5.

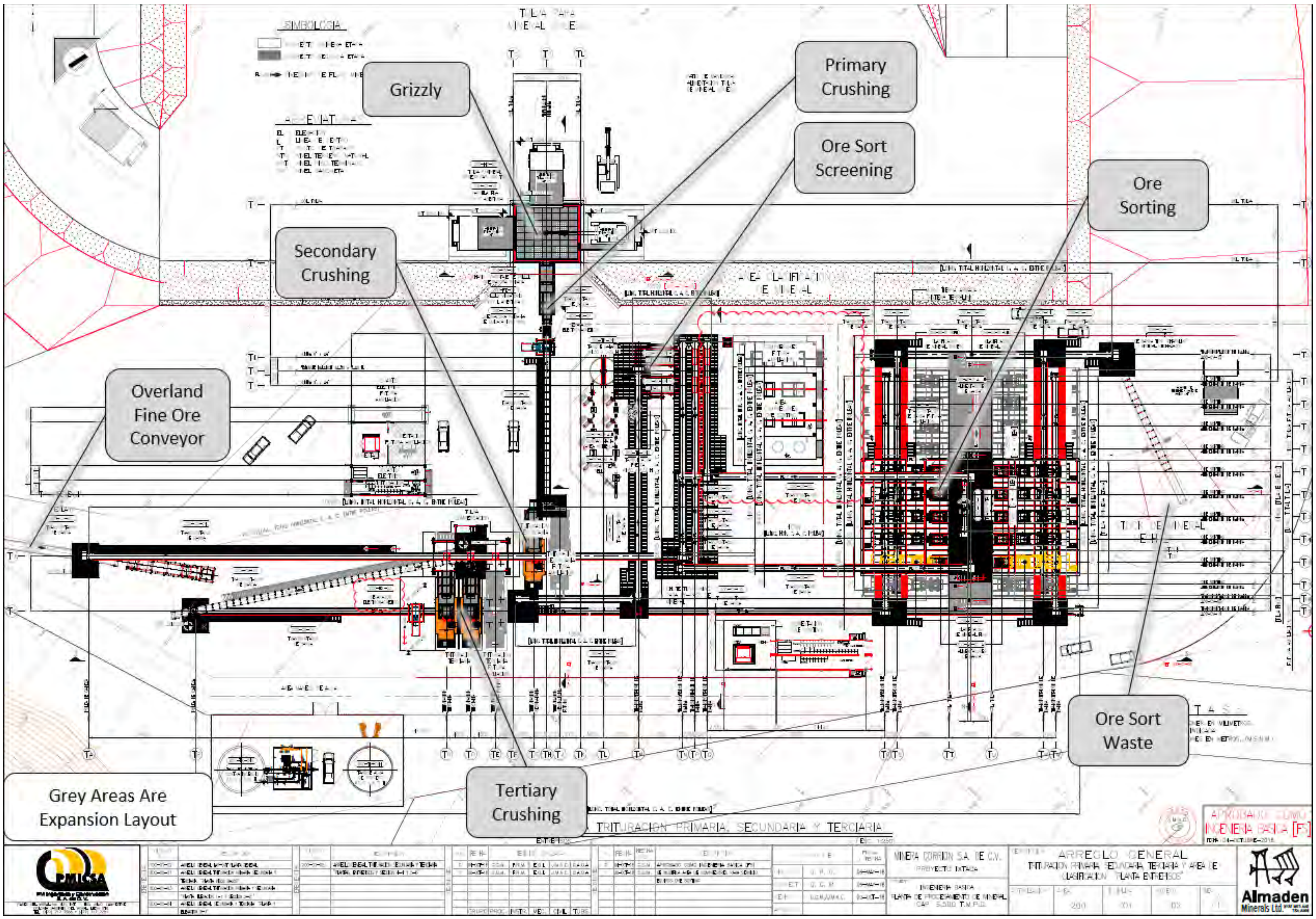



**Figure 14-2** **Crushing And Ore Sort Layout**

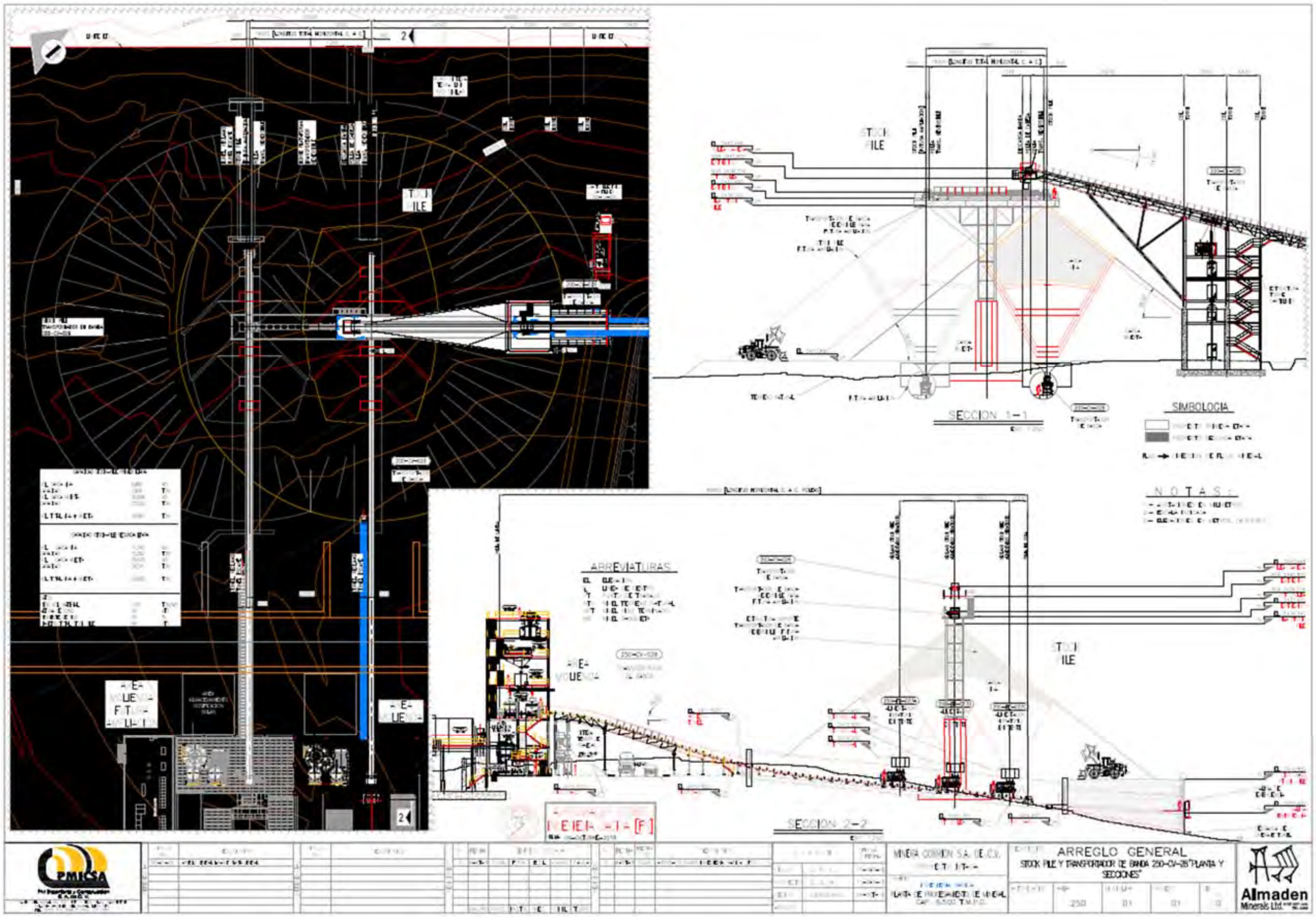



**Figure 14-3 Stockpile Layout and Section**

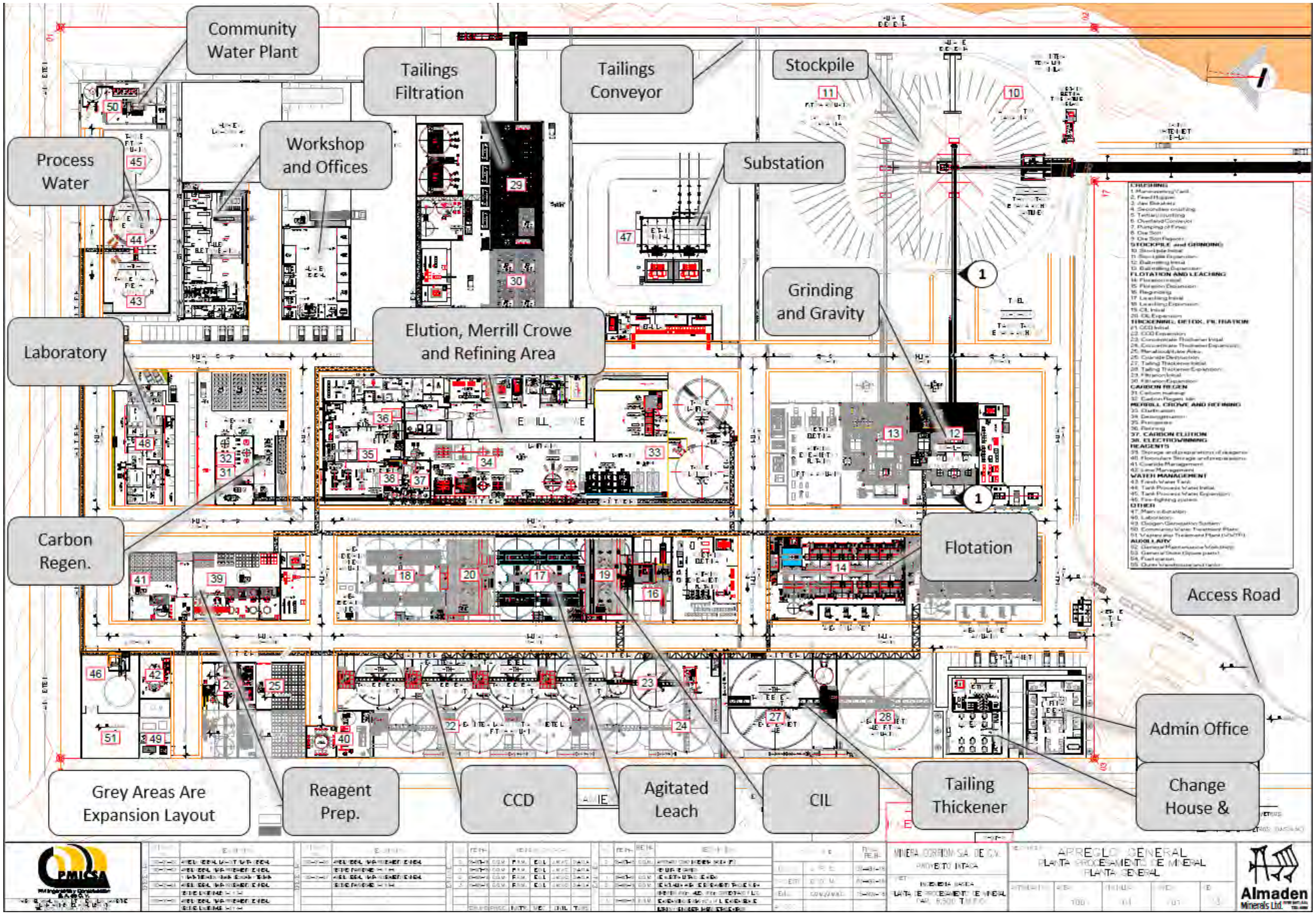



**Figure 14-4 Processing Plant Layout**

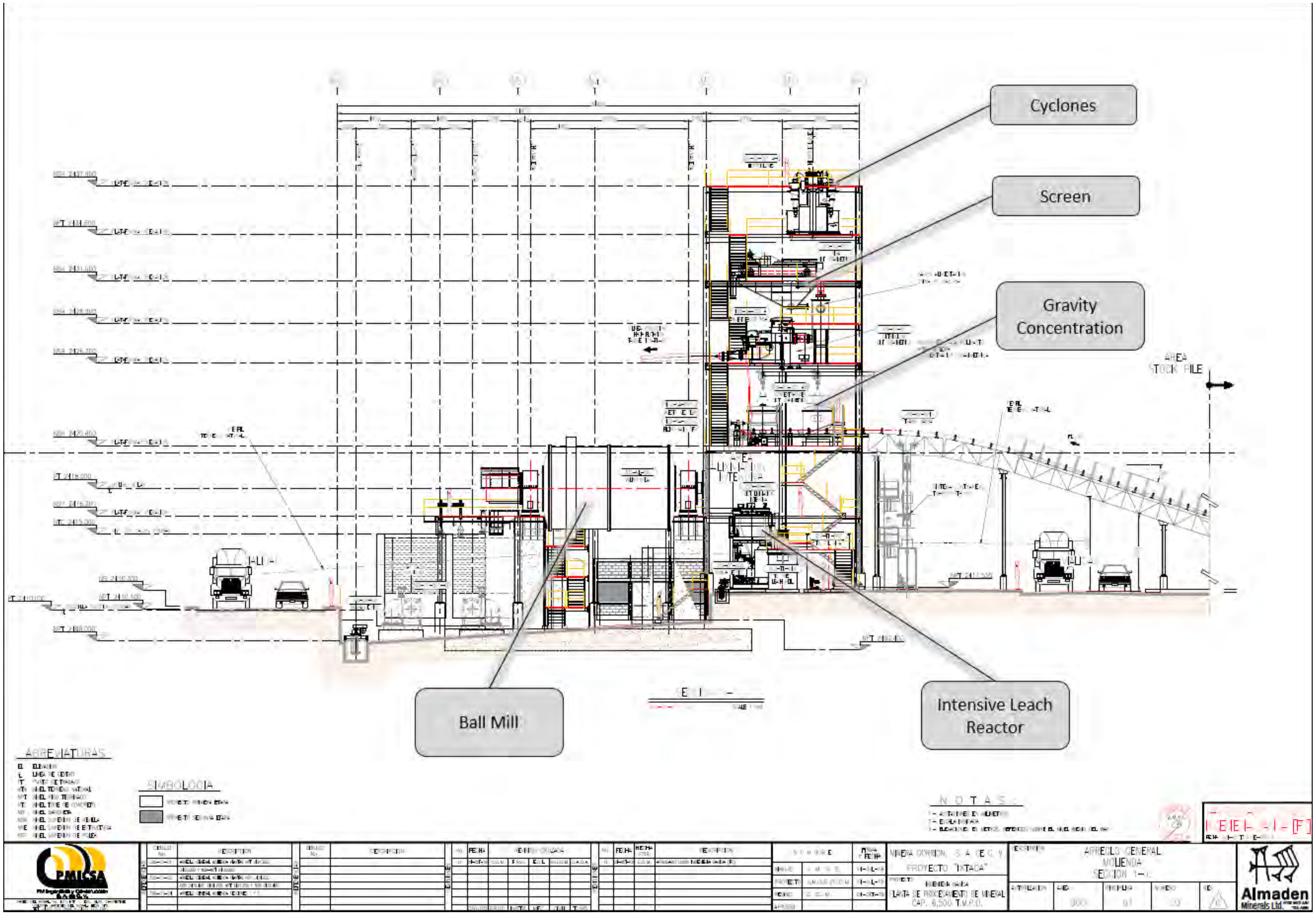



**Figure 14-5 Grinding and Gravity Concentration Section 1-1**

#### 14.4.4.2 **Flotation**

Cyclone overflow from the grinding circuit is pumped to a flotation conditioning tank. Copper sulfate, sodium isopropyl xanthate (SIPX), frother (AEROFROTH 65), and promoter (AERO 3477) are added to enhance flotation performance.

Flotation is carried out in seven conventional 160 $m^3$ mechanical cells, each using forced-air. Flotation concentrate is collected and pumped to the concentrate thickener. Thickener overflow gravity flows to a tank where it is recycled for plant use. Thickener underflow is pumped at 40% solids to a 900 kW vertical regrind mill where lime is added before regrinding.

Regrind product at approximately $P_{80}$ 10 µm is pumped to the CIL for leaching.

#### 14.4.4.3 **CIL and Agitated Leach**

Leaching is carried out in 2 stages. CIL leaching for 24 hours will complete gold extraction, followed by 72 hours of agitated leaching to complete silver leaching.

Leach feed from the regrind mill is first pumped to a CIL feed sampler, and then slurry is contacted with carbon using six CIP tanks operating in series accounting to a total of 24 hours of residence time. Sodium cyanide and lime slurry is added to CIL Tanks 1 and 3.

Carbon concentrations of 20 g/L are required in all tanks. Barren carbon enters the adsorption circuit at CIP Tank 6 and moves countercurrent to the slurry flow using interstage screens and pumps from a downstream to upstream tanks.

The countercurrent process is repeated until the carbon becomes loaded and reaches CIP Tank 1. Carbon is then moved to loaded carbon recovery screen. The loaded carbon is washed with water and pumped to the desorption area. Underflow from the loaded carbon recovery screen is returned to CIL Tank 1.

The slurry from CIP Tank 6 flows by gravity to a carbon safety screen to recover any carbon in the event of damage to the CIP Tank 6 interstage screen. Recovered carbon is collected in a bin for manual transfer.

Underflow from the carbon safety screen gravitates to four agitated leach tanks to complete silver leaching. Slurry from the last leach tank gravity flows to a Merrill Crowe circuit.

#### 14.4.4.4 **Carbon Desorption and Regeneration**

Carbon desorption and regeneration areas is carried out by acid washing of carbon, stripping of gold from loaded carbon (elution), and carbon regeneration.

Carbon from the loaded carbon screen is pumped to acid wash. Acid wash is carried out with dilute hydrochloric acid with two 5.8 $m^3$ acid wash columns inside an acid-proofed concrete bund to ensure that all spillage is captured and kept separate from other process streams.

After acid wash the carbon is pumped to an elution circuit that includes elution columns, strip solution tank, strip solution pump, and a strip solution heat exchanger. The elution circuit operates in closed circuit with electro-winning cells.

The elution is carried out in 2 columns, one with dimensions 3' diameter x 24' height, and a second column with 4' diameter x 32' height.

Strip solution heat exchangers maintains the strip solution at 145 °C during the stripping cycle and ensures that the temperature of solution entering the electro-winning cells is below 100 °C.

Eluate flows directly from the top of the elution column to a loaded solution tank after cooling through heat exchangers. The eluate is pumped from the loaded solution tank to electro-winning cells to recover gold and silver as sludge. Barren solution from electro-winning gravitates back to the strip solution tank. The sludge is drained from the electrowinning cells and vacuum filtered before refining.

#### 14.4.4.5 **Merrill Crowe**

A Merrill Crowe process operates in closed circuit with four counter current decantation (CCD) thickeners.

Slurry from the final leach tank flows to the CCD thickeners where pregnant solution is removed. The pregnant solution is clarified with three horizontal leaf clarifiers using a diatomaceous earth precoat.

Oxygen is then removed from the clarified solution with a vacuum de-aeration column. Solution is percolated through a packing bed while under a vacuum.

Zinc dust is added to the clarified, de-aerated solution which precipitates gold and silver. The precipitate is filtered using three filter presses and sent to refining.

#### 14.4.4.6 **Refining**

Filtered cake from electro-winning and Merrill Crowe is dried in two drying ovens and directly smelted with fluxes in two induction furnaces. Gold-silver doré is poured into doré moulds. Gold-Silver doré bars are weighed, stamped, sampled and stored in a safe ready for dispatch.

Furnace exhaust is passed through a wet scrubber to remove any entrained particles and then vented through a stack.

#### 14.4.4.7 **Detoxification**

Tails from the last CCD stage are thickened and fed to a detox reactor at 45% solids w/w. Cyanide destruction is carried out using the $SO_2$/Air process using sodium metabisulphite. Slurry produced from the detoxification stage is pumped to the final tailings thickener.

An HCN detector will monitor for airborne gas and a cyanide analyzer will be used to monitor cyanide levels and ensure that target cyanide levels are achieved.

#### 14.4.4.8 **Tailings thickener**

The final tailings thickener combines tailings streams from flotation and detoxification. Thickener overflow is recirculated to the process water system. Thickener underflow is pumped to tailings filtration at 65% solids.

#### 14.4.4.9 **Tailings Filtration**

Tailings thickener underflow is pumped to tailings filtration where moisture is reduced to 16.5% using six ceramic disc vacuum filters. Filter cake is discharged and transported to the waste rock co-disposal area by a conveyor. Filtered tails is deposited in a stockpile by a mobile radial stacker ready for placement in the co-disposal area.

## 14.5 Reagents and Power Consumption

Reagents are prepared in a separate contained area and are bunded to control any spillage. Tank storage capacity is based on reagent consumption rates to supply the process without any interruption.

A summary of the estimated reagent consumption rates is provided in Table 14-2.

Electrical power is estimated at 15 MW ramping up to 26MW in Year 5.

**Table 14-2 Reagents and Consumables Summary**

| Reagent | Consumption kg/t Mill Feed |
|---|---|
| Copper sulphate | 0.125 |
| Sodium Silicate | 0.125 |
| Sodium Isopropyl Xanthate | 0.125 |
| Aero 3477 | 0.078 |
| Aerofroth 65 | 0.060 |
| Cal (Calcium Hydroxide) | 1.214 |
| Flocculant | 0.029 |
| Sodium Cyanide | 0.645 |
| Zinc powder | 0.054 |
| Diatomaceous earth | 0.016 |
| Sodium hydroxide | 0.091 |
| Sodium metabisulfite | 1.510 |
| Nitric acid | 0.639 |
| Hydrochloric acid | 0.025 |
| Activated carbon | 0.009 |
| Sodium nitrate | 0.029 |
| Borax anhydrous | 0.039 |
| Sodium carbonate light | 0.005 |
| Crucibles | 0.00005 |
| Grind Media | 0.500 |
| Grind Media (Regrind) | 0.008 |

## 14.6 Process Water and Power

The raw water supply to the process plant is described in Item 18 (Infrastructure), along with fire water and potable water.

Raw water from the is pumped from the fresh water dam (FWD) and WSD to a Fresh Water storage tank with 12.70 m diameter and 16.30 m height. Make up water and fire water for the plant are drawn from the Fresh Water Tank.

Water recycled in plant area is pumped to a Process Water tank with 16.1 m diameter and 16.3 m height.

A water balance over the process indicates approximately 1,700 $m^3$ per day of fresh make up water is required.

## 14.7 Process Personnel

Process labour summarized in Table 18-8 averages 105 personnel in the initial operation. Process labour is estimated to peak at approximately 160 personnel after the throughput expansion. Labour will primarily be locally sourced living with 20 minutes from the mine site. Labour rates are based on in-house data from local Mexican mining operations. A 5 day shift rotation with 3 x 8 hour shifts has been assumed.

# 15.0 **Infrastructure**

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 15.1 Site Access

The Project is accessible by driving 40 km east along Highway 119 from Apizaco; an industrial center located approximately 50 km north of Puebla City, and then north approximately 20 km along a paved road to the town of Santa Maria. Public gravel roads currently traverse the proposed mining areas.

Site access road requirement are depicted on Figure 15-1.

Public bypass roads are located to the east and west of the Project. A new road is constructed around Santa Maria to bypass mine traffic around the town.

A new bridge will be installed across the Rio Apulco to accommodate mine deliveries.

Most onsite road will only require upgrading of existing roads. Figure 15-1 distinguishes between new and upgraded roads.

## 15.2 Power

Almaden engaged Federal Electricity Commission (Comisión Federal de Electricidad or CFE) through one of its departments, the Centro Nacional de Control de la Energía (CENACE) to complete an assessment of power delivery to the Project.

The first study, (Estudio Indicativo) completed by CENACE examined generation capacity and concluded that Ixtaca will be supplied through a 115 kV transmission line from a substation at Apizaco called Zocac. Total length of the transmission line is 27 km.

The Project requires a new 115/4.16 transformer onsite as the connection point to the transmission line.

Plant power distribution from the main substation will be by overhead power lines and buried conduits.

Standby emergency power will be supplied by diesel generators relocated from the Rock Creek mine.

## 15.3 Fuel

Diesel will be delivered to site in tanker trucks and will be available for use by vehicles using onsite 120,000 litre storage.

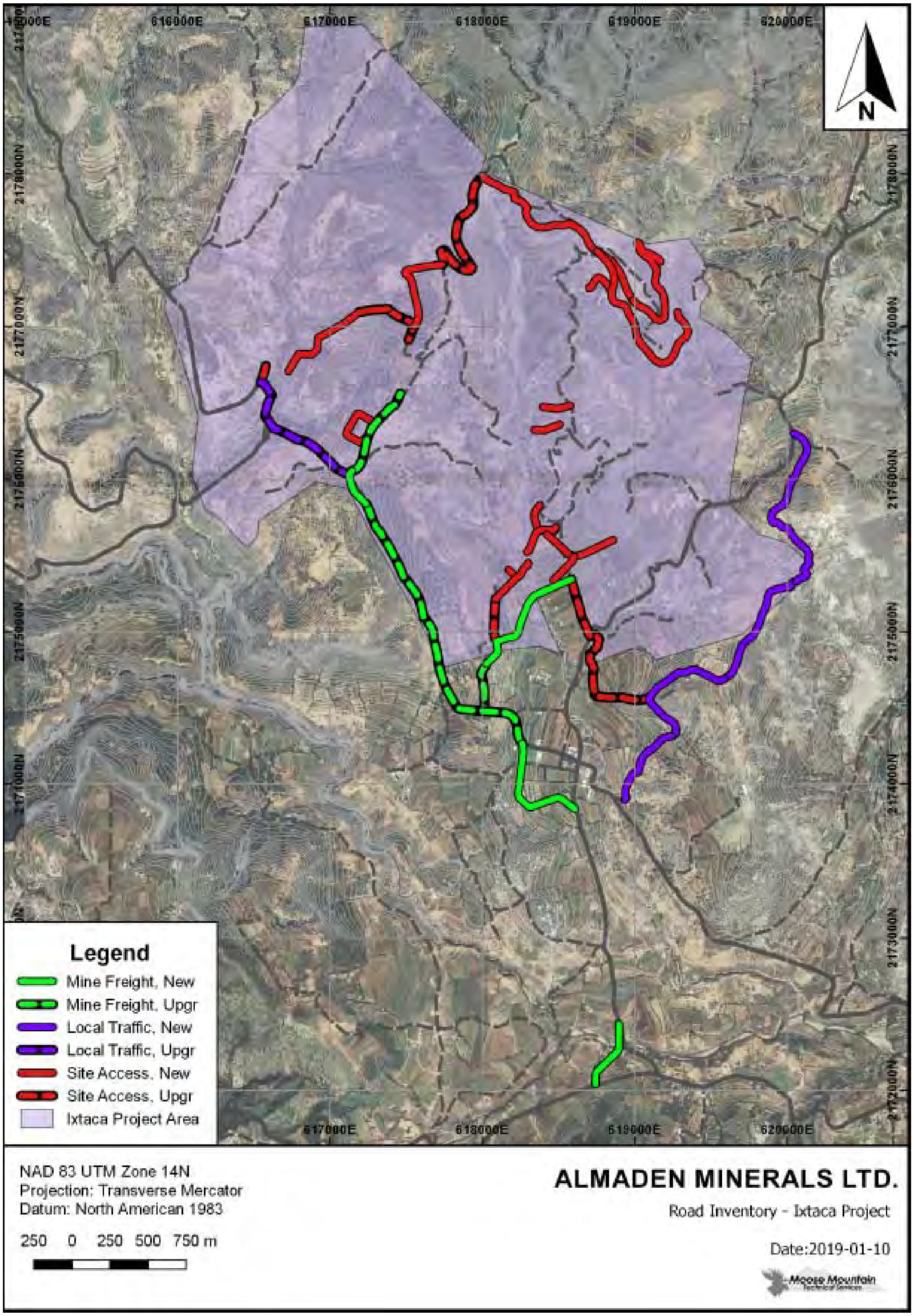



**Figure 15-1 Ixtaca Project Roads**

## 15.4 Water Supply

Regional and site-specific data rainfall data were used to develop a daily rainfall dataset for the Project. Regional data from multiple regional climate stations were reviewed and due to proximity to the site, the Ixtacamaxtitlan regional station was determined most representative of the Project. Regional climate stations in the Project vicinity and are presented in Table 15-1.

**Table 15-1 Regional Rainfall Data**

| Station Number | Station Name | Easting (m) | Northing (m) | Elevation (masl) | Period of Record | Number of Years in Period of Record | Average Annual Precipitation (mm) | Distance from Ixtaca (km) |
|---|---|---|---|---|---|---|---|---|
| 21047 | Ixtacamaxtitlan | 624,340 | 2,176,063 | 2,472 | 1954-2016 | 62 | 602 | 7.7 |
| 21021 | Capulaque | 629,773 | 2,188,906 | 2,098 | 1954-2016 | 62 | 976 | 18.4 |
| 21103 | Zacapoaxtla | 647,802 | 2,197,903 | 1,828 | 1944-2016 | 72 | 1411 | 38.1 |
| 21140 | Chignahuapan | 601,280 | 2,194,000 | 2,291 | 1974-2016 | 42 | 776 | 23.6 |

A climate station was installed at the Project site in April 2013. The available rainfall data (April 2013 to August 2016) were used in conjunction with the historical precipitation record at the Ixtacamaxtitlan regional station to develop a long-term estimate of the daily precipitation adjusted for the Project.

A detailed daily water balance model was prepared for the Project using GoldSim. The water balance flow schematic is shown on Figure 18-2. The model incorporated 54 years of adjusted daily precipitation data and other key parameters and assumptions, as follows:

- A daily evaporation record from the Ixtacamaxtitlan climate station (spanning 30 years)
- A Log Pearson Type III frequency distribution based on the Ixtacamaxtitlan station record
- Net water demand at the Process Plant of 1,680 $m^3$/day for mine years 1 through 5, and 3,360 $m^3$/day for mine years 6 through 12. This water demand is based on;
  - Daily processing rate (filtered tailings production): 7,650 tonne/day for Years 1-4; 15,300 tonne/day for Years 5-10 and 10,500 tonnes/day for Year 11
  - Water content of ore feed to plant: 3%
  - Placed filtered tailings water content: 16.5%
- Groundwater inflows to the pit by year per FS numerical groundwater model for the Project
- Base-case runoff from native ground based on SCS Curve Number of 85 (equates to basin yield of 12 to 16%)
- The process plant contact water will be pumped back into the process. The plant contact water will be zero discharge to the environment.

The main elements in the water balance model include the West Tailings and Rock Storage Facility (West T/RSF), Water Storage Dam (WSD), Fresh Water Dam (FWD), the Open Pit, and the South Rock Storage Facility (SRSF). The overall site water management plan at Year 10 is shown on Figure 15-3.

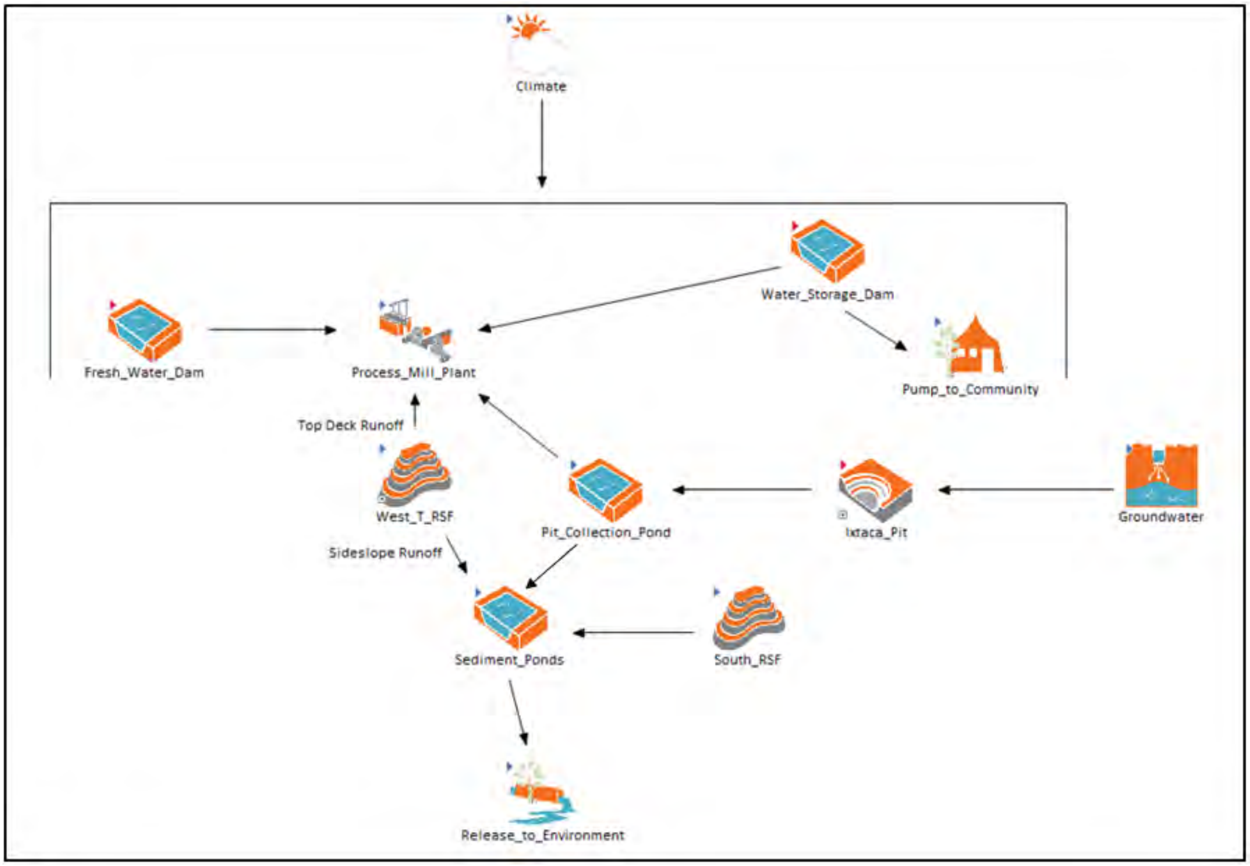



**Figure 15-2 Water Balance Flow Schematic**

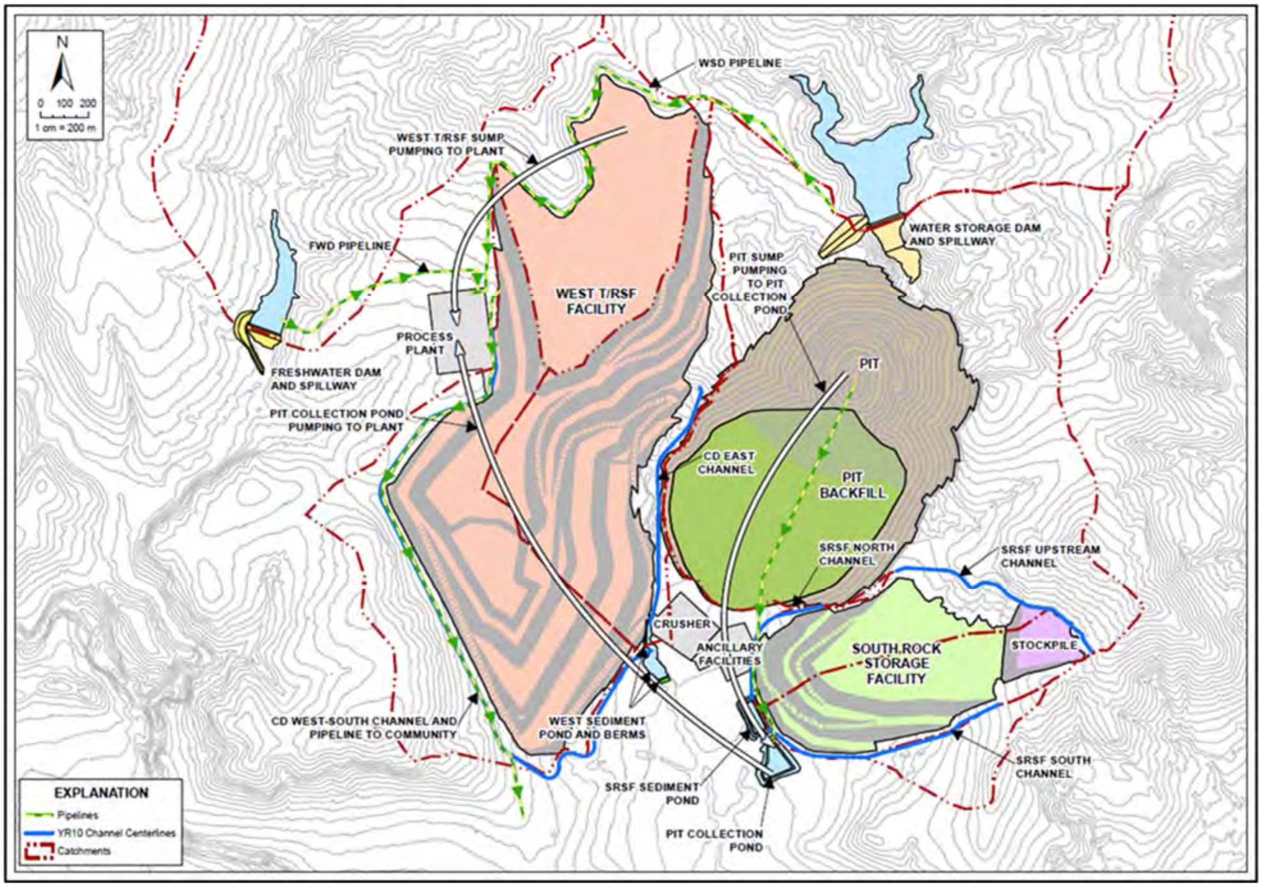



**Figure 15-3 Overall Site Water Management Plan – Year 10.**
*Note: The entire drawing is inside the Ixtaca Claim Boundary*

The main objectives of the site water management plan are to optimize the use of water, prevent discharge of water from the filtered tailings operational surface (West T/RSF), maximize the use of stormwater runoff as fresh water supply to the Process Plant, and to maintain a flow of water downstream of the mine for the community. Process plant demands will be met from the following sources:

- Stormwater runoff from the West T/RSF operating surface
- Fresh water will be provided from various sources including:
    - Groundwater inflow to the pit
    - Stormwater runoff collected in the open pit
    - The FWD
    - The WSD

In the early years of operations (Years 1 to 5), the predicted groundwater inflows and stormwater in the pit and surface of Co-disposal will supply the plant water demand, with no makeup water anticipated from the FWD and WSD. In the later years of operation (Years 6 onwards), all water sources are used to meet plant demand.

A portion of rainfall or groundwater inflow accumulated in the open pit will be used for dust control during the dry months.

The results of the stochastic daily water balance model illustrate that the mine will operate in a water balance over a broad range of climatic conditions with the base-case parameters noted above. These climatic conditions were modeled by randomizing 55 years of historical climate data. The precipitation model was then calibrated with 500 Monte Carlo realizations, each of consisting of 14 years, coming out to 7,000 total simulation years. Results of these realizations are reported probabilistically, in percent likelihood. In addition to the precipitation model, the water balance assumed that the WSD maintains the capacity to store the 100-year, 24-hours storm volume. The schematic water balance is illustrated in Figure 18-2.

The model results are primarily sensitive to the basin yield (i.e., the Curve Number parameter was used to estimate daily runoff relative to daily precipitation depth in the model). A sensitivity analysis was therefore completed and the conclusion from water balance modeling indicates adequate water supply to the plant for average conditions (50$^{th}$ percentile) with a Curve Number of 80 and equates to a basin yield of approximately 10% or higher. For the first five years of the mine life a CN as low as 60 does not result in a plant shortfall for 90% of the model simulations. This indicates that a plant shortfall during this period is unlikely.

Sensitivity analyses were also performed to assess the likelihood of a dry climatic period affecting water supply for plant startup with the base-case CN of 85 and assuming no groundwater is realized in mine year 1. Under these conditions, the model shows adequate water supply for plant operations for the 90$^{th}$ percentile of simulation runs (i.e., less than 10% of the 500 mine-life simulations result in a plant shortfall under the modeled conditions). Based on the model sensitivity evaluation, there is a very low probability of a plant shortfall during plant startup and through mine year 5.

Upgrades to site monitoring of precipitation and streamflow were implemented in 2018, including installation of H-flumes and telemetry systems for remote data access. This data will continue to be monitored and analyzed through startup and during operations.

## 15.5 Mine Maintenance Facility

The maintenance facility location is in the area of the crusher near the pit rim. Major maintenance on haul trucks will be carried out at the maintenance facility. Mine area administration offices, dry, wash bays, warehouse, and fuel storage will also be located in this area. The maintenance facility will be expanded in Year 4 to accommodate the ramp-up in equipment fleet size which will start in Year 5.

## 15.6 Tailings Management

The FS mine plan will not include a separate tailings management facility. Instead the tailings and waste rock will be co-disposed in the West Tailings and Rock Storage Facility (West T/RSF). Tailings produced by the flotation process will be sent through a filter press to achieve a volumetric moisture content of approximately 15% to 20%. The filtered tailings will then be conveyed from the plant to a central point in the West Tailings and Rock Storage Facility. From this location, the tailings will be placed, spread and compacted in layers to an average dry density of 1.8 tonnes per cubic meter (t/m$^3$). Due to the size of the planned operational deck, tailings may be transported from the central stacker area to the limits of the facility by truck or conveyor. The filtered tailings will be surrounded by a limestone waste rock buttress and will be deposited with shale and volcanic waste rock. Approximately 48 million tonnes of tailings and 216 million tonnes of waste rock consisting of limestone, volcanics, and black shale will be stored in the West Tailings and Rock Storage Facility.

#### 15.6.1 **Tailings Storage Alternatives**

Based on the results of assessments for both tailings storage locations and tailings technologies (Knight Piesold, 2017), the tailings storage facility initially designed as a conventional slurry tailings facility within the drainage to the west of the plant site. A geotechnical site investigation program was developed and implemented for the study to better characterize the foundation materials within the valley as well as to identify potential borrow materials. This program consisted of 12 boreholes, 18 test pits, and 6 geophysical lines as well as laboratory testing on disturbed and undisturbed samples. The results of the investigation indicated weaker than anticipated foundation conditions within the drainage west of the plant site and insufficient suitable construction materials within the TMF footprint for construction of the starter embankment and basin liner. Revisions required to the initial design to address these factors increased the costs of the starter and phased embankment construction.

Based on the results of the geotechnical investigation and input received from local communities suggesting a preference for filtered tailings, a slurry facility (designed to address the results of the geotechnical investigation increased risk identified) was compared to a co-disposal facility with both rock and filtered tailings stored in the location of the West Tailings and Rock Storage Facility. This comparison considered high-level costs along with construction, operations and closure risks. Based on this assessment, the co-disposal option was considered the best approach to tailings management at Ixtaca.

#### 15.6.2 **Design Criteria Summary**

Key design criteria for the West Tailings and Rock Storage Facility are summarized in Table 15-2.

**Table 15-2 Ixtaca West Tailings and Rock Storage Facility Design Criteria Summary**

| | |
|---|---|
| **Life of Mine** | 11years |
| **Mill Throughput (Tailings Production)** | 6,100 tpd (Year 1)<br>7,650 tpd (Year 2-4)<br>13,300 tpd (Years 5-11) |
| **Filtered Tailings Volumetric Moisture Content** | 15% to 20% |
| **Total Tailings**<br>**Total Waste Rock**<br>**Tailings Compacted Average Dry Density**<br>**Limestone Stacked Average Dry Density**<br>**Shale Stacked Average Dry Density**<br>**Volcanics Stacked Average Dry Density** | 48 Mt<br>216 Mt<br>1.8 t/m$^3$<br>2.11 t/m$^3$<br>2.09 t/m$^3$<br>1.37 t/m$^3$ |
| **Facility Stability** | Minimum Static Factor of Safety<br>At Peak Strength: 1.5<br>At Residual Strength: 1.5<br>Seismic: Deformation analysis showing acceptable deformations (less than 0.5 m to 1 m) for the calculated $k_{yeild}$ seismic acceleration |
| **Seismic Design Criteria** | Applicable Earthquake Design Ground Motion (EDGM) for the operation phase = MCE (1 in 10,000-year event) |

| | |
|---|---|
| | Peak Ground Acceleration (PGA) = 0.4 g<br>Design magnitude = 8.0 |
| **Surface Water Management** | Prevent discharge of runoff from the operational top surface for the 100-year, 24-hour storm event.<br>No water will be stored on the co-disposal facility. |
| **Seepage** | No seepage is anticipated from the tailings due to the low moisture content of the tailings (a volumetric moisture content of approximately 15% to 20%). |

The general arrangement of the final West Tailings and Rock Storage Facility for LOM is shown on Figure 15-4.

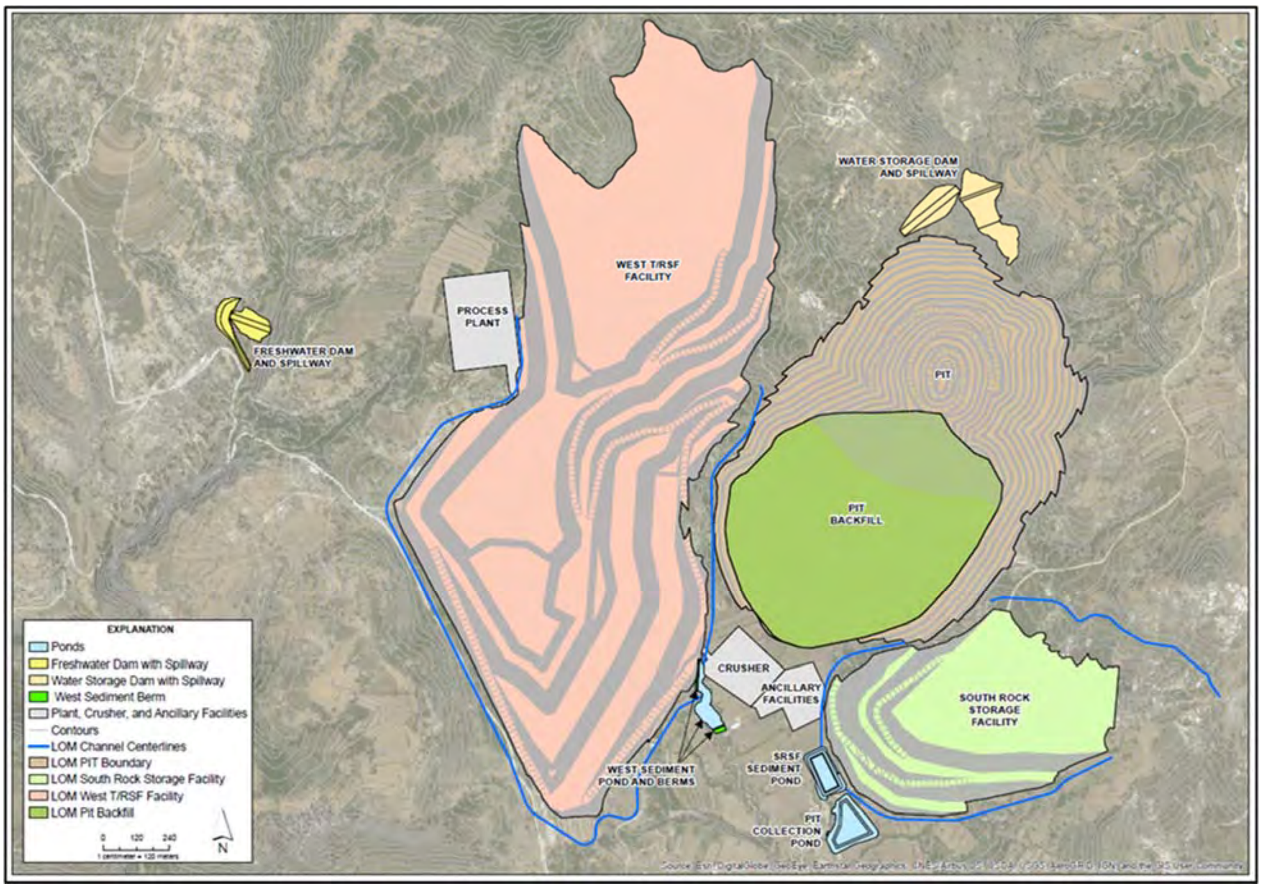



**Figure 15-4 West Tailings and Rock Storage Facility General Arrangement - LOM**
*Note: The entire drawing is inside the Ixtaca Claim Boundary*


**Figure 15-5: West T/RSF LOM Layout**

*Note: The entire drawing is inside the Ixtaca Claim Boundary*

### 15.6.3 Tailings and Rock Storage Design

The following sections provide a brief description of the West Tailings and Rock Storage Facility design.

**Facility Foundation Preparation –** Foundation preparation for the West Tailings and Rock Storage Facility will include removal of trees, clearing and grubbing of vegetation, and removal of topsoil and unsuitable foundation materials. Topsoil will be stockpiled south of the Open Pit for use in facility reclamation. After topsoil removal is complete, unsuitable foundation materials including alluvial and colluvial soils, and unconsolidated tuff deposits will be removed to an estimated depth of 5 m. The currently-estimated extent of unsuitable foundation material removal is shown on Figure 15-6. At the downgradient toe of the West Tailings and Rock Storage Facility, a shear key will be excavated. The northern portion of the shear key will be excavated to a depth of approximately 10 meters below ground surface (mbgs) with 2(H):1(V) side slopes and a bottom width of 100 m (refer to blue shaded area on Figure 15-6 and cross-section on Figure 15-7). The southern portion of the shear key will be excavated to a depth of 20 mbgs with 2(H):1(V) side slopes and a bottom width of 60 m (refer to orange shaded area on Figure 15-6 and cross section on Figure 15-8). The shear key excavation will be backfilled with limestone rock fill. Cross-section locations are shown on Figure 15-5.

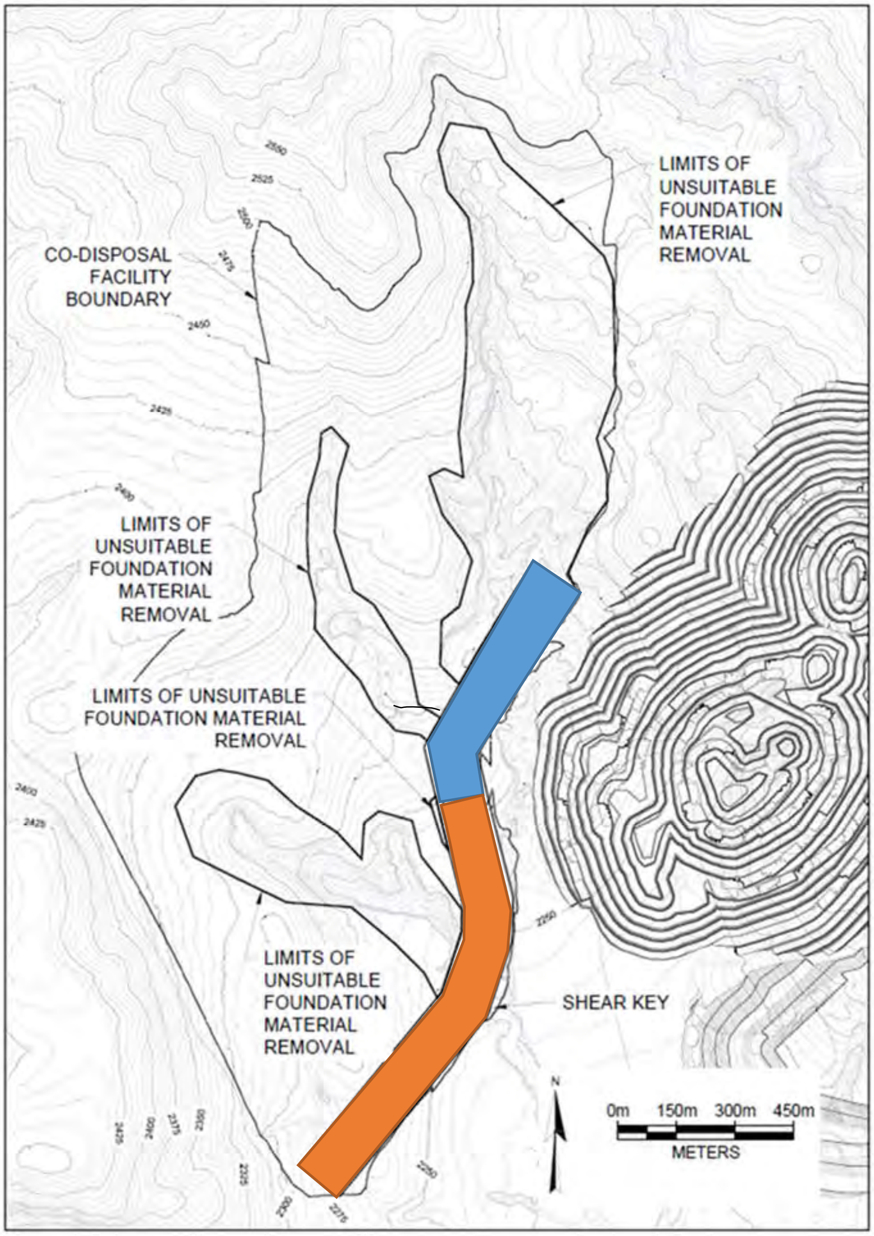



**Figure 15-6 – West Tailings and Rock Storage Facility Foundation Preparation**

*Note: The entire drawing is inside the Ixtaca Claim Boundary*

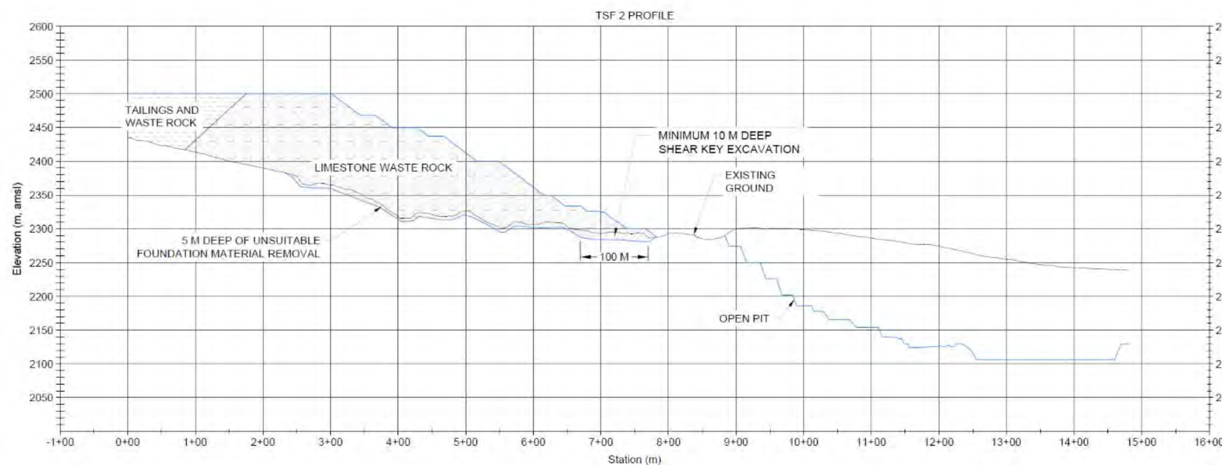



**Figure 15-7 West Tailings and Rock Storage Facility Northern Portion Cross Section - LOM**

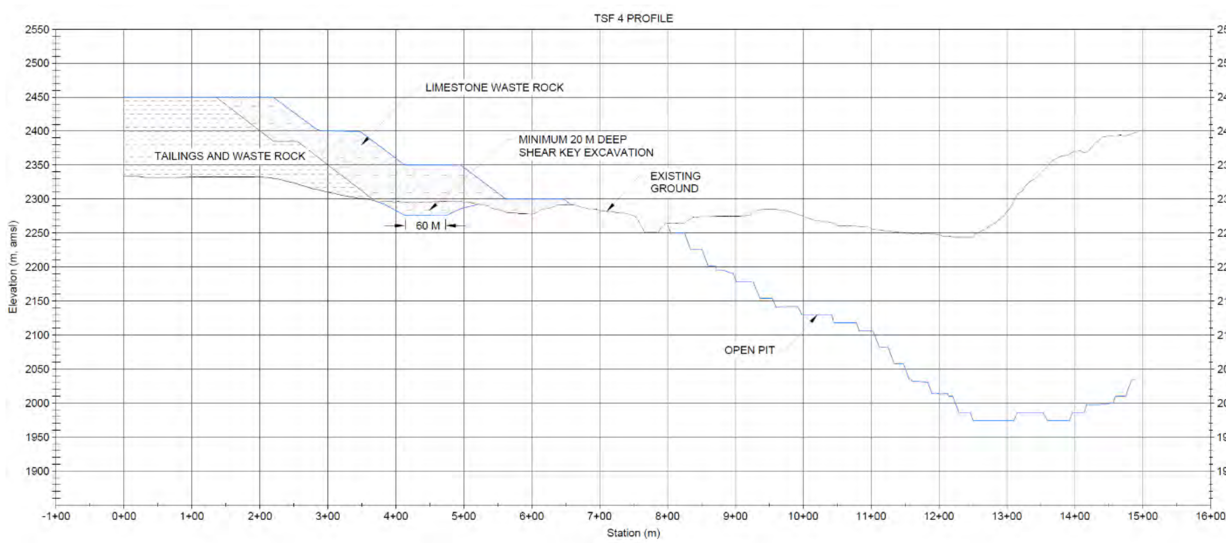



**Figure 15-8 West Tailings and Rock Storage Facility Southern Portion Cross Section - LOM**

**Underdrainage System –** An underdrainage collection system will be provided for the West Tailings and Rock Storage Facility that will capture perched groundwater below the tailings, thus preventing increased pore pressures at the foundation/tailings interface. The compacted tailings are expected to achieve a vertical permeability on the order of $1x10^{-6}$ cm/s or less based on permeability testing presented in Knight Piesold's study (Knight Piesold, 2016).

The underdrainage collection system will consist of bench drains placed approximately every 25 m on the slope. The bench drains will drain to either the perimeter of the facility or one of the internal existing drainages and consist of corrugated, perforated polyethylene pipe (CPEP). The CPEP will be placed in limestone drain rock wrapped by non-woven geotextile. In addition, underlying existing drainages will be filled with coarse limestone waste rock to facilitate drainage. Water from the underdrainage system will be directed to the West Sediment Pond. The currently estimated extent of the underdrainage collection system is illustrated on Figure 18-9.

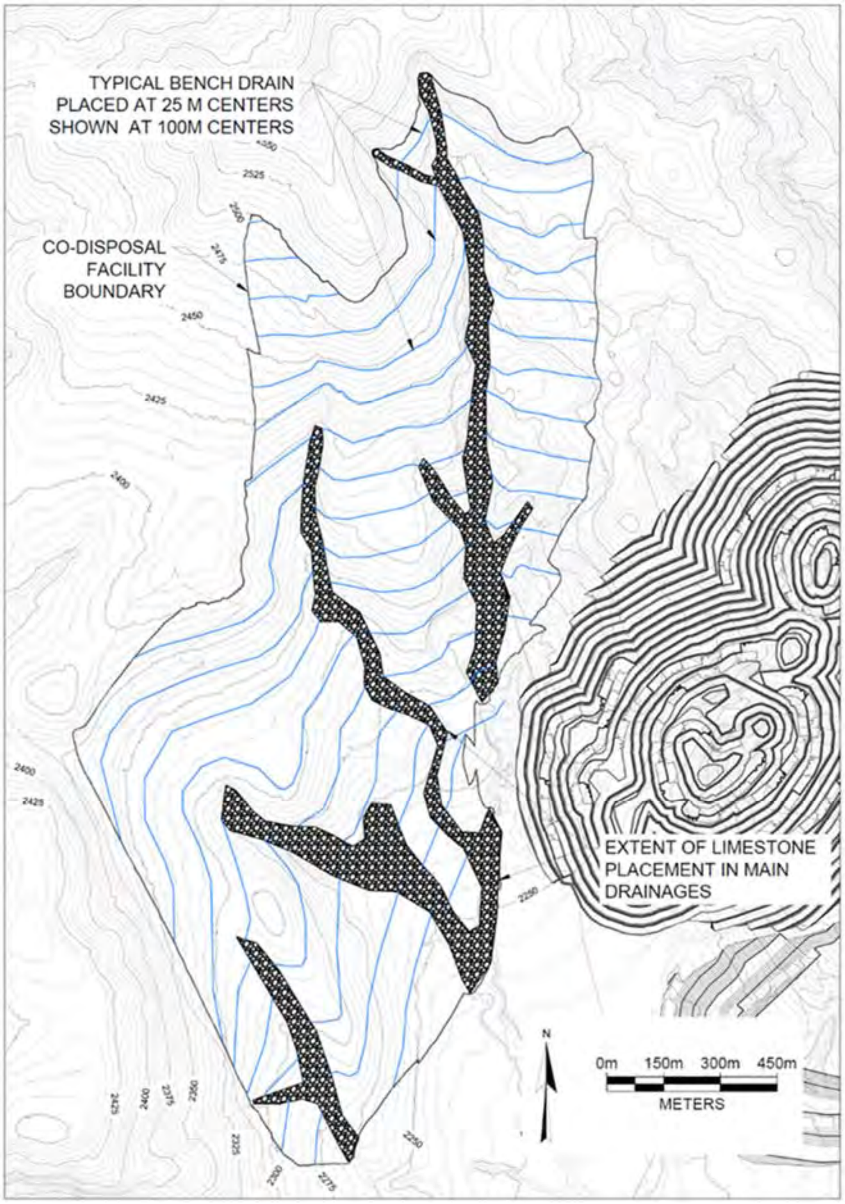



**Figure 15-9 Typical Underdrain Configuration**
*Note: The entire drawing is inside the Ixtaca Claim Boundary*

**Facility Operation -** The West Tailings and Rock Storage Facility will be continuously expanded. Waste rock will be placed to a minimum of 100 m thick in the outer portion of the facility and used to construct perimeter buttresses which will be used for placement of the filtered tailings (refer to Figure 15-7 and Figure 15-8). Tailings will be placed behind the perimeter rock zones by conveyor and/or truck then spread, placed, and compacted in thin lifts (~0.3m) to an average dry density of approximately 1.8 t/m3.

Based on the stability analyses for the facility, the overall facility configuration will conform to the following requirements:

- 75 m offset from the pit boundary
- 3H:1V overall slope (achieved using an 85m bench width) to an elevation of 2350m
- 2H:1V overall slope (achieved using an 35m bench width) above 2350m
- Maximum elevation of the southern portion of 2450m
- Maximum elevation of the northern portion of 2550m

Each compacted lift on the operating deck will be graded to a minimum 5% to 7% slope to drain stormwater to a collection sump. The collection sumps will be drained via pumping and pipeline directly to the Process Plant.

**Water Management -** Diversion channels are designed around the West Tailings and Rock Storage Facility to manage upstream stormwater and minimize seepage into the open pit highwall (refer Figure 15-4).

A runoff diversion channel and pipeline corridor (WSD Channel and Pipeline from the Water Storage Dam to the Process Plant) will be located upstream of the West T/RSF. The channel and pipeline will be relocated up-gradient following Year 4. The West-South Diversion Channel is intended to collect and convey stormwater from natural catchments upstream of the facility, and from the limestone buttress slopes of the West T/RSF, to the West Sediment Pond. The West T/RSF (Co-disposal) (CD) East Channel is located to collect and convey stormwater from natural catchments and the slopes of the West T/RSF buttress slopes, to the West Sediment Pond. This channel is intended to minimize ponding and seepage of stormwater above the open pit highwall to maximize open pit stability.

**Facility Instrumentation –** Instrumentation is included for ongoing monitoring of the performance of the West Tailings and Rock Storage Facility. The instrumentation will include vibrating wire piezometers installed in the foundation and tailings mass. In addition, monitoring wells will be placed downgradient of the facility to monitor groundwater quality. These are detailed in the mine environmental plans.

### 15.6.4 **West Tailings and Rock Storage Facility Closure**

The objective of the closure of the West Tailings and Rock Storage Facility is to leave the facility as a physically and environmentally stable landform, with a landscape and habitat consistent with adjacent land use that will require minimal post-closure monitoring and maintenance. The mine site closure plans are detailed in Section 17.4 and summarized as follows:

- Facility slopes will be regraded to an overall maximum slope of 2.5H:1V.
- Any exposed tailings will be covered with a layer of limestone waste rock with a minimum slope of approximately 5% to direct stormwater runoff away from the surface of the facility.
- A 300 mm thick layer of topsoil will be placed over the entire facility (topsoil will be stockpiled as part of the foundation preparation of the West Tailings and Rock Storage Facility) and revegetated.
- The stormwater runoff collection sump and pipeline to the Pit Collection Pond will be decommission and removed.
- Stormwater runoff from the closed West Tailings and Rock Storage Facility will be routed in stormwater control channels around the facility and discharged into natural channels downgradient from the facility.

## 15.7 Site Wide Water Management

The open pit has a large upstream watershed and a water diversion system is required to prevent uncontrolled runoff from flowing into the open pit. The open pit diversion system includes the Water Storage Dam (WSD), located upstream of the open pit, with a floating pump station and pipeline to transfer water to the Process Plant, or to release excess flow to downstream communities.

The WSD is a Rockfill embankment structure designed to store up to approximately 1.8 million $m^3$ of water. The results of the daily water balance model illustrate that the WSD has the capacity to store the 100-year, 24-hours storm volume over a broad range of climatic conditions as discussed in Section 15.3. The volume of water stored in the WSD is relatively constant through Year 5 and fluctuates over the year to store wet season stormwater and to supply plant makeup water and community demand. The primary outflow from the WSD is pumping of fresh water for release to the downstream community; the pumping rate is graduated with higher pumping rates corresponding to higher water levels to maintain storm storage capacity on an annual basis.

An emergency spillway will be excavated in bedrock on the west abutment of the WSD to prevent overtopping of the facility during the Inflow Design Flood (IDF) event. Extreme event flows would be routed through the spillway and discharged into a drainage upstream of the open pit.

The Fresh Water Dam (FWD) is in the drainage adjacent to the west of the process plant site. The FWD is a Rockfill embankment structure designed to store approximately 330,000 $m^3$ of water and will provide makeup water to the Process Plant during the dry season. The FWD has a spillway located in the west abutment to pass overflow downstream.

Diversion channels are located upstream and around the West T/RSF and South RSF to manage upstream stormwater and runoff from the facility side slopes. These surface water controls will minimize seepage under the facilities and will convey runoff from disturbed areas through sediment control ponds to settle sediment prior to release downstream of the Project. A temporary diversion channel will be located east of the open pit for Year 1 and Year 2 of the mine life to reduce stormwater inflow to the pit when the pit is small. Runoff from this channel will be routed through the South RSF sediment pond.

Surface water that cannot be diverted around the pit due to topography, together with pit wall runoff, will be pumped during operations to the Pit Collection Pond located east of the South RSF. Groundwater inflows to the open pit will also be pumped from the pit bottom to the Pit Collection Pond. Horizontal drains will be installed in the pit walls to reduce pore water pressure in the pit highwalls. Water in the Pit Collection Pond will be pumped to the Process Plant as makeup water or directed to the South RSF Sediment Pond and released downstream of the project.

# 16.0 **Market Studies**

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 16.1 Market Studies

The Ixtaca Project is expected to produce silver-gold doré bars. Gold and silver production will likely be sold under hedging transactions or on the spot market, or both. Terms and conditions are expected to be typical of similar contracts for the sale of doré throughout the world.

Almaden has not yet entered into sales agreements with potential buyers.

Contracts to support operations will include the supply and delivery of bulk explosives and contract mining.

## 16.2 Commodity Price Projections

For the purpose of the Study a gold price of US$1,275/oz, and silver price of US$17/oz was assumed derived from common peer usage at the time. Exchange rate of 1US$ = 20 MXN Peso was been assumed.

## 16.3 Comments on Section 16

The QP has reviewed the information provided by Almaden on marketing, contracts, and metal price projections, and note that the information provided is consistent with the source documents used, and that the information is consistent with what is publicly available on industry norms. The information can be used in mine planning and financial analyses in the context of this Report.

# 17.0 Environmental Studies, Permitting, and Plans, Negotiations, or Agreements with local individuals or groups

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

Significant environmental and social study and analyses have been conducted for the Ixtaca Project.

## 17.1 Environmental Studies

A summary of key physical, chemical, and biological environments is provided in the following sub-sections.

### 17.1.1 Meteorology

Site-specific climate data collection began in 2013, using an automated climate station established by KP downstream of the then proposed tailings management facility (TMF), at an elevation of approximately 2250 m. This station, which is called the Ixtaca Climate station, is currently operating and collects data of air temperature, humidity, solar and net radiation, wind speed and direction, precipitation, and atmospheric pressure.

In 2015, two additional automated precipitation stations were added, both of which consist of a tipping bucket rain gauge and a data logger. The Almeya station is located upstream of the TMF at an approximate elevation of 2615 m, and the Bodega station is located downstream of the proposed Project area at an approximate elevation of 2250 m. In 2018, an additional tipping bucket rain gage was added at the Puente station located in the upper portion of the watershed containing the open pit. Also in 2018, telemetry systems were added to the site monitoring program to enable desktop access of remote data.

Summary data from the Ixtaca Climate station includes a mean annual temperature of approximately 14°C, with mean monthly temperatures ranging from a low of approximately 12°C to 13°C in December/January to a high of approximately 16°C to 17°C in April/May/June. Other metrics from the station include (Knight Piésold, 2017):

- Relative humidity measurements indicate that the climate is reasonably dry, particularly in the winter months, with an annual average of approximately 70%.
- Over an approximate three-year period, the maximum wind speed was 14.9 m/s, and monthly average wind speeds ranged from 2 m/s to 3 m/s.
- The predominant wind directions were north and north-west.
- Solar radiation is typically greatest in April and least in October, and ranges from approximately 5.9 kWh/m² to 3.4 kWh/m².
- The mean annual lake evaporation is estimated to be approximately 714 mm, with monthly mean values ranging from approximately 46 mm in December/January to 74 mm in May.
- The long-term mean annual precipitation is estimated to be 720 mm, and occurs entirely as rainfall.
- The wet season is from May to October, when 84% of annual rainfall is expected to occur, on average. The wettest month is typically June.

- Rainfall on site, particularly during the wet season, tends to arrive in short duration, high intensity bursts.
- Barometric pressure is relatively uniform year round at approximately 102.6 kPa.

Additionally, climate data are available from Government of Mexico regional meteorological stations; several of which are located within 35km of the Project, each with over 25 years of daily data on precipitation, evaporation, and minimum and maximum temperatures. The Ixtaca Climate station data were compared to the regional stations and found to have similar data trends.

#### 17.1.2 **Surface Hydrology**

The local climate along with size, vegetation cover, and soil and rock types of each drainage basin all contribute to the runoff response of Project area watersheds. Typical of many areas in Mexico, the Project experiences rainfall primarily as short duration, high-intensity storm events during the wet season (May to October). This type of precipitation distribution combined with the steep topography and poorly draining soils results in a rapid runoff response with correspondingly high peak flows of short duration. The distinct dry and wet climatic seasons in the region result in intermittent and episodic streamflows in the wet season and little to no flow during the dry season. The Project area streams are above the water table and constant baseflow is not observed; however, interflow/ temporary baseflow is observed as flows decrease from low to little or no flow through the dry season.

Five streamflow monitoring stations were installed at the Project in 2014 and were enhanced in 2017 following complications with high sediment loads and were further updated in late 2018. Continuous streamflow records for streams in the Project area are currently being collected. Data collected to date include the following (Knight Piésold, 2017):

- The mean annual runoff is estimated to range from 58 mm (1.8 l/s/km2) to 87 mm (2.8 l/s/km2).
- Streams in the area follow an episodic/ephemeral hydrologic regime, and the annual hydrographs mimic the patterns of annual precipitation, with the highest flows typically occurring during the wet season of May to October and the lowest flows occurring during the dry season of November to April.
- The stage records for the Project site stream gauges exhibit the 'flashy nature' of streams in the area, with water levels rising and falling very rapidly in response to short duration high-intensity rainstorms.
- Return period peak discharge values at the Project were calculated to range between 2 m3/s for a 2-year return period, up to 77 m3/s for a 500-year return period.
- Flows typically fall to very low levels during the dry season, and some creeks go completely dry for short and extended periods each year.
- Low flows are typically higher at the Project area in northern upland sites than in southern lowland sites.

#### 17.1.3 **Surface Water Quality**

Surface water quality sampling sites were established to target background and pre-mining (baseline) water quality upstream and downstream of the project facilities. Thirteen surface water monitoring locations were sampled as conditions allowed from 2009 to 2016 (KP, 2017a) and in 2018 by SRK (SRK, 2018). The surface water quality monitoring locations are shown on Figure 20-1. Sample collection has been intermittent depending on flow conditions. Upstream sites in the El Tecolote and Coxalenteme catchments had sufficient flow to sample surface water quality year-round but the monitoring sites in the lower reaches of these catchments were frequently reported as dry outside of the rainy season (KP, 2017a). Flow conditions were always sufficient to collect water quality samples from the monitoring locations farther downstream in the Rio Apulco and Rio Los Lobos and only occasionally reported as dry in the Rio Los Ameles. During the most recent sampling event in April 2018, only four of the 13 surface water monitoring stations had adequate water for sampling (Apulco, Hotel, Puente, and Sector Riego). After the April 2018 site visit SRK recommended the removal of four monitoring stations (Tuligtic 1, Tuligtic 2, El Protrero, and RLA 100E).

Water within the project area is generally classified as neutral to slightly basic, hard to very hard and well-buffered, with variable turbidity and total suspended solids (KP, 2017a). Turbidity and TSS exceed the relevant water quality standards at some sites. Metal concentrations were generally highest toward the end of the wet season, in September and October, and conclusions regarding concentrations at most sites during the drier season cannot be made as samples were not typically collected due to insufficient flow.

When compared with the water quality standards of Ley Federal de Derechos (aquatic life), NOM-127-DW (drinking water standards), and NOM-001 (discharge standards for irrigation and aquatic life), the baseline surface water quality exceeds numerous standards. The most frequent aquatic life guideline exceedances were reported for total suspended solids, ammonia, dissolved and total aluminum, dissolved and total barium, and total iron. Concentrations of these parameters exceeded the standard in most samples collected from most sites. Total lead and zinc also exceeded the standard in samples collected from most sites; however, standard exceedances were less frequent (i.e. less than half of the total number of samples). Parameters that exceeded the standard sporadically or at only one or two sites include total beryllium, chromium, copper, mercury, molybdenum, and silver, and dissolved iron, molybdenum, and zinc.

Parameters that exceeded irrigation standards in at least one sample collected from most sites include TSS, total aluminum, total iron, and total manganese. Fluoride, sulphate, and dissolved manganese concentrations also exceeded the standard in at least one sample; however, exceedances were limited to one or two sites. Exceedances of the drinking water standard (NOM-127-DW) were frequently reported for pH, turbidity, ammonia, nitrite, dissolved and total aluminum and iron, and total barium, manganese, and sodium. Parameters that exceeded the drinking water standard less frequently include sulphate, dissolved manganese, and total cadmium and chromium.

Elevated baseline concentrations of metals and other parameters are common in areas close to mineral deposits (e.g., the El Tecolote and Coxalenteme catchments), or in large river systems that carry high total suspended solids (e.g., the Río Apulco/Río Los Ameles).

The site locations are illustrated on Figure 17-1.

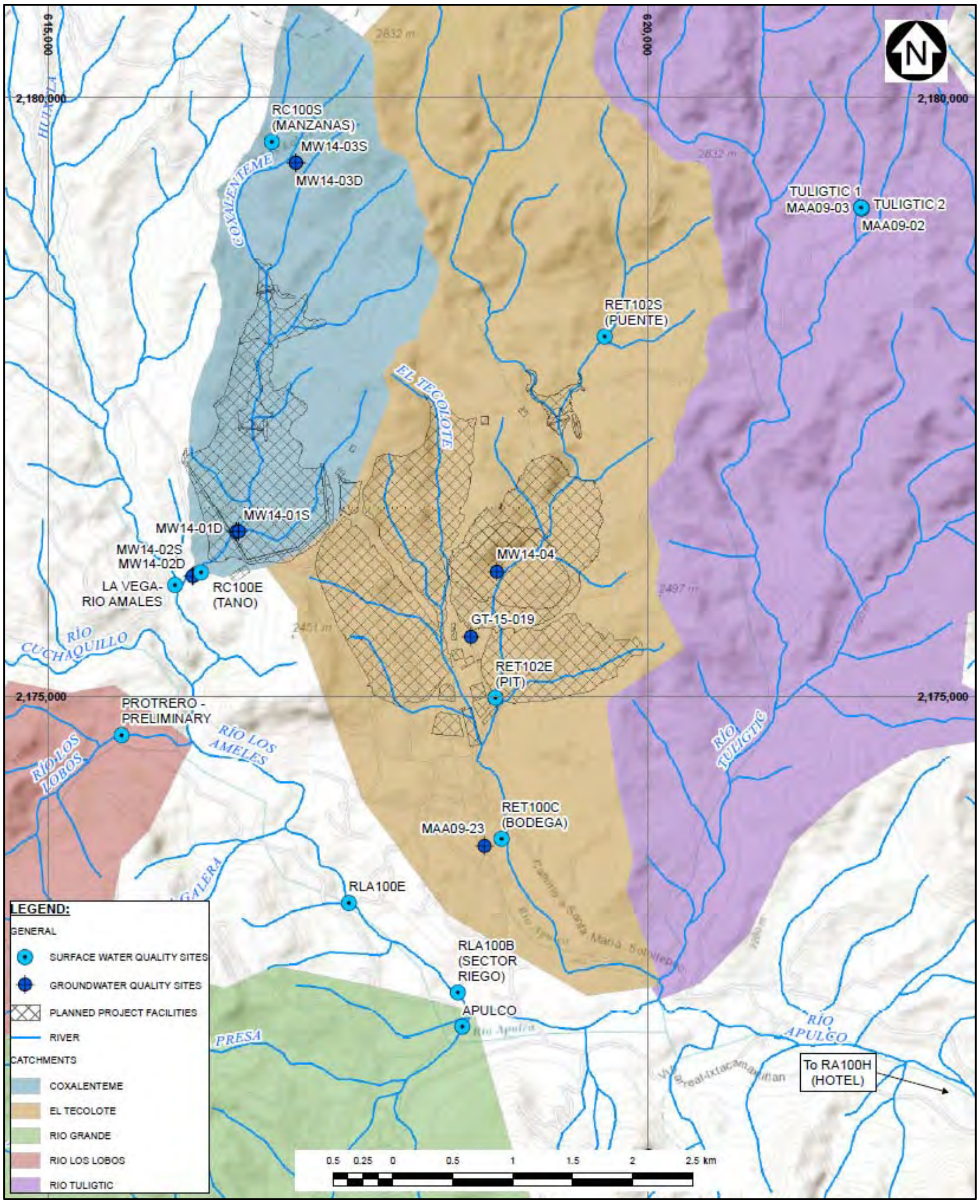



**Figure 17-1 Surface and Ground Water Quality Sampling Sites. Source: Knight Piesold, March 2017**

Upstream sites in the El Tecolote and Coxalenteme catchments had sufficient flow to sample surface water quality year-round but the monitoring sites in the lower reaches of these catchments were frequently reported as dry outside of the rainy season. Flow conditions were always sufficient to collect water quality samples from the monitoring locations further downstream in the Rio Apulco and Rio Los Lobos and only occasionally reported as dry in the Rio Los Ameles.

Ion concentrations generally decreased from upstream to downstream and were higher in the Coxalenteme and El Tecolote catchments than at sites outside of the project area. Water within the project area is generally classified as neutral to slightly basic, hard to very hard and well-buffered, with variable turbidity and total suspended solids (TSS). Turbidity and TSS increased from upstream to downstream within the Coxalenteme and El Tecolote catchments and exceeded the relevant water quality standards at some sites. Total and dissolved concentrations of some metals (aluminum, copper, chromium iron, and lead) increased from upstream to downstream in the El Tecolote catchment and in the Coxalenteme catchment. Metal concentrations were generally highest toward the end of the wet season, in September and October.

Analytical results were compared with the water quality standards included in the following: Ley Federal de Derechos (LFD) and Norma Oficial Mexicana (NOM; NOM-127-DW (drinking water standards) and NOM-001 (discharge standards for irrigation and aquatic life)). The standards were selected based on the potential local uses, which include: Aquatic Life (NOM 001 Aq and LFD-Aq), Irrigation (NOM-001-Irrigation and LFD-Irrigation), and Drinking Water (NOM-127-DW).

### 17.1.4 **Groundwater**

Previous studies of the groundwater, including monitoring well constructions, hydraulic testing, water-quality testing, and environmental background and pre-mining (baseline)studies were conducted by Hidrogeologos Consultores (2013) and Knight Piésold (2014, 2017a, 2017b, and 2017c).

For the Ixtaca technical report, a field data collection program for hydrogeologic characterization was carried out and a 3D numerical model of groundwater flow beneath the Ixtaca Project area was developed. Field activities consisted of packer isolated interval testing (packer testing); monitoring well construction, development, and testing of newly installed and existing wells; and water level monitoring. A technical report (SRK, 2018) documents the field work and groundwater modeling. The study evaluates pre-mining, mining, and post-mining hydrogeological conditions and predicts dewatering requirements, and potential environmental impacts.

The proposed Project facilities lie in two catchment areas, which are tributaries of the Río Los Ameles/Río Apulco river system: Coxalenteme and El Tecolote. Streams in the area follow an episodic/ephemeral hydrologic regime (Knight Piésold, 2017b). The annual hydrographs mimic the pattern of annual precipitation, with the highest flows typically occurring during the wet season of May to October and the lowest flows occurring during the dry season of November to April.

Water use in the project area consists of domestic use of springs occurring in the catchment above the project area. Springs and seeps within the project area were mapped and characterized by AML personnel. Additional springs and seeps within the region mapped by outside sources were provided by AML. These data along with water levels within the project area were combined to evaluate and understand groundwater gradients, to evaluate potential variability in hydraulic conductivity, and to further refine the conceptual groundwater model.

SRK's 2018 field program consisted of drilling four core holes, packer testing, monitoring well installation, hydraulic testing of existing and newly installed wells, and water level monitoring. A summary of prior testing, instrumentation, and well construction information for the Ixtaca Project was compiled from multiple volumes of historic reports, figures, and appendices. Based on the review, 58 existing water level monitoring, testing, and installation points were identified within the project boundary.

Water level elevations range from 49.5 mbgs and 2,554 meters above measured sea level (mamsl) in the high country north of the project area to 30.5 mbgs and 2,540 mamsl in the low country south of the pit area. Generally, groundwater flow follows topography, with a steep downward gradient from north to south near the project. Two areas do not follow the general pattern, including an area underlain by undifferentiated ash units west of the proposed pit, and the lowland area south of the proposed pit. Both exhibit relatively flat-water tables.

Hydraulic testing during the 2018 field program was done using packers to isolate test intervals in the newly drilled core holes before well construction. Additional testing was performed in accessible existing and newly-installed monitoring wells. Testing included slug tests, constant-rate injection tests, and constant-head injection tests. Lower permeability intervals were tested using stepped-pressure, or Lugeon methods. A total of 44 tests were performed during the 2018 field program (21 packer and 23 wells tested). An additional 203 packer and well tests were performed during previous field campaigns between 2012 and 2017. Short-term hydraulic testing revealed a wide range of hydraulic conductivity values within the various hydrogeologic units of the project area. After careful review of the historic data, it was decided not to use the information in developing the 3D numerical groundwater model. However, in the future these data may be useful in mitigating uncertainties or in identifying areas requiring additional characterization.

The conceptual model of groundwater flow at Ixtaca includes the following components:

- The long-term mean annual precipitation is estimated to be 720 mm and occurs entirely as rainfall. The wettest month is typically June. The mean annual evapotranspiration is estimated to be approximately 714 mm, with monthly mean values ranging from 46 mm in December to 74 mm in May.
- Groundwater recharges from precipitation and generally flows from topographically high areas (highland with elevation of about 3,000 mamsl in the north to topographically low areas in the south (the lowest elevation is 2,150 mamsl at the Rio Apulco River south of the proposed pit).
- The recharge from precipitation in the highlands is estimated to be 72 mm/a or 10% of precipitation. The recharge in the lowlands is estimated to be about 14.4 mm/a or 2% of precipitation. These recharge rates, and their distribution based on topography were obtained during the process of model calibration to measured water levels.
- Rio Grande and Rio Apulco are primary rivers near the project and groundwater discharges into them and their tributaries. Flows in these rivers decrease significantly during dry months. Additional rivers in the region that are typically ephemeral include Rio Loa Ameles, Rio Los Lobos, and Rio Tuligitic.
- Hydrogeologic units in the project area include:
    - Volcaniclastics – The volcaniclastic unit shows localized sub-layers of fine ash, coarse ash, breccia, and lapilli tuff. Permeability of the volcaniclastics varies depending on the degree of consolidation and fracturing. Volcaniclastic materials associated with hydrothermal alteration are typically more competent and more prone to fracturing, which increases the permeability.
    - Limestone and Shale – The sedimentary units are typically of low permeability, but hydraulic conductivity increases locally along fold axes and near the intrusive contact.

  - Intrusions/Dikes – The intrusive bodies are expected to have low permeability, except at the contacts with host rocks. Fracturing and permeability locally increases in the sedimentary host rocks near intrusions.
  - Structure – The limited testing conducted across faults during drilling did not identify structures with increased permeability or faults acting as major barriers to groundwater flow.
  - Additional to bedrock water-bearing zones, saturated overburden is present within the project area. The overburden is generally thin (less than 1 m) but reaches up to 7 m thick in river valleys. Zones of alluvium, colluvium, ash-tuff, and/or an agglomeration of all may be up to 100 m thick based on drilling information south of the proposed pit location.
- Measured hydraulic conductivity values vary over a wide range, from 0.00003 m/d to 9 m/d (by more than five orders of magnitude as described in Section 3) and do not allow definition of hydrogeological units based on lithological signature. Available testing data indicates that the measured hydraulic parameters show a trend of hydraulic conductivity decreasing with depth. Based on the analyses, three major hydrogeological units were defined:
  - Shallow bedrock (upper 50 m) with intermediate hydraulic conductivity;
  - Intermediate bedrock (depth from 50 to 300 m) with low hydraulic conductivity; and
  - Deep bedrock (depth below 300 m) with very low hydraulic conductivity.
- Water level elevations throughout the project area exhibit a steep hydraulic gradient, with levels ranging from 2,540 mamsl in the highlands north of the project to 2,154 mamsl just south of the pit over approximately 4.5 km. This generally indicates the presence of low hydraulic conductivity rocks. Flat water level gradients were observed in the ash west of the proposed pit at 2,350 mamsl and the area south of the proposed pit extending to the Rio Apulco at 2,150 mamsl. These flat groundwater gradients support the assumption that these areas exhibit elevated hydraulic conductivity.

A numerical groundwater model for the Ixtaca Project was developed using the MODFLOW-SURFACT finite-difference code (Hydrogeologic, 1996; Harbaugh and McDonald, 1996) and the Groundwater Vistas v.7 interface developed by Environmental Simulations, Inc. (Rumbaugh and Rumbaugh, 2017). The groundwater model domain covers approximately 157 square kilometers ($km^2$) within the vicinity of the proposed open pit mine. The northern, western and eastern model boundaries primarily follow topographic divides and/or are parallel to regional groundwater flow and are thus assumed to be 'no flow' boundaries. The southern boundary is defined by the Apulco River.

Twelve model zones were created considering the low and high hydraulic conductivity values established from historic aquifer testing data. Each model zone has specific values for horizontal (Kh) and vertical (Kz) hydraulic conductivity (K), specific storage (Ss) and specific yield (Sy). Storage parameters are based on literature and onexperience from projects with similar conditions.

The creeks and springs in the model area are represented by 'drain cells'. The Apulco River is assumed to flow for most of the year. Within the model area it is therefore represented using model 'river cells'. The mine plan for the open pit was dated 6 August 2018 and consists of annual pit layouts that span an 11-year period. They were processed into drain cells with the location and head representing the elevation of the pit for each time period. The model simulates transient filling of the pits using the LAK2 package for MODFLOW-SURFACT (Council 1997). Lake cells were assigned based on the ultimate pit-shell excavations and planned backfill, as provided by Ixtaca (2018).

Head distribution in a steady state calibration depends on recharge, hydraulic conductivity values (K), sources, sinks and boundary conditions. In the case of the Ixtaca model, the valid K values from short-term tests are considered good qualitative indicators of the properties of the rocks. However, because of the limited number of valid tests and the concentrated coverage (within the proposed pit extents) of the 2018 tests, the numerical model does not rely on K values for calibration. Instead, water level elevations from the existing monitoring wells are used. The short-term tests are used qualitatively to adjust the numerical groundwater model where needed. The calibration objective was reached when an acceptable correlation was obtained between the observed and simulated water levels and hydraulic gradient. Twenty-six of the 34 target water levels over the model area were calibrated to within 3 m of observed, and 4 of the remaining 8 were within 4 m of observed.

No long-term hydraulic test data suitable for transient calibration are available for the Ixtaca site. Consequently, a transient calibration was obtained using water level fluctuations in response to seasonal recharge. Recharge factors were calculated over a 3-year period and the resultant fluctuations in groundwater levels compared to water level observations. In the author's opinion, the groundwater model reproduces hydrogeological conditions prior to the mining and reasonably calibrated to the measured water levels, and the model can be used for predictive simulations.

Predicted passive groundwater inflows to the proposed pit range between 19 L/s (1,618 $m^3$/d) and 34 L/s (2,974 $m^3$/d). Changes in simulated average pit inflows over time will occur in response to the mine pit elevation, the extent of the mine pit area, and the drawing down of the local water table over time through release of groundwater storage. The maximum inflows are reached in year 2 (34 L/s when the open pit is rapidly excavated within the most permeable upper bedrock) and the final pit inflow in year 11 is 20 L/s. Actual pit groundwater inflows are likely to be sporadic, with higher inflows related to the intersection of preferential groundwater flow paths (such as fractures) during mining. Based on the predictive results, the groundwater inflow into the pit could be handled passively (by in-pit sumps) without any active dewatering by perimeter wells or pit wall horizontal holes.

Additional inflow from direct precipitation to the pit (less evaporation) is estimated to be 29 L/s (2,517 $m^3$/d) under average long-term conditions. Thus, direct precipitation to the pit will likely form the largest component of water to be pumped from the pit sumps during mining. It is assumed that up-gradient/ catchment runoff will be diverted around the pit during mining to the extent possible.

Groundwater flow near the open pit is predicted to be radially inward from all directions. The predicted change in the long-term water table from pre-mining water levels reaches a maximum of 200 m within the pit. The 1-m drawdown zone extends 1 km north of the pit, 2 km west of the pit, 1.5 km east of the pit and 3 km south of the site, thus just reaching the banks of the Apulco River. In response to the lowered groundwater levels around the pit during mining, groundwater baseflow to the creeks and springs in the catchment are predicted to decrease by 9% (from 5,937 $m^3$/d to 5,420 $m^3$/d; 69 L/s to 63 L/s) compared to pre-mining conditions. In addition, net groundwater baseflow to the Apulco River decreases from an average of 8 L/s (710 $m^3$/d) to a net groundwater contribution of 0 L/s during the 11 years of mining.

The model predicts that a pit lake will form after mining, and the pit lake will exhibit both spillover and flow-through characteristics. The pit lake will reach 90% of full recovery within 90 to 100 years. After 113 years, the pit lake elevation reaches the maximum possible stage (2,230 mamsl) before surface spillover commences at a rate of 15 L/s down-gradient (south) of the pit. Groundwater seepage will be only inwards for the first 40 years following the end of mining; thereafter, there will also be groundwater outflows, with equilibrium conditions being 7 L/s inflow and 6 L/s outflow to groundwater.

There are varying levels of uncertainty associated with model parameters, and sensitivity analysis was undertaken to evaluate the implications of these uncertainties. The sensitivity analysis results indicate that the model is most sensitive to increases in the specific yield. The results have a medium sensitivity to hydraulic conductivities. Doubling the hydraulic conductivity of the hydrogeological units increases the average dewatering rate by 21%, with the range being between 25 L/s and 35 L/s; Doubling the specific yield and specific storage increases the average dewatering rate by 42%, with the range being between 27 L/s and 46 L/s. Sensitivity analysis indicates that the post-mining simulation results are most sensitive to precipitation parameters, where alterations by 25% decrease/increase start of surface spillover by 25 years and flow rates increase/decrease by 7 L/s.

#### 17.1.5 **Groundwater Quality**

To provide background and pre-mining (baseline)groundwater data for the project, seven groundwater monitoring wells were installed in 2014 (KP, 2015). About a year later geotechnical borehole GT-15-019 was converted to a monitoring well. The groundwater quality monitoring program includes both upgradient and downgradient groundwater wells. Monitoring well locations are shown on Figure 17.2.

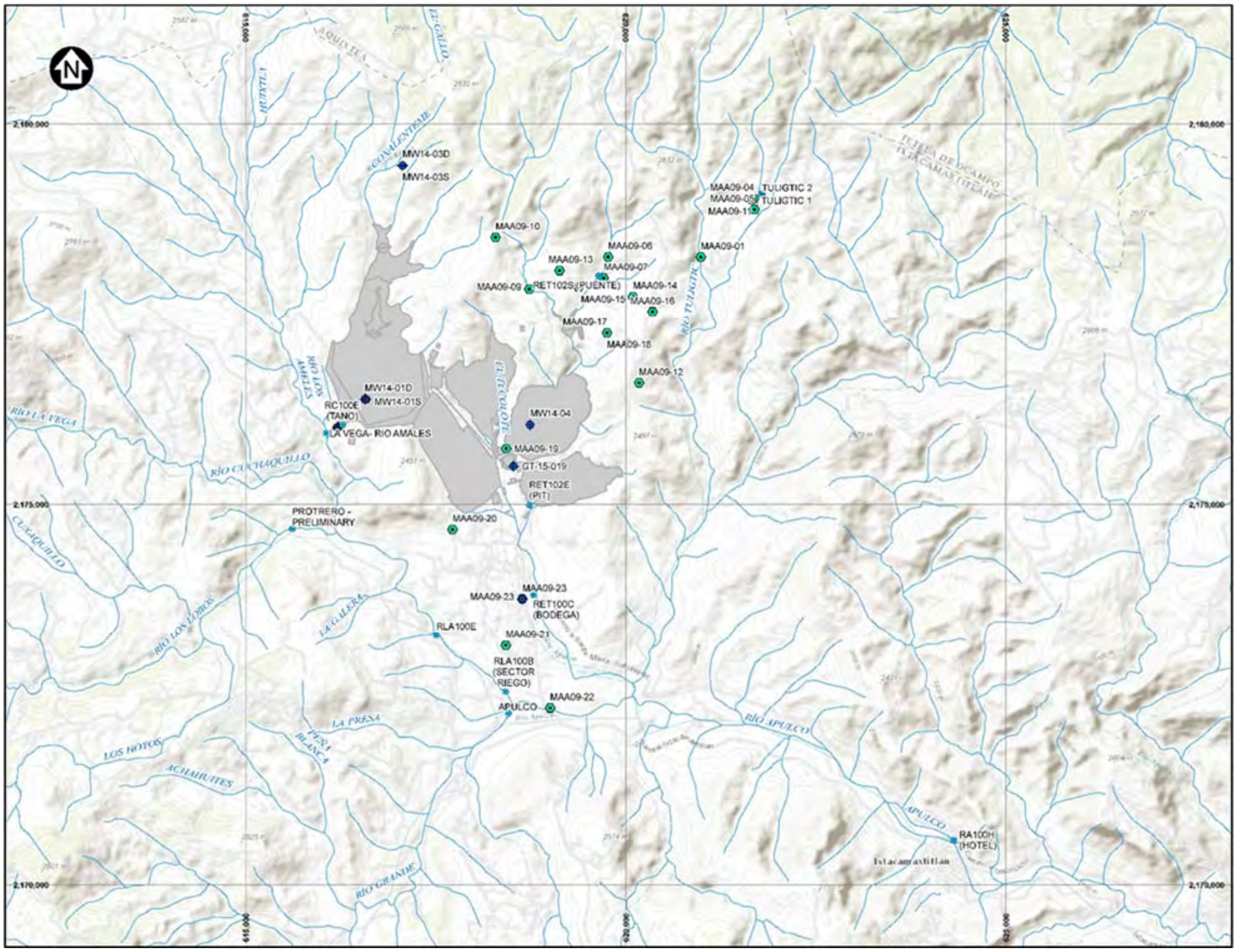



**Figure 17-2 Locations of Ground Water Quality Sampling Sites (from KP, 2017b)**

Three dominant groundwater types have been identified in the Project area (KP, 2017b): (1) calcium-sulphate, (2) calcium-bicarbonate, and (3) sodium-bicarbonate. A few locations have intermediate water types, specifically with respect to the dominance of carbonate or sulphate. Water types are not well correlated to specific lithological units but are likely influenced by their position within the watershed, localized geochemical enrichment, localized mineral enrichment, and residence time of the groundwater in the vicinity of each of the monitoring wells. Groundwater in the project area is generally characterized as neutral to slightly basic pH, alkaline with strong buffering capacity and varied hardness.

When compared with the water quality standards of Ley Federal de Derechos (aquatic life), NOM-127-DW (drinking water standards), and NOM-001 (discharge standards for irrigation and aquatic life), the baseline groundwater quality exceeds numerous standards. Samples collected from monitoring wells in the upper Rio Coxalenteme and the Rio El Tecolote areas exceed the NOM-127-SSA1-1994 Drinking Water Standard for hardness. Concentrations above standard are also noted for total dissolved solids, fluoride, arsenic, iron, manganese, and molybdenum (KP, 2017b).

### 17.1.6 Geochemistry

A program of geochemical sampling and analyses to determine the acid rock drainage and metal leaching (ARDML) potential of mine rocks was carried out. The program consisted of 276 samples of drill core representing future waste rock (191 samples), low-grade ore (40 samples), and ultimate pit wall rocks (45 samples). In addition to the data from this program, Almaden has a database consisting of nearly 130,000 multi-element analyses for 35 elements. Theanalytical program included the following analyses:

- Multi-element analyses of 59 elements by aqua regia digestion with ICP-MS finish.
- Acid-base Accounting, which consisted of the following:
  - Total sulphur and sulphate sulphur. Sulphide sulphur was calculated by difference, from which acid generating potential (AP) is calculated ($S^{2-}$ x 31.25 = AP)
  - Total inorganic carbon
  - Paste pH, using method EPA 600/2-78-054/3.2.2 (Sobek et al., 1978)
  - Acid neutralizing potential (NP). NP was determined by two methods:
    - The modified method of Lawrence and Wang (1997), and
    - Laboratory analysis of total inorganic carbon (TIC).
- Mineralogical analyses were conducted on five samples of waste rock and one sample of low-grade ore at SGS Canada using the QEMSCAN high definition mineralogical scanning method.
- The Shake Flask Extraction (SFE) method was conducted on 11 samples, using the protocol described in Price (2009) with a water-to-rock ratio of 3:1. One duplicate test was run using a 20:1 water-to-rock ratio as a comparison to the Price (2009) method. The SFE provides an estimate of leachate quality resulting from the first flush by meteoric water.
- Kinetic Net Acid Generation (KNAG) tests (Price, 2009) were conducted on 16 samples of waste rock and 12 samples of ultimate pit wallrock, with multi-element analyses of KNAG leachate.
- Humidity cell testing of a yet to be determined number of samples is recommended and if approved will commence as soon as practical.

The testing program was designed to obtain data sufficient to ensure compliance with best practice for mine waste management. The program also complies with Mexican regulations, including NOM-157-SEMARNAT-2009, which establishes procedures to implement mine waste management plans and Anexo Normative 5 of NOM-141-SEMARNAT-2003, which describes the test methods for whole rock chemistry analysis, leach tests and acid base accounting.

Based on sample distribution, the program concluded that approximately 5% of waste rock, 30% of low grade ore, and 7% of pit wall rocks will be PAG. The potential for ARDML from these facilities will be assessed in the predictive geochemical modeling task which will be reported in a subsequent document.

SFE testing on waste rock and low-grade indicated no constituents leaching at concentrations above NOM-157 or NOM-001 limits. However, arsenic, antimony, manganese, molybdenum, and selenium in SFE leachate exceeded World Health Organization guidelines.

The low-grade ore stockpile will be removed by the end of mining, so there is no potential for environmental impacts from low-grade ore after closure. Runoff from the LGO stockpile will be managed to prevent impacts to water resources during operations.

The metallurgical processing flowsheet was not updated from the PFS, so no new tailings products were generated for geochemical testing. Flotation and cyanide detoxed tailings were subjected to geochemical testing for the PFS (KP, 2017c). The flotation tailings solids exceed regulatory limits for antimony, arsenic, and lead, but no analytes exceed regulatory limits in SFE leachate. The detoxed tailings exhibit no exceedances of either solid or aqueous concentrations in the SFE test results. It should be noted that the SFE indicates only short term leaching potential rather than long term.

From a bulk perspective, there will be more than enough neutralizing potential present in the tailings, waste rock, and pit walls to neutralize any acid generated. However, there are still unknowns that must be evaluated in the predictive modeling. One unknown is how the fraction of PAG materials will affect the overall drainage quality. If the PAG rocks are concentrated in specific zones, then localized ARD may occur at specific stages of mining from the waste rock stockpiles or the pit walls. The current geologic model and mine plan lack the sequencing detail to evaluate this potential, so identification of localized ARD will likely have to be done operationally. Another unknown is the potential for long term neutral metal drainage. Oxyanions that are mobile at neutral pH, including antimony, arsenic and selenium, must be assessed in greater detail. The potential for long term metal leaching will be addressed in the predictive modeling report.

#### 17.1.7 **Flora and Fauna**

According to INEGI (Carta de Uso de Suelo y Vegetación, Serie V, INEGI 2011) and with the flora and fauna field work performed by the company within the Sistema Ambiental Regional (SAR) and the footprint of the mine, the SAR showed ten types of vegetation, from which only three correspond to natural vegetation:

- Pine forest (22.21%),
- Táscate forest (8.99%)
- Pino-encino forest (3.10%).

The remaining vegetation is dedicated to agriculture, and secondary vegetation and grass; the area is largely degraded.

In the footprint of the mine the natural vegetation represented by Táscate forest with only a 0.05% from the total area, the rest of the vegetation is secondary arboreal vegetation from Táscate forest (64.97%), agriculture (26.86%) and induced grass (8.11%) with *Junierus deppeana* and *Pinus Pseudostrobus* the dominant species.

The SAR and the footprint of the mine have been historically impacted by anthropogenic (agriculture and cattle raising), resulting in a widely fragmented Pinus vegetation, leaving auspicious room for the establishment of secondary vegetation.

Diversity in the SAR is considered as medium, due to the presence of dominant species of each vegetation type. Inside the footprint of the mine 60 species of flora have been registered, 22 of them are weeds.

Of the species at risk and protected by NOM-059-SEMARNAT-2010 inside the SAR and the footprint only one species was identified: *Cupressus lusitanica* (white cedar). The geographic distribution of this species is wide in Mexico, it is distributed all along the Sierra Madre Oriental, Sierra Sur, Occidental, Meseta de Chiapas, and part of the Trans Mexican Volcanic Belt. It is reported as a species with no problems for survival.

At total of 117 species of fauna have been registered (6 amphibians, 15 reptiles, 25 mammals and 71 birds). The fauna diversity inside the SAR is considered as medium high. In respect to the NOM-059-SEMARNAT-2010 two amphibian species were cataloged within the NOM: *Aquiloeurycea cephalica* (as threatened species) and Lithobates montezumae (As Pr); six reptile species: *Crotalus ravus* y *Phrynosoma orbiculae* (as Category A for protection*), Barisia imbricata, Plestiodon lynxe; Salvadora bairdi and Sceloporus grammicus* as Pr; one mammal species *Glaucomys Volans* as category A for protection.

Nine species of birds were registered inside the mine footprint, three of them are in risk category: *Accipeter cooperil, Chatharus mexicanus with Pr category and Tilmatura dupontii as A gategory, Contopus cooperi, Myarchus tuberculifer, Pheucticus melanocephalus, Setophaga oocidentalis, Troglodytes aedon and Tyrannus melancholicus*. The majority of these species are migratory.

#### 17.1.7.1 **Relocation of flora and fauna.**

The Ixtaca project environmental management plan includes the following activities for mitigating impacts to flora and fauna:

- To rescue the largest quantity of individual plants (vascular and epiphytes), during site preparation previous to construction, with regulated environmental techniques;
- Relocate previously rescued flora individuals, to a similar surface from the original;
- List the priority flora species for the rescue, endemic species or all species catalogued as risk species for NOM-059-SEMARNAT-2010;
- Avoid or reduce the adverse effects on the fauna inside the footprint of the project, by identifying adequate methods for the rescue and relocation of individuals, as well as the site rehabilitation all inside the footprint.
- Relocate species of wild fauna that could be affected by the development, or by any mine infrastructure for the development of the project.
- Special emphasis will be given to species under NOM-059-SEMARNAT-2010, with slow displacement; for the capturing and relocation close to the site area;
- Capture and relocation of species with slow displacement, who's habitat or distribution is restricted.
- Implement adequate techniques for the capture and relocation controlled to avoid harm or stress to all organisms of wild fauna;
- Identify relocations sites, close to and with similar natural characteristics to the original habitat.
- Verify that the relocation zones present equivalent environmental conditions from rescue zones and that and ecosystem overload is not generated;

- Train the project work force to identify fauna species and to protect them;

All these activities will be performed to comply with NOM-059-SEMARNAT-2010. In general, where necessary and reasonable, any sensitive species of flora and fauna within the proposed disturbance footprint will be relocated prior to development as part of the Environmental Management Plan.

There are no known species of flora and fauna located at the Ixtaca site that will prevent the development of the proposed mine.

## 17.2 Permitting

Mine permitting in Mexico is administered by the federal government body Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). Guidance for the federal environmental requirements is derived from the Ley General del Equilibrio Ecológico y la Protección al Ambiente (LGEEPA). Article 28 of the LGEEPA specifies that SEMARNAT must issue prior approval to parties intending to develop a mine and mineral processing plant. An Environmental Impact Assessment (Manifestación de Impacto Ambiental (MIA) by Mexican regulations) is the mechanism whereby approval conditions are specified where works or activities have the potential to cause ecological imbalance or have adverse effects on the environment. This is supported by Article 62 of the Reglamento de la Ley Minera. Article 5 of the LGEEPA authorizes SEMARNAT to provide the approvals for the works specified in Article 28.

The LGEEPA also contains articles that are relevant to conservation of soils, tailings management, water quality, flora and fauna, noise emissions, air quality, and hazardous waste management. The Ley de Aguas Nacionales provides authority to the Comisión Nacional de Agua (CONAGUA), an agency within SEMARNAT, to issue water abstraction concessions, and specifies certain requirements to be met by applicants.

Another important piece of environmental legislation is the Ley General de Desarrollo Forestal Sustentable (LGDFS). Article 117 of the LGDFS indicates that authorizations must be granted by SEMARNAT for land use changes to industrial purposes. An application for change in land use or Cambio de Uso de Suelo (CUS), must be accompanied by a Technical Supporting Study (Estudio Técnico Justificativo, or ETJ).

Almaden has engaged a Mexican environmental consultant to develop the MIA, CUS, and ETJ for the Ixtaca Project, with an anticipated submission in the first quarter of 2019.

Guidance for implementation and adherence to many of the stipulations of environmental legislation is provided in a series of Normas Oficiales Mexicanas (NOM). These NOM provide specific procedures, limits, and guidelines, and carry the force of law. The relevant permit application will be developed as the Project progresses.

The Company has informed the author that material changes to the permitting status of the Property since the date of the Study are provided in the Company's public disclosure record since that time.

## 17.3 Social and Community Engagement

### 17.3.1 Local Communities

The Ixtaca Project is located within the State of Puebla, in the municipality of Ixtacamaxtitlán. Ixtacamaxtitlán covers approximately 561km$^2$ and the Project is located in the northern portion of the municipality. Ixtacamaxtitlán is home to approximately 0.4% of the population of the State of Puebla, or 25,326 people (2010 census) and, although located only a short 2-hour drive from large Volkswagen and Audi manufacturing facilities, it is one of Puebla's poorest municipalities.

The local economy is based on activities such as agriculture and livestock ranching which is done on a limited commercial basis, but largely for individual and family use. There are small-scale artisans known locally for fabrication of wooden furniture.

Mexico's Instituto Nacional de Estadística y Geografía ("INEGI") collected extensive census data on Ixtacamaxtitlán in 2010, which provides a good general picture of this part of Mexico. The closest communities to Ixtaca are Santa Maria Zotoltepec, Zacatepec, Vista Hermosa de Lázaro Cárdenas, and Tuligtic.

Generally speaking, these communities have a lack of employment opportunities with a large number of families dependent on social services. The Consejo Nacional de Población (CONAPO) rates their degree of marginalization as "high", which is an index calculation based on levels of illiteracy, and access to basic services and infrastructure (drainage, availability of drinking water, dirt floor, toilet, electric power).

Similarly, the Consejo Nacional de Evaluación de la Politica de Desarrollo Social (CONEVAL) estimates that 25.1% of the municipal population lives in extreme poverty; 56% in conditions of moderate poverty; and 17% of the population are vulnerable to some aspect of social deficiency.

### 17.3.2 Community Engagement

Open, transparent communication with stakeholders has been fundamental to Almaden's approach since staking the original Tuligtic claims in 2001.

Over the past several years, Almaden has interacted with over 20,000 people from over 53 communities and 8 different states in the following ways:

- Coordinated nine large community meetings, with total attendance at these meetings approaching 4,100 people;
- Taken a total of approximately 480 people, drawn from local communities, to visit 24 mines;
- Arranged 46 sessions of "Dialogos Transversales", wherein community members are invited to attend discussions with experts on a diverse range of issues relating to the mining industry such as an overview of Mexican Mining Law, Human Rights and Mining, mineral processing, explosives, water in mining, risk management, and mine infrastructure amongst other things;
- Opened a central community office in the town of Santa Maria Zotoltepec, which is continually open to community members and includes an anonymous suggestion box;

- Invested in a "mobile mining module" which allows company representatives to establish a temporary presence in communities more distant from the project, and allows for those interested to learn more about the project;
- Employed as many local people as possible, reaching up to 70 people drawn from five local communities. Almaden operates the drills used at the project, and hence can draw and train a local workforce as opposed to bringing in external contractors;
- Initiated a program of scholarships for top performing local students, with 130 scholarships granted to date to individuals from 23 different communities (79 women and 51 men);
- Established several clubs, including reading, dancing, football, music, and theatre clubs, to contribute to the vitality of local communities;
- Focused on education, enabling over 4,300 people to be positively impacted by our investments, such as rehabilitation of school-related infrastructure, donation of electronic equipment, and scholarships for top-performing students.

In 2017, Almaden engaged a third-party consultant to lead a community consultation and impact assessment at the Ixtaca project. In Mexico, only the energy industry requires completion of such an assessment (known in Mexico as a Trámite Evaluación de Impacto Social, or "EVIS") as part of the permitting process. The purpose of these studies is to identify the people in the area of influence of a project ("Focus Area"), and assess the potential positive and negative consequences of project development to assist in the development of mitigation measures and the formation of social investment plans. To Almaden's knowledge, this is the first time a formal EVIS has been completed in the minerals industry in Mexico, and as such reflects the Company's commitment to best national and international standards in Ixtaca project development.

The EVIS and subsequent work on the development of a Social Investment Plan were conducted according to Mexican and international standards such as the Guiding Principles on Business and Human Rights, the Equator Principles, and the OECD Guidelines for Multinational Enterprises and Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector.

Fieldwork for the EVIS was conducted by an interdisciplinary group of nine anthropologists, ethnologists and sociologists graduated from various universities, who lived in community homes within the Ixtaca Focus Area during the study to allow for ethnographic immersion and an appreciation for the local customs and way of life. This third-party consultation sought voluntary participation from broad, diverse population groups, with specific attention to approximately one thousand persons in the Focus Area.

This extensive consultation resulted in changes to some elements of the mine design, including the planned construction of a permanent water reservoir to serve the local area long after mine closure, and the shift to drystack filtered waste management.

Positive impacts to the socio-economy of the region are expected to continue as the Project is developed into a mine and becomes a source of more jobs. Almaden plans to continue its open communication with the communities to provide for realistic expectations of any proposed mining operation and the social impacts of such a development.

#### 17.3.3 Land Acquisition

At the time of the Study, Almaden had secured through purchase agreements with numerous independent owners, roughly 1,139 hectares which are required for the proposed production plan. This was completed through friendly land purchase agreements with locals, considering fair market value. There are no communities that require relocation as part of the Project development. Mineral Claim owners have the right to obtain the temporary occupancy, or creation of land easements required to carry out exploration and mining operations, under the Federal Mining Law.

#### 17.3.4 Potential Social or Community Requirements and/or Plans

The Ixtaca project is in an area previously logged and with little to no current land use. The mine will not require the resettlement of any communities. It is currently anticipated that water wells will not be required, as preliminary models indicate that there is sufficient water for operations from collection of rainwater. As the local community draws its water from springs at higher elevations than the mine plan, community water is unlikely to be impacted by mine development.

The Company has informed the author that updates to the Company's engagement activities with local communities since the date of the Study are provided in the Company's public disclosure record since that time.

### 17.4 Mine Closure

Reclamation and closure actions describe activities during the active closure period, when the bulk of physical reclamation will take place, and the post-closure period, when monitoring and some miscellaneous maintenance activities may be required. The reclamation and closure actions were developed to provide walk-away solutions for post-closure.

#### 17.4.1 Open Pit

At closure, given the open pit will be a permanent structure, a safety berm will be built around the open pit to serve as a warning to the public and preclude their access. Fences and signs would require maintenance in perpetuity and would not constitute a walk-away solution. Therefore, these structures are not proposed as closure actions. The pit berm will be constructed by dozing material around the perimeter of the open pit.

A lake is expected to form in the pit. Geochemical testing indicates that approximately 7% of the pit shell area will be potentially acid generating (PAG). At this time has been assumed that the neutralizing potential of the waste rock will dominate, and no long-term treatment or mitigation will be required.

In the long term (year 100-113), the lake is expected to spill over the crest of the pit. A spillway and channel have been located and sized to divert pit lake overflow around the South Rock Storage Facility.

#### 17.4.2 West Tailings and Rock Storage Facility

The slopes of the West Tailings and Rock Storage Facility will be regraded to an overall slope of 2.5H:1V to facilitate cover placement and revegetation. The top surface will be placed with a 5% slope to direct stormwater runoff during operations and will be re-graded as required at closure to ensure that water does not pond on the final surface.

Based on the tailings production schedule, at the end of the mine life, some compacted filtered tailings will be exposed at the surface of the facility at the end of the mine life. These areas will be covered with 1m of limestone rock underlain by 0.5m of compacted limestone rock which will be sourced from select areas within the Rock Storage Facility. After placement of the rock, the entire facility will be covered with 300mm of locally-salvaged growth media and revegetated. Growth media will be sourced from stockpiles around the dump.

No solution management is anticipated for the co-disposal facility given the tailings is filtered and compacted thus resulting in significant reduction of potential for long-term seepage.

#### 17.4.3 **South Rock Storage Facility**

During closure of the facility, the slopes of the South RSF will be regraded to an overall slope of 2.5H:1V to facilitate cover placement and revegetation. The entire facility will be covered with 300-mm of locally-salvaged growth media and revegetated. The top surface of the waste rock dump will be graded to 2% to direct stormwater runoff.

#### 17.4.4 **Water Dams**

At closure the Fresh Water Dam will be reclaimed. The Fresh Water Dam embankment will be breached and the disturbance covered and revegetated.

The Water Storage Dam will remain post-closure for the benefit of local communities.

#### 17.4.5 **Buildings**

Materials and reagents in the beneficiation plant will be removed and disposed of in appropriate landfills and/or returned to manufacturers. Processing equipment will be removed and sold for salvage value. Buildings and structures at the plant and elsewhere across the site as well as linear networks such as pipelines, powerlines, and conveyors will be demolished and the debris hauled to an on-site landfill.

The foundations will be broken and covered with locally sourced rock and/or growth media. It has been assumed that demolition debris will be hauled up to 30 km to account for both on-site and off-site disposal.

#### 17.4.6 **Roads**

Roads not required for the active reclamation and closure period will be removed at the end of operations. Those not required for long-term monitoring or maintenance activities will be reclaimed at the end of the active reclamation and closure period. Any remaining roads required for the post-closure period will be reclaimed once the post-closure monitoring period ends.

#### 17.4.7 **Diversions**

At closure, all earthworks structures will be reclaimed for positive drainage. The diversion channels used during operations will be reclaimed by backfilling and revegetation.

#### 17.4.8 **Wells**

Monitoring wells required for monitoring groundwater quality during the closure and post-closure periods will remain and the rest will be abandoned. Once the monitoring period is over, the remaining monitoring wells will be abandoned.

#### 17.4.9 **Monitoring**

A surface and groundwater quality monitoring will continue for 20 years during the closure and post-closure periods.

# 18.0 Capital and Operating Costs

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 18.1 Introduction

Costs for open pit mining, borrow source mining, and bulk earthworks have primarily been priced by local mining contractors. Similarly, the process and infrastructure, tailing and water management costs have been priced using non-binding estimates from local engineering and construction contractors with recent experience in constructing mining projects. The companies that provided these estimates are equipped to carry out the construction of the Project.

All currencies shown in this Section are expressed in USD. A foreign exchange rate of 1 USD: 20 MXN Peso has been used. The overall capital cost estimate meets the American Association of Cost Engineers (AACE) Class 3 requirement of an accuracy range between -10% and +15% of the final project cost.

## 18.2 Capital Costs

Initial capital of $174 million is estimated for the Ixtaca Project including the relocation the Rock Creek plant. Initial capital costs are estimates derived from a combination of experience in similar projects and consultation with contractors and equipment suppliers. Table 18-1 below shows the breakdown of initial capital, Table **18-2** shows the breakdown of sustaining capital of $111.3 million.
Table **18-3** shows the break down of the expansion capital included in the Sustaining Capital.

**Table 18-1 Initial Capital Cost Summary**

| | **$ Millions** |
|---|---|
| **Direct Costs** | |
| Mining | $22.2 |
| Process | $80.2 |
| Onsite Infrastructure | $24.3 |
| Offsite Infrastructure | $7.5 |
| **Indirects**, EPCM, Contingency and Owners Cost | $39.9 |
| **Total** | **$174.2** |

**Table 18-2 Sustaining Capital Cost Summary**

| | **$ Millions** |
|---|---|
| **Direct Costs** | |
| Mining | $2.9 |
| Process | $56.9 |
| Tailing and Water Management | $6.9 |
| Onsite Infrastructure | $1.5 |
| Closure | $34.2 |

| | |
|---|---|
| **Indirects**, EPCM, Contingency and Owners Cost | $9.0 |
| **Total Sustaining Capital Cost** | **$111.3** |

**Table 18-3 Expansion Capital Cost Summary**

| | **$ Millions** |
|---|---|
| Mining | $1.2 |
| Process | $56.9 |
| Infrastructure | $1.5 |
| Indirects, EPCM, Contingency and Owner's Costs | $5.0 |
| **Total** | **$64.5** |

### 18.2.1 Basis of Estimate

Costs for open pit mining, borrow source mining, and bulk earthworks have been priced by various local mining contractors following a competitive bid process.

Process and infrastructure costs are priced using non-binding estimates from local engineering and construction contractors with recent experience in constructing mining projects. Contractor's estimates have been derived from the following:

- Current general arrangement layouts and detailed drawings of the Ixtaca mine and process facility.
- Engineering contractor remaining estimate of the costs to relocate the existing Rock Creek plant, from Nome, Alaska to the Ixtaca site, including all transport and logistics costs.

Costs for equipment not supplied from Rock Creek are based on recent supplier quotations.

Work Breakdown Structure (WBS) has been developed for all costs within the project. The estimate was prepared using a combination of Excel-based estimate templates and in-house database software. A standard coding system, based on the WBS and commodity codes was used to categorize each entry and organise the estimate.

The WBS was used to organise the estimate and provide summaries by project area, sub-area and/or commodity. The capital, sustaining and closure costs can be used in future phases of the project.

#### 18.2.1.1 Bulk Earthworks Including Site Preparation and Roads

Onsite and offsite roads, and unit rates for clearing and grubbing, bulk earthwork, are based on costs provided by local construction companies.

MMTS has applied the estimated contractor miner rates to estimated site bulk earthworks volumes. Waste rock overhaul for primary crusher pad fill has been estimated by MMTS.

#### 18.2.1.2 Concrete

Costs were provided by area as defined by the current FS drawings of the Ixtaca Process Plant.

#### 18.2.1.3 Structural Steel

Structural steel costs have been derived from the current Ixtaca FS drawings.

#### 18.2.1.4 Mechanical

The estimate was prepared from the FS mechanical equipment list and process diagrams.

The mechanical installation pricing includes consideration of receiving free issue mechanical equipment from the Rock Creek mine.

Recent quotations were used to assess costs for other major equipment, and all other mechanical equipment which will not be delivered from Rock Creek. These costs are based on recent quotes and similar projects.

#### 18.2.1.5 Platework and Liners

Costs for all platework and metal liners (measured in kilograms), for tanks, launders, pumpboxes, and chutes have been assessed from the FS drawings.

#### 18.2.1.6 Piping

Estimates for piping have been prepared from the current FS drawings for the Ixtaca facility.

#### 18.2.1.7 Site Services

Services were estimated from the FS Ixtaca drawings.

#### 18.2.1.8 On Site Electrical Distribution

Electrical costs were estimated from the current Ixtaca layout and FS electrical drawings.

#### 18.2.1.9 Off Site Electrical Distribution

The cost estimate for permanent electrical power supply by means of a transmission line to the site's substation was developed by a Mexican engineering contractor specializing in wholesale power distribution. This includes interaction with the external power network, transmission line right of way and proposed design concept.

#### 18.2.1.10 Instrumentation

Plant instrumentation and control system costs are based on the installation of a Distributed Control System (DCS). Field Instruments are based on Ixtaca FS drawings and instrument lists, including necessary junction boxes and cabling. Site communication costs are based on Ixtaca FS drawings.

#### 18.2.1.11 Open Pit Mining

Contract miner quotes have been used to estimate:

- Earthworks unit rates.
- Equipment mobilization costs
- Explosive related facilities

MMTS has included allowance for mine operations management, mine planning, and mine technical services in EPCM.

#### 18.2.1.12 Tailings, Water Management, and Closure

MTOs were estimated based on design drawings. Unit rates were sourced as follows:

- Unit rates for earthworks and liner supply and install were obtained by subcontract with Servicios Geologicos IMEx, S.C. (IMEx) located in Hermosillo, Sonora, Mexico
- Unit rates for gabions and geosynthetic clay liner were calculated based on labor rates provided by IMEX and supplier estimates for materials

#### 18.2.1.13 Environmental

MMTS costs for environmental include estimated CONAFOR compensation for habitat disturbance. An allowance has also been made for erosion control during construction.

#### 18.2.1.14 Estimate base currency

The estimate has been prepared with US dollars (US$) as the base currency. Estimates provided by Mexican mining contractor were based in Mexican Peso (MXN) and converted to USD using 1 US$ = 20 MXN. Fluctuations in foreign exchange rates were not considered in this FS estimate.

#### 18.2.1.15 Labour Cost

Labour costs for the FS are by contractor's budgetary quotations for the following:

- Contract mining;
- Process and infrastructure;
- Tailing Co-disposal, RSF, and Water Management;
- Rock Creek Dismantling, Refurbishment, Transportation and Delivery to site;

Travel and living out allowance is included in the contractor's quoted rates. It is expected that most personnel will be hired locally by the contractor. The location is close to several small towns, and 50km from Apizaco a major industrial zone. It is expected that the contractor will arrange their own accommodation.

A productivity factor has been built into the Contractor's costs and applied to the labour portion of the estimate to allow for the inefficiency.

#### 18.2.1.16 Indirect Costs

Indirect costs include items that are necessary for the completion of the project, but are not directly related to the direct construction costs, and are in addition to items covered directly by the contractor 'all-in' labour rate.

Construction Indirects

Construction Indirects to be calculated as a percentage of the Direct Costs and will allow for all temporary buildings and services required during construction and commissioning. Estimates will be based on durations from the construction schedule. Construction indirects are based on all services and facilities required to support the various construction activities.

- Local Mexican contractor construction indirects for process and infrastructure are included in the direct cost estimates.
- External roads construction indirects are included in the construction directs.
- Pioneering construction indirects are included in the direct costs.
- Mining indirects where calculated on 3% of the all mining non-pioneering costs.
- Construction indirects for the external powerline are included.
- Environmental construction indirects of 1% is included.
- Construction indirects are included for the West T/RSF (Co-disposal Facility), South RSF, water management, Water Storage Dam, Fresh Water Dam, and sustaining and closure capital.

Spares

The local Mexican contractor estimated the capital and commissioning spares, 3% and 2% of the capital process equipment respectively.

Mining spares are included in the mining direct costs.

Initial Fills

An allowance is included for initial fills.

Freight and Logistics

The dismantling and relocation of the Rock Creek plant has been estimated by an engineering contractor based on a budget quotation to freight from Alaska, US to Ixtaca, Mexico. Freight and logistics costs include:

- Land and ocean transportation.
- Loading and offloading including cranage.
- Ocean transportation.
- Bonds and insurance.

Customs duties and brokerage, are excluded from the freight and logistics estimate.

An additional allowance of 3% of material and equipment costs has been made for freight and logistics.

Commissioning and Start-up

An allowance has been included for commissioning in the direct costs. The contractor will be responsible for the testing and commissioning all equipment in their scope under the observation of Company representatives. MMTS has made additional allowance for commissioning and start-up indirect costs.

EPCM Costs

EPCM allowance is calculated based on consultant and contractor quotations, taking percentages of the direct costs as applicable:

- Process and infrastructure – 12% applied to the discipline material take-offs.
- Relocation of Rock Creek Equipment – 15% of the relocation cost of the Rock Creek Equipment.
- Tailing and Water Management - a contractor has provided estimated costs for the detailed engineering and construction management of the West T/RSF and South RSF foundations, FWD, WSD, and water management based on the contractor's estimate of personnel time and expenses.
- Others – 15% of environmental, plant mobile equipment, non-PMI indirects and Owners Costs.

Vendor Assistance

Vendors' assistance is based on estimates by MMTS. An allowance is calculated based on number of men and duration for Vendor's assistance during construction.

Temporary Construction Facilities & Services

Based on construction staffing and site requirements, estimates have been included for temporary structures, facilities and services required during construction, and commissioning.

#### 18.2.1.17 **Owner's costs**

Owner's costs have been estimated by MMTS to cover those costs which are normally incurred by the Owner for their support of the project. These costs include Almaden project management costs, pre-production operations, commissioning, staff recruitment, site office and storage facilities, safety equipment, travel, site transportation, field general expenses, communication systems, training and orientation programmes.

#### 18.2.1.18 **Contingency**

Contingency is an allowance for undefined items of work that reside within the current scope of the project which have not been foreseen or described at the time the estimate. A contingency based on the total direct and indirect costs is included to cover undefined costs.

Contingency Excludes:

- Major scope changes such as changes in end product specification, capacities, building sizes, and location of the asset or project.
- Extraordinary events such as major strikes and natural disasters.
- Management reserves.
- Escalation and currency effects.

Contingency is generally included in most estimates and is expected to be expended. Varying amounts of contingency have been applied to reflect the varying degrees of risk of different components of the project.

Table 18.4 shows the allowances for contingencies.

**Table 18.4 Allowances for Contingencies**

| Description | (%) | Risks |
|---|---|---|
| Tailings and West Co-Disposal Facility | 20 | High |
| South RSF | 20 | High |
| Water Management | 15 | Medium |
| Mining Pre-production | * | Low |
| Mining – Initial Capital | 12 | Medium |
| Mining Mobile Equipment | 15 | Medium |
| Earthworks (Bulk) | 12 | High |
| Concrete | 12 | Medium |
| Structural Steel | 12 | Medium |
| Mechanical | 12 | Medium |
| Mechanical - Relocation | 15 | Medium |
| Platework | 12 | Medium |
| Plant Mobile Equipment | 15 | Medium |
| Piping | 12 | Medium |
| Electrical | 12 | Medium |
| Instrumentation | 12 | Medium |
| Tailings filter plant | 31 | High |
| Environmental | 15 | Medium |
| Field Indirects | 15 | Medium |
| Spares | ** | Low |
| Initial Fills | 15 | High |
| Commissioning and Start-up | 15 | High |
| EPCM | * | Medium/High |
| Vendors assistance | 15 | High |
| Owner's Costs | 15 | Medium/High |

* Included in contractor's rates (EPCM for tailing and water management)
** included in Rock Creek Spares

The contingency has been included in the estimate on a per item basis varying from 5% to 20%. The assigned contingency for each item is based on the amount and quality of currently-available relevant data.

#### 18.2.1.19 Exclusions

The following items are excluded from the initial capital cost estimate:

- Working capital, (included in the financial model)
- Cost escalation during construction
- Schedule delays
- Costs such as those caused by:

  - scope changes
  - unidentified adverse ground conditions
  - extraordinary climatic events
  - labor disputes
  - permit applications
  - receipt of information beyond the control of EPCM contractors
  - cost of financing
  - sunk costs
  - research and exploration drilling
  - royalties, corporate and mining taxes
  - sustaining capital (but will be included in the financial model)
  - permitting costs
  - closure costs (estimated separately)
  - Duties and taxes - sales taxes should be identified in all costing so that exemptions can be estimated
  - Foreign exchange fluctuations
- Financing costs.
- Refundable taxes and duties.
- Currency fluctuations.
- Lost time due to severe weather conditions.
- Lost time due to force majeure.
- Customs duties and brokerage, are excluded from the freight and logistics estimate.
- Additional costs for accelerated or decelerated deliveries of equipment, materials and services resultant from a change in project schedule.
- Warehouse inventories other than those supplied in initial fills.
- Environmental bond cost.
- Any project sunk costs including this study.
- Mine reclamation and closure costs (included in sustaining capital costs).
- Escalation post (Q4 2018).
- Social, sustainability and community related issues.
- Consequences from encountering different geotechnical conditions during future project phases than those upon which the existing design criteria and assumptions are based.

## 18.3 Operating Cost Estimate

### 18.3.1 Operating Cost Summary

The total life of mine operating costs for the Ixtaca Project are $22.5/tonne mill feed. Operating costs are summarized in Table 18-5.

**Table 18-5 LOM Operating Cost Summary**

| | | |
|---|---|---|
| Mining costs | $15.2 | $/tonne milled |
| Processing | $10.5 | $/tonne milled |
| G&A | $1.1 | $/tonne milled |
| **Total** | **$26.8** | **$/tonne milled** |

*Note: numbers may not add up due to rounding.*

### 18.3.2 Mining

Operating costs for mining are derived from estimates supplied by various contractor mining companies following a competitive bid process. Mining operating costs also account for varying productivities by period. Average LOM Mine operating costs of $1.84/tonne mined also include GME costs for owner supervision and technical services. Average LOM mining operating costs ($/tonne mined, not including stockpile rehandle) are summarized in Table 18-6.

**Table 18-6 Mining Operating Cost Summary**

| | $/tonne mined |
|---|---|
| Drilling | $0.16 |
| Blasting | $0.19 |
| Loading | $0.30 |
| Hauling | $0.95 |
| Pit Maintenance and Support | $0.16 |
| Contractor GME | $0.06 |
| Owner GME | $0.02 |
| **Total** | **$1.84** |

### 18.3.3 Processing

A breakdown of process operating unit costs is presented in Table 18-7.

**Table 18-7 Process Initial Operating Cost Summary**

| | $/t mill feed |
|---|---|
| Labour | 0.85 |
| Reagents and Consumables | 5.97 |
| Power | 4.07 |
| Maintenance | 0.99 |
| Tailings haul from stockpile to co-disposal | 0.35 |
| **Total** | **12.23** |

*Note: numbers may not add up due to rounding.*

Total process cost reduces to $10.40/ t mill feed in Year 5 after throughput increases from 7,650 tpd to 15,300 tpd.

#### 18.3.3.1 Process Power Cost

The annual power cost estimate is based on the power of all major equipment and a unit cost of 0.084 $/kWh based on in-house data from similar operations in Mexico.

#### 18.3.3.2 Process Labour

Process labour summarized in Table 18-8 averages 105 personnel in the initial operation. Process labour is estimated to peak at approximately 160 personnel after the throughput expansion. Labour will primarily be locally sourced living with 20 minutes from the mine site. Labour rates are based on in-house data from local Mexican mining operations. A 5 day shift rotation with 3 x 8 hour shifts has been assumed.

**Table 18-8 Process Personnel**

| | |
|---|---|
| Operations | 63 |
| Maintenance | 27 |
| Laboratory | 15 |
| **Total** | **105** |

**Reagents and Consumables**

Reagents and consumables are based on reagent consumptions described in Section 14 and vendor quotes.

#### 18.3.4 General & Administration (G&A)

Annual G&A cost is US$4.7 M per year is summarized in Table 18-9.

**Table 18-9 Annual G&A Costs**

| | US$/year |
|---|---|
| Personnel | $2,065,000 |
| Expenses | |
| Admin, IT, HR | $849,000 |
| Security and Safety | $107,000 |
| Environment | $1,349,000 |
| Public Relations and Community Affairs | $339,600 |
| **Total** | **$4,709,600** |

## 18.4 Closure Cost Estimate

The closure cost estimate was prepared using SRCE Version 2.0.

The cost estimate does not include costs to remove equipment. The cost estimate does not take credit for salvage.

# 19.0 **Economic Analysis**

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 19.1 Cautionary Statement

The results of the economic analyses discussed in this section represent forward- looking information as defined under Canadian securities law. The results depend on inputs that are subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here. Information that is forward-looking includes:

- Mineral Resource and Mineral Reserve estimates;
- Assumed commodity prices and exchange rates;
- Mine production plans;
- Projected recovery rates;
- Sustaining and operating cost estimates;
- Assumptions as to closure costs and closure requirements;
- Assumptions as to environmental, permitting and social risks.

Additional risks to the forward-looking information include:

- Changes to costs of production from what is assumed;
- Unrecognized environmental risks;
- Unanticipated reclamation expenses;
- Unexpected variations in quantity of mineralised material, grade, or recovery rates;
- Geotechnical and hydrogeological considerations during mining being different from what was assumed;
- Failure of plant, equipment, or processes to operate as anticipated;
- Accidents, labour disputes and other risks of the mining industry.

## 19.2 Assumptions

The economic analysis assumes the Ixtaca Project is a 100% equity financed project. All dollar amounts in this analysis are expressed in US dollars, unless otherwise specified.

The Economic analysis includes the entire project life. The valuation date on which the Net Present Value (NPV) and Internal Rate of Return (IRR) are measured is the start of Year -1.

Details of the capital and operating cost estimates are described in Section 18. The production schedule used for the economic analysis is described in Section 13.

Base case prices are derived from recent common peer usage discussed in Item 19.

**Table 19-1 Inputs for Economic Analysis**

| Parameter | Value | Unit |
|---|---|---|
| Gold Price | 1,275 | $US/oz |
| Silver Price | 17 | $US/oz |
| AU Payable | 99.9 | % |
| AG Payable | 99.7 | % |
| AU Offsite Costs | 1.10 | US$/Oz |
| AG Offsite Costs | 0.25 | US$/Oz |
| Almadex NSR Royalty | 2.0 | % |
| Extraordinary Mining Duty | 0.5 | % |
| Special Mining Duty | 7.5 | % |
| Income Tax | 30.0 | % |

## 19.3 Taxes and Mining Duties

Effective January 1, 2014, the Mexican Tax Reform increased corporate income tax rate from 28% to 30% and introduced two new mining duties. The Tax Reform includes the implementation of a 7.5% Special Mining Duty (SMD) and a 0.5% Extraordinary Mining Duty (EMD) on gross revenue from the sale of gold, silver and platinum. The SMD is applicable to earnings before income tax, depreciation, depletion, amortization and interest. The SMD and EMD are tax deductible for income tax purposes. Ixtaca is anticipated to generate approximately US$130 million in Federal taxes, US$50 million in State taxes and US$30 million in Municipal taxes.

## 19.4 Analysis

The Project Cash Flow is summarized in
Table **19-2**.

**Table 19-2 Cash Flow Summary**

| Year | | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Production** | | | | | | | | | | | | | | |
| Waste | **Mt** | 8 | 37 | 37 | 40 | 43 | 37 | 43 | 44 | 33 | 3 | 0 | 0 | 325 |
| Crusher Feed | Mt | | 3.61 | 4.56 | 4.56 | 4.74 | 9.22 | 9.14 | 9.07 | 8.88 | 9.72 | 7.35 | 3.83 | 74.68 |
| AU | g/t | | 0.86 | 1.04 | 0.86 | 1.12 | 0.60 | 0.60 | 0.50 | 0.44 | 0.36 | 0.34 | 0.48 | 0.59 |
| AG | g/t | | 61.5 | 64.4 | 54.8 | 49.1 | 35.9 | 39.7 | 28.6 | 33.8 | 23.3 | 15.4 | 19.0 | 35.7 |
| Mill Feed | Mt | | 2.23 | 2.80 | 2.79 | 2.79 | 5.58 | 5.58 | 5.59 | 5.58 | 5.60 | 5.60 | 3.83 | 47.96 |
| AU | g/t | | 1.25 | 1.50 | 1.24 | 1.62 | 0.79 | 0.83 | 0.65 | 0.55 | 0.44 | 0.37 | 0.48 | 0.77 |
| AG | g/t | | 91.3 | 97.2 | 81.1 | 74.7 | 50.9 | 56.5 | 38.3 | 43.8 | 29.0 | 16.4 | 19.0 | 47.9 |
| Dore Produced | | | | | | | | | | | | | | |
| AU | kOz | | 77 | 116 | 94 | 118 | 119 | 126 | 99 | 64 | 50 | 45 | 37 | 946 |
| AG | kOz | | 5,803 | 7,700 | 6,428 | 5,881 | 7,871 | 8,743 | 5,844 | 6,652 | 4,328 | 2,351 | 1,770 | 63,372 |
| **Revenue** | | | | | | | | | | | | | | |
| Payable Au | $M | | $98 | $148 | $120 | $151 | $151 | $161 | $126 | $81 | $63 | $57 | $48 | $1,205 |
| Payable Ag | $M | | $98 | $130 | $109 | $100 | $133 | $148 | $99 | $113 | $73 | $40 | $30 | $1,074 |
| Less Refining | $M | | $2 | $2 | $2 | $2 | $2 | $2 | $2 | $2 | $1 | $1 | $0 | $17 |
| Less Royalty | $M | | $4 | $6 | $5 | $5 | $6 | $6 | $4 | $4 | $3 | $2 | $2 | $45 |
| **Net Payable** | **$m** | | **$191** | **$271** | **$223** | **$244** | **$277** | **$301** | **$219** | **$188** | **$133** | **$94** | **$76** | **$2,217** |
| **Operating Costs** | | | | | | | | | | | | | | |
| Mining | $M | | $62 | $77 | $85 | $106 | $102 | $108 | $89 | $61 | $22 | $10 | $6 | $728 |
| Process | $M | | $27 | $34 | $34 | $33 | $57 | $58 | $58 | $56 | $58 | $54 | $34 | $504 |
| G&A | $M | | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $52 |
| **Total Operating Costs** | **$M** | | **$94** | **$116** | **$124** | **$143** | **$164** | **$171** | **$152** | **$121** | **$85** | **$69** | **$44** | **$1,283** |
| **Net Income** | **$M** | | **$97** | **$155** | **$99** | **$100** | **$113** | **$130** | **$67** | **$67** | **$48** | **$25** | **$31** | **$934** |
| **Total Capital Costs** | **$M** | **$174** | **$10** | **$3** | **$1** | **$65** | **$1** | **$1** | **$1** | **$1** | **$1** | **$1** | **$1** | **$286** |
| **Salvage** | **$M** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** |
| **Pretax Cash Flow** | **$M** | **($174)** | **$87** | **$152** | **$98** | **$36** | **$112** | **$129** | **$66** | **$66** | **$48** | **$25** | **$31** | **$663** |
| **Total Taxes** | **$M** | **$0** | **$7** | **$42** | **$29** | **$26** | **$30** | **$37** | **$14** | **$6** | **$8** | **$1** | **$9** | **$210** |
| **After-Tax Cash Flow** | **$M** | **($174)** | **$80** | **$110** | **$69** | **$10** | **$81** | **$93** | **$52** | **$60** | **$39** | **$23** | **$22** | **$453** |

*Note: numbers may not add up due to rounding.*

## 19.5 Economic Results and Sensitivities

A summary of financial outcomes comparing base case metal prices to alternative metal price conditions are presented in Table 19-3. Alternate prices cases consider the project's economic outcomes at varying prices witnessed at some point over the three years prior to this study.

**Table 19-3 Summary of Ixtaca Economic Sensitivity to Precious Metal Prices (Base Case is Bold)**

| | | | | | |
|---|---|---|---|---|---|
| Gold Price ($/oz) | 1125 | 1200 | **1275** | 1350 | 1425 |
| Silver Price ($/oz) | 14 | 15.5 | **17** | 18.5 | 20 |
| | | | | | |
| Pre-Tax NPV 5% ($million) | 229 | 349 | **470** | 591 | 712 |
| Pre-Tax IRR (%) | 35% | 46% | **57%** | 67% | 77% |
| Pre-Tax Payback (years) | 2.0 | 1.8 | **1.6** | 1.4 | 1.3 |
| | | | | | |
| After-Tax NPV 5% ($million) | 151 | 233 | **310** | 388 | 466 |
| After-Tax IRR (%) | 25% | 34% | **42%** | 49% | 57% |
| After-Tax Payback (years) | 2.6 | 2.1 | **1.9** | 1.7 | 1.5 |

A sensitivity analysis on metal prices (Table 19-3), operating costs (Table 19-4), foreign exchange rate (Table 19-5), and capital costs (Table 19-6), shows that the Project is most sensitive to fluctuations in gold price and foreign exchange rate assumptions, and less sensitive to variations in capital and operating costs. The gold grade is not presented in the sensitivity tables because the impact of changes in the gold grade mirror the impact of changes in the gold price.

**Table 19-4 Summary of Economic Results and Sensitivities to Operating Costs ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | Pre-Tax | After-Tax | Pre-Tax | After-Tax | Pre-Tax | After-Tax |
| **Opex ($/t milled)** | -10% | | $26.8/t | | +10% | |
| **NPV (5% discount rate)** | $565 | $371 | $470 | $310 | $376 | $249 |
| **Internal Rate of Return (%)** | 64% | 47% | 57% | 42% | 49% | 36% |
| **Payback (years)** | 1.5 | 1.7 | 1.6 | 1.9 | 1.7 | 2.0 |

The Ixtaca project is also sensitive to the exchange rate between U.S. dollars and Mexican Pesos ("MXN"). The FS assumes an exchange rate of 20 MXN per U.S. dollar, and the following table shows the sensitivity of project economics to different exchange rates assuming base case metals prices.

**Table 19-5 Summary of Economic Results and Sensitivities to Exchange Rate ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | Pre-Tax | After-Tax | Pre-Tax | After-Tax | Pre-Tax | After-Tax |
| **Exchange Rate (MXN:USD)** | 18 | | **20** | | 22 | |
| **NPV (5% discount rate)** | $409 | $270 | $470 | $310 | $521 | $342 |
| **Internal Rate of Return (%)** | 52% | 38% | 57% | 42% | 62% | 45% |
| **Payback (years)** | 1.7 | 2.0 | 1.6 | 1.9 | 1.5 | 1.8 |

The Initial Capital cost is estimated to be US$174.2 million. The following table shows the sensitivity of project economics to a 10% change in the initial capital costs, assuming base case metals prices.

**Table 19-6 Summary of Economic Results and Sensitivities to Capital Cost ($ Million)**

| | Lower Case | | Base Case | | Upper Case | |
|---|---|---|---|---|---|---|
| | Pre-Tax | After-Tax | Pre-Tax | After-Tax | Pre-Tax | After-Tax |
| Initial Capital ($m) | -10% | | **116.9** | | +10% | |
| **NPV (5% discount rate)** | $493 | $326 | $470 | $310 | $448 | $294 |
| **Internal Rate of Return (%)** | 65% | 48% | 57% | 42% | 51% | 37% |
| **Payback (years)** | 1.5 | 1.7 | 1.6 | 1.9 | 1.7 | 2.0 |

The above sensitivity analysis demonstrates robust economics.

# 20.0 Adjacent Properties

The information in this section was drawn from the most recent major study prepared entitled “The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study” dated January 24th 2019 and updated October 3, 2019.

## 20.1 Cuyoaco Property

The Cuyoaco Property is located approximately 4km south east of the Tuligitic Property and it covers 643 hectares over two mineralized targets: the Pau copper-silver-gold skarn, and the Santa Anita gold Project.

## 20.2 Minera Frisco S.A. de C.V. Espejeras

The Espejeras Property is 100% owned by Minera Frisco S.A. de C.V. It is located roughly 7km north of the Tuligtic Property (**Figure 3-1**). Information on the exploration work carried out in the area to date is very limited. The area is considered prospective for gold and silver.

# 21.0 Other Relevant Data and Information

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

## 21.1 Preliminary Development Schedule

A project construction schedule and project execution plan has been developed as part of the FS. Key activities and milestones are summarized below:

- Permit submission during Q1 2019
- Permit Approvals by Q4 2019
- Ixtaca construction starts in Q4 2019
- Site preparation starts in Q4 2019
- Powerline construction starts in Q4 2019
- Begin construction of WSD and FWD coffer dams in Q4 2019
- Rock Creek plant transported to Ixtaca site end of Q1 2020
- Mine preproduction starts in Q2 2020
- West T/RSF Year 1 limestone buttress and foundation preparation complete by end of Q2 2021
- Plant startup in Q2 2021

# 22.0 Interpretation and Conclusions

The information in this section was drawn from the most recent major study prepared entitled “The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study” dated January 24th 2019 and updated October 3, 2019.

## 22.1 Introduction

An open pit mine plan has been evaluated for the Ixtaca Project. The QP notes the following interpretations and conclusions.

## 22.2 Mineral Tenure, Surface Rights

Information from Almaden legal counsel supports that the mining tenure held is valid and is sufficient to support declaration of Mineral Resources and Mineral Reserves. The Company has informed the author that material changes to the claim size and legal status of the mineral claims since the date of the Study are provided in the Company’s public disclosure record since that time.

A significant portion of surface rights in the proposed mining area has been acquired by Almaden. Additional surface rights negotiations will be required to execute the current mine plan.

To the extent known, there are no other significant factors and risks that may affect access, title, or the right or ability to perform work on the property that have not been discussed in this Report.

## 22.3 Geology and Mineralization

The Ixtaca deposit is an epithermal gold-silver deposit, mostly occurring as anastomosing (branching and reconnecting) vein zones hosted by limestone and shale basement rocks with a minor component of disseminated mineralisation hosted in overlying volcanic rocks.

Knowledge of the deposit settings, lithologies, mineralization style and setting, and structural and alteration controls on mineralization is sufficient to support Mineral Resource and Mineral Reserve estimation.

## 22.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

The quantity and quality of the lithological, collar and downhole survey data collected in the exploration and infill drill programs conducted during the Ixtaca campaigns are sufficient to support Mineral Resource and Mineral Reserve estimation.

Sample security procedures met industry standards at the time the samples were collected. Current sample storage procedures and storage areas are consistent with industry standards.

Data verification has been extensively conducted by Almaden, and no material issues have been identified by those programs.

Data collected have been sufficiently verified that they can support Mineral Resource and Mineral Reserve estimation and be used for mine planning purposes.

## 22.5 Metallurgical Testwork

Metallurgical testwork completed has been appropriate to the style of mineralization. There are 3 distinct metallurgical domains hosting precious metal mineralization at Ixtaca:

- Limestone ore contains most of the economic mineralization and contributes 75% of metal production in the FS (90% of metal production in the payback period).
- Volcanic ore contributes 12% of metal production in the FS.
- Black Shale ore contributes 13% of metal production in the FS.

The testwork demonstrated that economic mineralization responds well to processing by pre-concentration with XRT ore sorting, gravity concentration, intensive leaching of gravity concentrate, flotation, flotation concentrate regrind, leaching with 24 hours Carbon-in-Leach (CIL) to complete gold leaching and 72 hours of agitated leach to complete silver leaching.

The majority of economic mineralization is fine grained, requiring a primary grind $P_{80}$ of 75 µm for liberation, and regrind prior to leaching.

Test work has demonstrated repeatable good overall recoveries for gold and silver in the primary Limestone ore domain. Silver over all recoveries from the volcanic and black shale domains is good. Gold recoveries in volcanic and black shale are poor due to refractory mineralization in the volcanic and preg-robbing organic carbon in the black shale. Ongoing test work indicates that gold recovery improvements in the black shale can be achieved with organic carbon rejection by carbon pre-flotation or flotation cleaning using an organic carbon depressant. Good carbon rejection and subsequent leach recovery was also achieved by ultra fine gravity concentration of black shale concentrates.

The testwork results have been used to project metallurgical recovery performance by head grade and metallurgical domain.

## 22.6 Mineral Resource Estimates

Ordinary kriging was used to estimate the Mineral Resources reported at various gold equivalent cut-off grades. Capping was completed to reduce the effect of outliers within each domain. Uniform down hole 3 meter composites were produced for each domain and used to produce semivariograms for each variable. Grades were interpolated into blocks 10 x 10 x 6 meters in dimension by ordinary kriging. Specific gravities were determined for each domain from drill core. Estimated blocks were classified as either Measured, Indicated or Inferred based on drill hole density and grade continuity using the 2014 CIM Definition Standards.

Factors that may affect the resource estimate include: metal price assumptions, changes in interpretations of mineralization geometry and continuity of mineralization zones, metallurgical recovery assumptions, operating cost assumptions, including assumptions that surface rights to allow mining infrastructure to be constructed will be forthcoming, delays or other issues in reaching agreements with local or regulatory authorities and stakeholders, and changes in land tenure requirements or in permitting requirements from those discussed in this Report.

## 22.7 Mineral Reserves

Proven and Probable Mineral Reserves have been modified from Measured and Indicated Mineral Resources. Inferred Mineral Resources have been set to waste.

Factors that may affect the Mineral Reserves estimates include metal prices, changes in interpretations of mineralization geometry and continuity of mineralization zones, geotechnical and hydrogeological assumptions, process plant and mining recoveries, the ability to meet and maintain permitting and environmental licence conditions, and the ability to acquire surface rights required to execute the mine plan.

## 22.8 Mine Plan

Reasonable mine plans, mine production schedules, and mine costs have been developed for Mineral Reserves at Ixtaca using pit layouts and mine operations that are typical of other open pit gold operations in Mexico.

Pit layouts and mine operations are typical of other open pit gold operations in Canada, and the unit operations within the developed mine operating plan are proven to be effective for these other operations;

## 22.9 Geomechanical

A geomechanical plan has been executed for the Study to determine slope design parameters.

The following geomechanical risks to the project have been identified and incorporated on the project risk register:

- The potential for landslide and debris flow hazard in the ash tuff remains a risk to the project. Geologic observations indicate ash tuff failures and localized debris flows may occur in this terrain even without mining activity or disturbance. The recommended slope monitoring program will provide warning of ash tuff movement or debris flows.
- Medium slope failures may occur. These may be the result of Inter-ramp bench failures or the intersection of major structures in the pit wall. The recommended slope monitoring program will identify potential failures so that remedial action may be taken.

- A structural model has not been developed for the project. The development of a structural model and use for stability modeling has the opportunity to de-risk the project by identifying adverse structures prior to mining.
- Overflow from the Water Storage dam may occur over the life of the open-pit if a greater than 100-year storm event occurs. The water storage dam is located upstream of the open pit. It is expected that uncontrolled water flows over the open pit walls in the volcanic tuffs and shales have the potential to create failures or debris flows entraining material. Maintenance of reservoir levels, and the recommended slope monitoring program will provide warning of potential instabilities.

Overall geomechanical risks to the project can be reduced by conducting the recommended work in Section 23.3.3 before, and as mining commences in the Ixtaca open pit.

## 22.10 Tailings, Rock, and Water Management

Tailings and waste rock will be co-disposed in the West Tailings and Rock Storage Facility (West T/RSF). Tailings produced by the flotation process will be sent through a filter press and then conveyed from the plant to a central point in the West Tailings and Rock Storage Facility. From this location, the tailings will be placed, spread and compacted in layers. The filtered tailings will be surrounded by a limestone waste rock buttress and will be deposited with waste rock.

A stochastic daily water balance model was prepared for the Project using GoldSim. The main objectives of the site water management plan are to optimize the use of water, prevent discharge of water from the filtered tailings operational surface (West T/RSF), maximize the use of stormwater runoff as fresh water supply to the Process Plant, and to maintain a flow of water downstream of the mine for the community. Process plant demands will be met from the following sources:

- Stormwater runoff from the West T/RSF operating surface
- Fresh water will be provided from various sources including:
  - Groundwater inflow to the pit;
  - Stormwater runoff collected in the open pit;
  - The FWD;
  - The WSD;

In the early years of operations (Years 1 to 5), the predicted groundwater inflows and stormwater in the pit and surface of Co-disposal will supply the plant water demand, with no makeup water anticipated from the FWD and WSD. In the later years of operation (Years 6 onwards), all water sources are used to meet plant demand.

A portion of rainfall or groundwater inflow accumulated in the open pit will be used for dust control during the dry months.

The results of the daily water balance model illustrate that the mine will operate in a water balance over a broad range of climatic conditions with the base-case parameters noted above. For startup and through mine year 5 there is a very low risk of insufficient water for plant operations. There is uncertainty in the basin yield modeled in the daily water balance and associated risk that an actual CN of less than 80 may result in a plant shortfall from mine year 6 forward.

The following risks to the project have been identified for the West T/RSF and South RSF foundations, FWD, WSD, and water management structures and incorporated into the project risk register.

- Potential for insufficient water for the project after mine year 5 because of the reliance of precipitation and run-off for operational water. This may also include insufficient water for community water commitments which could result project interruptions. Data from the upgraded site monitoring stations will continue to be monitored and analyzed through start up and during operations. This data will be used to update the water balance and if a risk of plant shortfall still exists after mine year 5, then a contingency plan for alternative water sources should be developed.
- The potential for strength degradation in low strength, low-density ash foundation materials if saturated, piping under high seepage gradients and potentially brittle failure (collapse) under loading conditions in excess of pre-consolidation pressures. Additional characterization and design will be needed to further address the limitations of the existing foundation materials in the proposed facility footprints (West T/RSF, South RSF, FWD, and WSD).
- The potential for deeper than anticipated colluvial/alluvial and landslide deposits necessitate deeper than anticipated foundation excavations during construction which could increase construction costs for the project. Additional geotechnical investigation within the FS footprints of the FWD, WRD, West T/RSF, and South RSF toe areas is required to further quantify and mitigate this risk.
- The potential for difficulties during dry-stacking operations including, filtration inefficiencies, lack of operational controls and/or excessive rate of rise leads to excess pore pressure in the compacted tailings and slope instability. These should be addressed in the operations plan developed during the detailed design.
- The potential for differential settlement in the WSD eastern abutment due to construction of the 60-meter-high dam on different lithologies within the embankment footprint could cause damage to the geomembrane liner, seepage through the embankment, and release of water into the Open Pit. Additional geotechnical investigation and geologic mapping in the volcanics within the WSD footprint is required to further quantify this risk. The completion of a trade-off study for construction of the WSD with RCC versus the FS rockfill construction is also recommended.
- Seepage and piping through the portions of the facility footprints (West T/RSF, South RSF, FWD, and WSD) located on volcanics could impacted facility stability and groundwater chemistry. Additional geotechnical investigation in the eastern abutment would minimize this risk. In addition, Completion of a trade-off for construction of the WSD with RCC versus the FS rockfill construction is recommended.
- Due to the prevalence of ash tuffs and lapilli tuff and breccias in the proposed foundation excavations of the Fresh Water Dam and Water Storage Dam as well as the borrow source areas for these facilities, there is the potential for insufficient appropriate borrow materials for construction. Designs in the FS have minimized use of these materials as construction fill for the dams however, the volcanics are still used for liner subgrade preparation within the basins. Their suitability should be further characterized during the detailed design or alternatives should be identified.

The work to address each of these risks for the West T/RSF and South RSF foundations, FWD, WSD, and water management structures has been included in the recommended work detailed in Section 23.2.

## 22.11 Environmental, Permitting and Social Considerations

Almaden has engaged a Mexican environmental consultant to develop an Environmental Impact Assessment (MIA), an application for change in land use (CUS) and accompanying Technical Supporting Study (ETJ) for the Ixtaca Project, with an anticipated submission in the first quarter of 2019.

Almaden has conducted extensive open, transparent communication with project stakeholders.

The Company has informed the author that material changes to the claim size and legal and permitting status of the Property since the date of the Study are provided in the Company's public disclosure record since that time.

## 22.12 Capital and Operating Cost Estimates

The initial capital cost for construction of the Ixtaca Project has been estimated to be $174 million, and the total sustaining capital cost is estimated to be $111 million over the LOM.

## 22.13 Economic Analysis

Project economics assume a gold price of $1275/Oz, and a silver price of $17/oz, and exchange rate of 1US$ = 20 MXN Peso.

The Project NPV at a 5% discount rate is $310 million, with an IRR of 42% and initial capital payback of 1.9 Years. NPV is discounted to the start of Year -1.

Risks to the economic analysis include:

- Changes to costs of production from what is assumed;
- Unrecognized environmental risks;
- Unanticipated reclamation expenses;
- Unexpected variations in quantity of mineralised material, grade, or recovery rates;
- Geotechnical and hydrogeological considerations during mining being different from what was assumed;
- Failure of plant, equipment, or processes to operate as anticipated;
- Accidents, labour disputes and other risks of the mining industry.

# 23.0 **Recommendations**

The information in this section was drawn from the most recent major study prepared entitled "The Ixtaca Gold-Silver Project Puebla State, Mexico NI 43-101 Technical Report on the Feasibility Study" dated January 24th 2019 and updated October 3, 2019.

Pending financing and a production decision, MMTS recommends that the Ixtaca Project proceed to the detailed design phase.

## 23.1 Geology and Exploration

The following exploration drilling is recommended:

- Higher resolution drilling of the starter pit area to improve the definition of start-up mill feed
- Step out exploration of the north high-grade limestone
- Step out exploration of the north east black shale potential underground mining target
- Additional exploration of the Tano and SE Alteration zones

The exploration drilling costs are estimated to be $550,000.

## 23.2 Tailings, Rock, and Water Management Recommendations

The following work is recommended for the detailed design of the West T/RSF, South RSF, Fresh Water Dam, and Water Storage Dam.

- Additional geotechnical characterization in the West T/RSF footprint including drilling, laboratory testing, and geophysics to refine geotechnical parameters used in the stability analysis, and the extent and depth of the shear key at the downgradient toe of the West T/RSF.
- Additional geotechnical characterization in the South RSF footprint including drilling, laboratory testing, and geophysics to refine geotechnical parameters used in the stability analysis.
- Additional geotechnical testing to confirm geotechnical properties of the compacted filtered tailings and waste rock mix including gradation, density, drainage/permeability, consolidation, and strength.
- Additional geotechnical characterization in the Fresh Water Dam footprint including drilling, laboratory testing, and geophysics to refine geotechnical parameters used in the stability analysis.
- Additional characterization via targeted geotechnical drilling and laboratory testing in the volcanics in the eastern abutment of the Water Storage Dam.
- Trade-off study for the Water Storage Dam to compare the FS design to a roller compacted concrete design.
- Update the water balance with additional years of site monitoring data for precipitation and streamflows. If needed develop a contingency plan for alternative water sources as noted in Section 22.10.

The completion of the above work is estimated to cost $300,000.

Detailed engineering for the West T/RSF and South RSF foundations, the FWD, WSD, and water management structures is estimated to cost approximately $500,000. The total detailed design costs from these items is estimated to be $800,000. These costs have been included in the cost estimate.

Site-wide water management recommendations include continued monitoring and analysis of the site monitoring data, available from site via telemetry, to refine basin yield estimates.

## 23.3 Mining Recommendations

### 23.3.1 Open Pit Mining

The pit limit, pit phase designs, mining method/equipment, and production schedule will be developed for EPCM and used to negotiate a mining contract with the chosen contract mining group.

Activities involved in updating the mining section include (but are not limited to):

- Optimize the production schedule through examining various stockpiling scenarios and stockpile locations as well as RSF locations
- Develop a short-range monthly mine plan for Years -1, 1 and 2.
- Develop a more detailed mine area reclamation plan.
- Drill off Phase 1 and 2 in higher detail to confirm and update the geology model

Total open pit mining costs estimated at $150,000.

### 23.3.2 Underground Mining Potential

Potential underground mining has not been considered for the FS. Contiguous mineralized high grade zones beneath the FS open pit are potential underground mining (UG) resources. Figure 23-1 shows an section view below the pit with 60 m wide high grade mineralization that could be amenable to long hole open stoping.

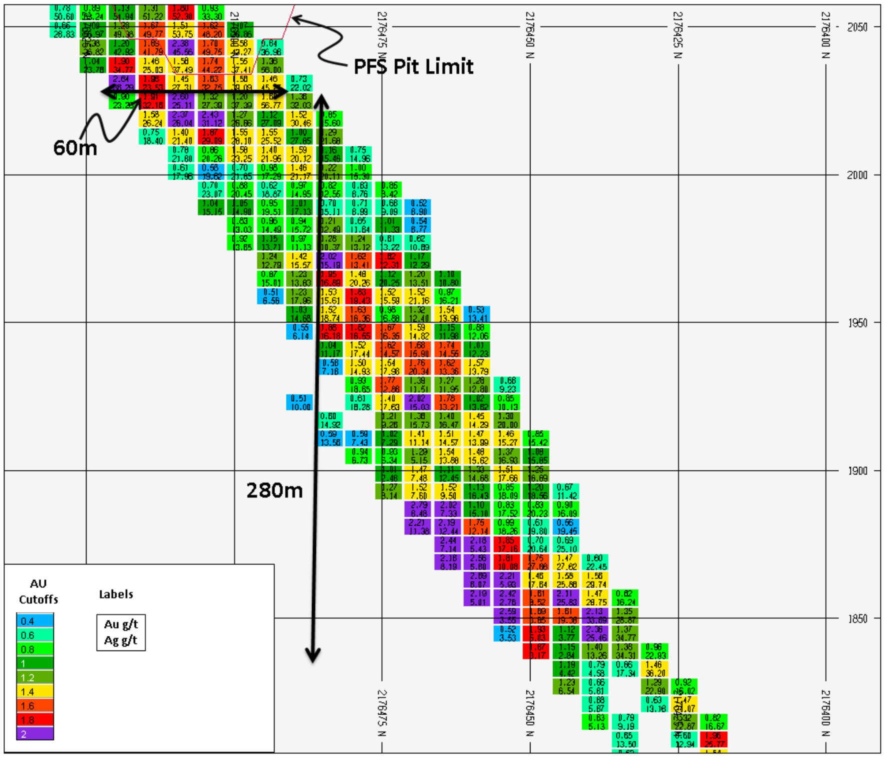


**Figure 23-1 Section View of Au>=$0.5 below the FS pit - looking South -East**

Engineering studies are recommended to determine the technical and economic viability of underground mining. Estimated cost to investigate potential underground mining is $80,000.

### 23.3.3 Geomechanical recommendations

The following recommendations are provided with respect to the open-pit slope design for the Ixtaca Project:

- A detailed structural model should be developed for the project based on all surface mapping, detailed geologic logs from all resource holes, and from acoustic televiewer data, Major joints and fractures from this model should be incorporated into the geologic and resource model. (May be performed by Almaden Minerals using their own geological team, or an outside consultant at $US 75,000 to $125,000).
- Stability analysis of the final and interim pit phases should be updated once a structural model is completed for the project. (Estimate for outside consultant to perform this work is $US 50,000 to $100,000).
- Bench face and slope performance should be assessed to determine if there is opportunity to optimize the slope angles. Principal validation of slope angles with be through slope performance and rock fabric mapping of the exposed pit walls. Mapping of the volcanic ash tuff rock slopes should be completed as the pit progresses to collect joint set length and additional spacing data. (May be performed by Almaden Minerals using their own geological team with training from an outside consultant at $US 25,000 to $35,000).

- Ensure adequate drainage measures along pit benches in the volcanic ash tuff are designed and implemented in the detailed design phase of the open pit. Any tension cracks where volcanic ash tuff is exposed at the recommended inter-ramp angle of 43° may be subjected to displacement, erosional, and failure mechanisms if adequate drainage is not designed and constructed on the benches. The ash tuff slopes, as designed, meet the slope acceptance criteria at a FoS of 1.3, however potential failure mechanisms may occur including gullying, piping, and erosion. (Part of normal mining design and mining costs, i.e., road maintenance, using either graders or bulldozers).
- Numerical modeling of the deepest and critical section of the open pit should be completed to assess incremental deformation and material strain softening in the weak rock mass. As mining commences, and slope monitoring deformations can be observed, numerical modeling should be completed to assess the stability of the deepest phases of the pit. (Estimate for outside consultant to perform this work is $US 30,000 to $60,000).

## 23.4 Metallurgy and Process Recommendations

Testwork should continue on Black Shale to improve gold recovery and overcome the preg-robbing properties. This metallurgical testing work is estimated to cost $100,000.

## 23.5 Environmental Recommendations

It is recommended to continue with the long lead environmental baseline studies, including climate, hydrology, and water quality to support permitting requirements. Advanced groundwater and surface water predictive models are recommended to interpret potential impacts and better mitigate for them. Costs for ongoing environmental work are estimated at approximately $300,000.

## 23.6 Infrastructure Recommendations

A study to refine the alignment of the powerline should be completed at a cost of $150,000.

## 23.7 Aggregate Potential

A large portion of the Ixtaca Waste rock is non-mineralized limestone. Limestone waste rock is Geo-chemical and geo-mechanical tests indicate that most of the limestone waste rock is likely suitable for use as an aggregate. The high calcium content also makes it potentially suitable for agriculture.

The potential to supply aggregate to the >60 million tonne per year Mexican aggregate market should be further investigated. Estimated cost for this study is $20,000.

## 23.8 Cement Potential

Chemical analysis of limestone flotation tailings shows high calcium content with low impurities. An investigation is recommended to determine if Ixtaca flotation tailings are a potential feedstock for a cement production process. Cost estimate to evaluate cement potential is $100,000.

### 23.9 Risk Assessment

A detailed project risk assessment is recommended. Estimated cost is $50,000.

### 23.10 Budget

The costs of completing the above recommendations is broken down in Table 26-1.

**Table 23-1 Recommendations Budget**

| Item | Cost ($) |
|---|---|
| Geology and Exploration | 550,000 |
| Tailings, Rock, and Water Management Recommendation | 800,000 |
| Open Pit Mining Studies | 150,000 |
| Underground Potential Mining Studies | 80,000 |
| Geomechanical | 320,000 |
| Environmental | 300,000 |
| Powerline | 150,000 |
| Aggregate potential | 20,000 |
| Cement potential | 100,000 |
| Risk Assessment update | 50,000 |
| **Total** | **2,520,000** |

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# 25.0 **Reliance on information provided by the registrant**

The author has not relied on any information from the registrant for this Technical Report Summary.

# APPENDIX A - LIST OF DRILL HOLES

Holes used in Resource Estimate are highlighted.

| HOLE | EASTING | NORTHING | ELEVATION | HOLE LENGTH (m) |
|---|---|---|---|---|
| CA-11-001 | 619100.90 | 2176535.30 | 2302.84 | 410.87 |
| CA-11-002 | 619148.11 | 2176789.80 | 2405.49 | 597.77 |
| CA-11-003 | 619147.74 | 2176790.16 | 2405.58 | 575.46 |
| CA-11-004 | 619154.90 | 2176474.60 | 2300.35 | 276.76 |
| CZ-14-001 | 619529.80 | 2179001.20 | 2748.82 | 374.29 |
| CZ-14-002 | 619445.00 | 2178781.00 | 2693.68 | 502.31 |
| CZ-14-003 | 619430.70 | 2178680.30 | 2662.33 | 482.50 |
| G-AGG-17-01 | 618880.90 | 2176125.80 | 2250.72 | 51.21 |
| G-AGG-17-02 | 618880.90 | 2176125.80 | 2250.72 | 51.21 |
| G-AGG-17-03 | 618741.27 | 2176032.50 | 2248.95 | 81.69 |
| G-AGG-17-04 | 618880.90 | 2176125.80 | 2250.72 | 51.21 |
| G-AGG-17-05 | 618880.90 | 2176125.80 | 2250.72 | 51.21 |
| GM-14-001 | 619132.10 | 2176272.00 | 2264.38 | 290.47 |
| GM-14-002 | 619062.50 | 2175860.40 | 2395.76 | 290.47 |
| GM-14-003 | 619239.90 | 2176591.00 | 2331.15 | 380.39 |
| GM-14-004 | 618794.50 | 2176338.70 | 2373.61 | 200.56 |
| GM-18-005 | 618740.00 | 2176040.00 | 2249.54 | 295.90 |
| GM-18-006 | 618750.00 | 2175950.00 | 2244.82 | 400.00 |
| GM-18-007 | 619250.00 | 2176575.00 | 2389.36 | 300.00 |
| GM-18-008 | 619092.50 | 2176352.00 | 2273.00 | 350.00 |
| GMET-17-01 | 618805.87 | 2176044.47 | 2247.93 | 200.56 |
| GMET-17-02 | 618880.90 | 2176125.80 | 2250.72 | 252.37 |
| GMET-17-02A | 618880.90 | 2176125.80 | 2250.72 | 352.96 |
| GMET-17-03 | 618805.87 | 2176044.47 | 2247.93 | 301.14 |
| GMET-17-04 | 618735.40 | 2175849.70 | 2239.67 | 154.84 |
| GMET-17-05 | 618805.87 | 2176044.47 | 2247.93 | 334.67 |
| GMET-17-07 | 618759.94 | 2175980.55 | 2244.77 | 301.14 |
| GMET-17-08 | 618964.30 | 2176158.10 | 2255.24 | 346.86 |
| GMET-17-09 | 618779.10 | 2175987.80 | 2250.43 | 340.77 |
| GMET-17-10 | 618964.30 | 2176158.10 | 2255.24 | 298.09 |
| GMET-17-12A | 618880.90 | 2176125.80 | 2250.72 | 273.71 |
| GMET-17-13 | 619056.45 | 2176423.96 | 2285.90 | 322.48 |
| GMET-17-14 | 619056.45 | 2176423.96 | 2285.90 | 368.20 |
| GMET-18-15 | 618800.48 | 2176022.90 | 2249.26 | 249.33 |
| GMET-18-16 | 618800.48 | 2176022.9 | 2249.31 | 261.52 |
| GMET-18-17 | 618800.48 | 2176022.9 | 2249.31 | 298.08 |
| GT-14-001 | 617985.50 | 2177975.60 | 2546.07 | 221.89 |
| GT-14-002 | 617803.80 | 2177636.40 | 2564.02 | 34.75 |
| GT-14-003 | 617896.90 | 2177445.10 | 2546.43 | 209.70 |
| GT-14-004 | 617247.20 | 2176309.00 | 2395.95 | 227.99 |
| GT-14-005 | 617049.20 | 2177187.20 | 2423.94 | 206.65 |
| GT-14-006 | 616767.70 | 2176972.40 | 2344.96 | 157.89 |
| GT-14-007 | 618389.40 | 2175286.40 | 2231.92 | 49.99 |
| GT-14-008 | 616412.00 | 2177312.00 | 2418.19 | 206.65 |
| GT-14-009 | 617558.70 | 2178820.30 | 2520.81 | 60.66 |

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|---|---|---|---|---|
| GT-14-009A | 617558.70 | 2178820.30 | 2520.81 | 124.36 |
| GT-14-010 | 616689.00 | 2177236.80 | 2352.34 | 51.51 |
| GT-14-010A | 616689.00 | 2177236.80 | 2352.34 | 188.37 |
| GT-14-011 | 617549.50 | 2178593.10 | 2493.80 | 44.99 |
| GT-14-011A | 617549.50 | 2178593.10 | 2493.80 | 200.56 |
| GT-14-012 | 618143.20 | 2178255.70 | 2551.17 | 49.99 |
| GT-14-012A | 618143.20 | 2178255.70 | 2551.17 | 49.99 |
| GT-14-013 | 616709.60 | 2176024.20 | 2415.97 | 200.56 |
| GT-14-014 | 617722.60 | 2178069.10 | 2513.01 | 60.66 |
| GT-14-015 | 616725.00 | 2177470.00 | 2367.40 | 60.66 |
| GT-15-016 | 617405.86 | 2177106.90 | 2439.15 | 60.66 |
| GT-15-017 | 616595.96 | 2176622.39 | 2343.69 | 60.66 |
| GT-15-018 | 616174.94 | 2177518.33 | 2440.64 | 69.80 |
| GT-15-019 | 618522.25 | 2175497.89 | 2238.74 | 49.99 |
| GT-15-020 | 619390.09 | 2177297.26 | 2446.97 | 121.62 |
| GT-15-021 | 619058.00 | 2177261.00 | 2464.81 | 30.18 |
| GT-16-022 | 617530.52 | 2176651.36 | 2413.19 | 30.18 |
| GT-16-023 | 617524.91 | 2176813.43 | 2414.28 | 72.85 |
| GT-16-024 | 616964.35 | 2176128.39 | 2388.76 | 91.14 |
| GT-16-025 | 616869.96 | 2176251.99 | 2369.01 | 74.37 |
| GT-16-026 | 616657.30 | 2176283.33 | 2360.00 | 69.80 |
| GT-16-027 | 616286.98 | 2176077.59 | 2320.57 | 30.18 |
| GT-16-028 | 616453.37 | 2176211.57 | 2322.69 | 30.18 |
| GT-16-029 | 616565.88 | 2176368.06 | 2328.52 | 30.18 |
| GT-16-030 | 616434.96 | 2176573.89 | 2370.00 | 66.75 |
| GT-16-031 | 616145.33 | 2177466.39 | 2440.93 | 109.42 |
| GT-16-032 | 616130.21 | 2176797.41 | 2409.76 | 51.51 |
| GT-16-033 | 617236.05 | 2176873.09 | 2411.95 | 91.14 |
| GT-16-034 | 618135.95 | 2175509.25 | 2249.21 | 75.90 |
| MW-14-01D | 616584.16 | 2176377.98 | 2327.61 | 58.90 |
| MW-14-01S | 616579.75 | 2176368.37 | 2327.77 | 37.60 |
| MW-14-02D | 616211.97 | 2176011.81 | 2315.09 | 64.90 |
| MW-14-02S | 616199.69 | 2176005.90 | 2312.37 | 28.80 |
| MW-14-03D | 617062.60 | 2179456.16 | 2570.60 | 68.90 |
| MW-14-03S | 617068.86 | 2179467.90 | 2570.59 | 50.10 |
| MW-14-04 | 618739.67 | 2176041.37 | 2248.76 | 62.90 |
| Santa Maria | 618640.00 | 2173747.00 | 2203.95 | |
| TU-10-001 | 618734.70 | 2176006.60 | 2247.48 | 349.91 |
| TU-10-002 | 618751.50 | 2176045.20 | 2249.47 | 377.34 |
| TU-10-003 | 618726.10 | 2175977.20 | 2244.01 | 391.67 |
| TU-10-004 | 618753.70 | 2176128.70 | 2279.40 | 446.60 |
| TU-10-005 | 618753.70 | 2176128.70 | 2279.40 | 490.12 |
| TU-10-006 | 618834.80 | 2176219.10 | 2325.34 | 529.74 |
| TU-10-007 | 618777.90 | 2175748.90 | 2245.27 | 442.54 |
| TU-10-008 | 618644.40 | 2175987.60 | 2253.13 | 559.61 |
| TU-10-009 | 618646.40 | 2176057.90 | 2264.93 | 341.90 |
| TU-10-010 | 618646.60 | 2175990.60 | 2253.01 | 611.43 |
| TU-10-011 | 618790.20 | 2176155.60 | 2278.34 | 458.72 |
| TU-10-012 | 618751.50 | 2176045.20 | 2249.47 | 544.98 |
| TU-10-013 | 618790.20 | 2176155.60 | 2278.34 | 559.07 |
| TU-10-014 | 618751.50 | 2176037.40 | 2248.82 | 361.49 |

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|---|---|---|---|---|
| TU-11-015 | 618916.80 | 2176140.30 | 2252.80 | 291.39 |
| TU-11-016 | 618978.70 | 2175835.20 | 2375.32 | 480.36 |
| TU-11-017 | 618916.80 | 2176140.30 | 2252.80 | 468.78 |
| TU-11-018 | 618964.10 | 2176158.20 | 2255.19 | 302.97 |
| TU-11-019 | 618978.70 | 2175835.20 | 2375.32 | 455.98 |
| TU-11-020 | 618964.10 | 2176158.20 | 2255.19 | 356.86 |
| TU-11-021 | 619004.50 | 2176206.60 | 2256.52 | 319.43 |
| TU-11-022 | 619004.50 | 2176206.60 | 2256.52 | 392.58 |
| TU-11-023 | 618793.40 | 2175702.98 | 2244.09 | 465.12 |
| TU-11-024 | 619002.30 | 2176209.90 | 2256.23 | 389.53 |
| TU-11-025 | 619260.60 | 2176009.30 | 2383.67 | 438.42 |
| TU-11-026 | 619055.30 | 2176223.60 | 2255.61 | 319.43 |
| TU-11-027 | 619092.80 | 2176248.00 | 2257.15 | 340.46 |
| TU-11-028 | 618659.20 | 2175993.80 | 2251.83 | 282.24 |
| TU-11-029 | 618863.25 | 2176122.30 | 2247.53 | 324.31 |
| TU-11-030 | 618602.40 | 2175894.08 | 2249.74 | 230.43 |
| TU-11-031 | 618806.97 | 2176043.89 | 2248.07 | 344.12 |
| TU-11-032 | 619154.90 | 2176474.60 | 2300.35 | 356.01 |
| TU-11-033 | 618509.50 | 2176044.90 | 2288.71 | 406.60 |
| TU-11-034 | 618777.72 | 2175991.37 | 2248.84 | 316.38 |
| TU-11-035 | 618700.72 | 2176020.35 | 2249.57 | 401.12 |
| TU-11-036 | 618745.96 | 2175925.12 | 2246.09 | 166.73 |
| TU-11-037 | 618512.46 | 2175852.96 | 2268.06 | 437.69 |
| TU-11-038 | 618739.65 | 2175798.95 | 2244.44 | 285.90 |
| TU-11-039 | 618962.37 | 2176161.65 | 2254.48 | 263.04 |
| TU-11-040 | 618450.56 | 2176157.40 | 2302.28 | 198.12 |
| TU-11-041 | 619241.11 | 2176587.53 | 2331.18 | 569.37 |
| TU-11-042 | 618244.68 | 2175915.65 | 2271.17 | 639.26 |
| TU-11-043 | 619311.04 | 2176678.66 | 2379.15 | 407.82 |
| TU-11-044 | 619100.90 | 2176535.30 | 2302.84 | 276.76 |
| TU-11-045 | 618791.29 | 2175575.38 | 2230.60 | 480.36 |
| TU-11-046 | 619241.11 | 2176587.53 | 2331.18 | 301.14 |
| TU-11-047 | 619161.37 | 2176320.10 | 2267.32 | 243.23 |
| TU-11-048 | 618916.80 | 2176140.30 | 2252.80 | 365.15 |
| TU-11-049 | 619091.07 | 2175947.99 | 2414.68 | 465.12 |
| TU-11-050 | 619164.04 | 2176319.31 | 2268.44 | 304.19 |
| TU-11-051 | 618914.70 | 2176144.40 | 2252.22 | 316.38 |
| TU-11-052 | 619091.27 | 2176252.37 | 2257.54 | 167.03 |
| TU-11-053 | 618863.70 | 2176122.61 | 2247.57 | 410.87 |
| TU-11-054 | 619040.03 | 2176028.18 | 2394.97 | 471.22 |
| TU-11-055 | 619052.21 | 2176227.51 | 2255.82 | 231.04 |
| TU-11-056 | 618829.90 | 2176092.90 | 2249.24 | 392.58 |
| TU-11-057 | 618806.97 | 2176043.89 | 2248.07 | 480.97 |
| TU-11-058 | 619082.10 | 2176028.70 | 2391.42 | 187.76 |
| TU-11-059 | 618979.23 | 2175834.90 | 2375.30 | 701.34 |
| TU-11-060 | 618758.23 | 2175983.00 | 2244.51 | 176.17 |
| TU-11-061 | 618743.77 | 2175929.00 | 2245.82 | 420.01 |
| TU-11-062 | 618758.23 | 2175983.00 | 2244.51 | 292.00 |
| TU-11-063 | 618795.80 | 2175650.00 | 2239.26 | 432.21 |
| TU-11-064 | 618782.92 | 2175888.24 | 2266.08 | 285.90 |
| TU-11-065 | 618754.18 | 2175860.52 | 2246.83 | 420.01 |

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|---|---|---|---|---|
| TU-11-066 | 618979.23 | 2175834.90 | 2375.30 | 630.02 |
| TU-11-067 | 618730.44 | 2175904.32 | 2241.74 | 261.52 |
| TU-11-068 | 618803.94 | 2175953.38 | 2272.10 | 234.09 |
| TU-11-069 | 618749.80 | 2175736.77 | 2240.13 | 465.73 |
| TU-11-070 | 618832.54 | 2175999.74 | 2277.08 | 319.43 |
| TU-11-071 | 618820.83 | 2175621.36 | 2242.98 | 255.42 |
| TU-11-072 | 619022.54 | 2175897.56 | 2407.83 | 486.46 |
| TU-11-073 | 618831.73 | 2175903.59 | 2305.47 | 219.15 |
| TU-11-074 | 618819.30 | 2175495.40 | 2236.70 | 288.95 |
| TU-11-075 | 618792.10 | 2175575.61 | 2230.66 | 477.93 |
| TU-11-076 | 618851.11 | 2175958.84 | 2302.19 | 238.66 |
| TU-11-077 | 618795.50 | 2175440.40 | 2231.00 | 453.54 |
| TU-11-078 | 618877.90 | 2176036.30 | 2318.01 | 309.68 |
| TU-11-079 | 619035.90 | 2175935.80 | 2411.92 | 359.66 |
| TU-11-080 | 619795.60 | 2175994.20 | 2397.53 | 432.21 |
| TU-11-081 | 618914.14 | 2176082.10 | 2313.66 | 325.53 |
| TU-11-082 | 619035.70 | 2175937.80 | 2411.91 | 462.08 |
| TU-11-083 | 618831.60 | 2176091.70 | 2249.72 | 365.15 |
| TU-11-084 | 619302.70 | 2176484.90 | 2332.00 | 429.16 |
| TU-11-085 | 619089.90 | 2175950.80 | 2414.72 | 532.18 |
| TU-11-086 | 618914.14 | 2176082.10 | 2313.66 | 288.95 |
| TU-11-087 | 619301.40 | 2176485.60 | 2331.84 | 298.09 |
| TU-11-088 | 618831.80 | 2176091.40 | 2249.79 | 517.55 |
| TU-11-089 | 619088.50 | 2175950.10 | 2414.65 | 221.28 |
| TU-11-090 | 619240.50 | 2176626.30 | 2325.95 | 243.23 |
| TU-11-091 | 618937.70 | 2176081.90 | 2318.30 | 274.76 |
| TU-11-092 | 619091.20 | 2175948.70 | 2414.70 | 239.57 |
| TU-11-093 | 619238.90 | 2176628.90 | 2325.29 | 209.70 |
| TU-11-094 | 619198.10 | 2176586.50 | 2314.47 | 246.28 |
| TU-11-095 | 618937.70 | 2176081.90 | 2318.30 | 224.94 |
| TU-12-096 | 618883.70 | 2176125.60 | 2250.97 | 401.73 |
| TU-12-097 | 618976.78 | 2176157.83 | 2260.07 | 413.92 |
| TU-12-098 | 619235.90 | 2176510.50 | 2329.93 | 404.77 |
| TU-12-099 | 619151.20 | 2176032.30 | 2392.69 | 474.27 |
| TU-12-100 | 619235.90 | 2176510.50 | 2329.93 | 267.61 |
| TU-12-101 | 618883.70 | 2176125.60 | 2250.97 | 538.89 |
| TU-12-102 | 618964.10 | 2176158.20 | 2255.19 | 292.00 |
| TU-12-103 | 619232.80 | 2176513.50 | 2330.00 | 401.73 |
| TU-12-104 | 618964.10 | 2176158.20 | 2255.19 | 264.57 |
| TU-12-105 | 618791.30 | 2175575.40 | 2230.60 | 346.25 |
| TU-12-106 | 619235.90 | 2176510.50 | 2329.93 | 343.20 |
| TU-12-107 | 618919.10 | 2176136.80 | 2253.47 | 465.73 |
| TU-12-108 | 619040.90 | 2176208.50 | 2256.08 | 325.53 |
| TU-12-109 | 619235.90 | 2176510.50 | 2329.93 | 368.20 |
| TU-12-110 | 618450.80 | 2176157.50 | 2302.34 | 331.01 |
| TU-12-111 | 619044.60 | 2176208.50 | 2255.87 | 295.05 |
| TU-12-112 | 619000.50 | 2176193.30 | 2256.98 | 413.92 |
| TU-12-113 | 619237.70 | 2176515.40 | 2330.21 | 325.53 |
| TU-12-114 | 618510.00 | 2176047.30 | 2288.91 | 425.50 |
| TU-12-115 | 619044.60 | 2176208.50 | 2255.87 | 365.15 |
| TU-12-116 | 619299.20 | 2176482.80 | 2331.12 | 197.51 |

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| TU-12-117 | 619000.50 | 2176193.30 | 2256.98 | 307.24 |
| TU-12-118 | 618510.00 | 2176047.30 | 2288.91 | 321.87 |
| TU-12-119 | 618685.90 | 2176257.90 | 2376.51 | 615.09 |
| TU-12-120 | 618940.60 | 2176142.30 | 2254.05 | 331.62 |
| TU-12-121 | 619000.50 | 2176193.30 | 2256.98 | 267.61 |
| TU-12-122 | 618506.50 | 2175961.00 | 2278.85 | 395.02 |
| TU-12-123 | 618813.10 | 2176076.20 | 2247.68 | 356.01 |
| TU-12-124 | 618940.60 | 2176142.30 | 2254.05 | 356.01 |
| TU-12-125 | 618693.04 | 2176334.10 | 2380.83 | 404.77 |
| TU-12-126 | 618813.10 | 2176076.20 | 2247.68 | 393.19 |
| TU-12-127 | 618940.60 | 2176142.30 | 2254.05 | 420.01 |
| TU-12-128 | 618506.50 | 2175961.00 | 2278.85 | 425.50 |
| TU-12-129 | 618732.40 | 2176365.60 | 2380.58 | 444.40 |
| TU-12-130 | 618813.10 | 2176076.20 | 2247.68 | 288.95 |
| TU-12-131 | 618506.50 | 2175961.00 | 2278.85 | 431.60 |
| TU-12-132 | 618940.60 | 2176142.30 | 2254.05 | 273.71 |
| TU-12-133 | 618813.10 | 2176076.20 | 2247.68 | 261.52 |
| TU-12-134 | 618732.40 | 2176365.60 | 2380.58 | 438.30 |
| TU-12-135 | 618813.10 | 2176076.20 | 2247.68 | 438.30 |
| TU-12-136 | 618939.90 | 2176143.10 | 2253.95 | 185.32 |
| TU-12-137 | 618621.50 | 2175965.70 | 2252.61 | 331.01 |
| TU-12-138 | 618834.20 | 2176293.00 | 2361.70 | 404.77 |
| TU-12-139 | 618705.70 | 2175991.60 | 2248.16 | 349.30 |
| TU-12-140 | 619082.70 | 2176389.60 | 2275.19 | 218.85 |
| TU-12-141 | 618544.70 | 2175894.40 | 2265.29 | 362.10 |
| TU-12-142 | 618705.70 | 2175991.60 | 2248.16 | 443.79 |
| TU-12-143 | 619082.70 | 2176389.60 | 2275.19 | 200.56 |
| TU-12-144 | 618834.20 | 2176293.00 | 2361.70 | 307.24 |
| TU-12-145 | 619051.20 | 2176453.70 | 2294.88 | 441.35 |
| TU-12-146 | 618705.70 | 2175991.60 | 2248.16 | 248.72 |
| TU-12-147 | 618565.43 | 2175965.90 | 2263.74 | 296.57 |
| TU-12-148 | 618705.70 | 2175991.60 | 2248.16 | 312.72 |
| TU-12-149 | 618853.10 | 2176343.20 | 2356.78 | 340.77 |
| TU-12-150 | 618677.90 | 2175882.90 | 2243.93 | 294.44 |
| TU-12-151 | 619051.20 | 2176453.70 | 2294.88 | 392.58 |
| TU-12-152 | 618563.20 | 2176043.90 | 2272.66 | 319.43 |
| TU-12-153 | 618613.80 | 2176265.30 | 2354.68 | 334.67 |
| TU-12-154 | 618646.60 | 2175813.20 | 2242.00 | 259.38 |
| TU-12-155 | 619051.20 | 2176453.70 | 2294.88 | 380.39 |
| TU-12-156 | 618673.20 | 2175759.90 | 2240.00 | 270.05 |
| TU-12-157 | 618518.50 | 2176161.10 | 2316.38 | 423.06 |
| TU-12-158 | 618639.10 | 2175999.90 | 2254.71 | 145.69 |
| TU-12-159 | 619051.20 | 2176453.20 | 2294.77 | 371.25 |
| TU-12-160 | 618640.40 | 2175720.50 | 2240.00 | 382.83 |
| TU-12-161 | 618914.70 | 2176351.30 | 2329.54 | 282.85 |
| TU-12-162 | 619051.20 | 2176453.20 | 2294.77 | 395.63 |
| TU-12-163 | 618469.30 | 2175923.20 | 2281.00 | 432.21 |
| TU-12-164 | 618730.70 | 2176004.10 | 2247.57 | 327.96 |
| TU-12-165 | 618914.70 | 2176351.30 | 2329.54 | 407.82 |
| TU-12-166 | 619051.20 | 2176453.20 | 2294.77 | 453.54 |
| TU-12-167 | 618410.65 | 2176024.28 | 2274.72 | 487.07 |

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| TU-12-168 | 618734.10 | 2176005.90 | 2247.49 | 373.68 |
| TU-12-169 | 618946.40 | 2176414.40 | 2312.43 | 413.92 |
| TU-12-170 | 618984.30 | 2176547.10 | 2325.52 | 392.58 |
| TU-12-171 | 618435.90 | 2175974.50 | 2276.25 | 444.40 |
| TU-12-172 | 618745.60 | 2176037.90 | 2249.21 | 571.80 |
| TU-12-173 | 618946.40 | 2176414.40 | 2312.43 | 416.97 |
| TU-12-174 | 618984.30 | 2176547.10 | 2325.52 | 407.82 |
| TU-12-175 | 619001.70 | 2176403.90 | 2300.36 | 313.33 |
| TU-12-176 | 618407.50 | 2176026.90 | 2274.57 | 535.84 |
| TU-12-177 | 618604.70 | 2175820.10 | 2245.99 | 416.36 |
| TU-12-178 | 618984.30 | 2176547.10 | 2325.52 | 426.11 |
| TU-12-179 | 619001.70 | 2176403.90 | 2300.36 | 349.91 |
| TU-12-180 | 618984.30 | 2176547.10 | 2325.52 | 420.01 |
| TU-12-181 | 619001.70 | 2176403.90 | 2300.36 | 224.94 |
| TU-12-182 | 618569.60 | 2175756.10 | 2246.49 | 446.84 |
| TU-12-183 | 618408.31 | 2176025.50 | 2274.61 | 264.57 |
| TU-12-184 | 618982.70 | 2176546.50 | 2325.58 | 434.04 |
| TU-12-185 | 618408.31 | 2176025.50 | 2274.61 | 167.03 |
| TU-12-186 | 619165.43 | 2176322.56 | 2268.44 | 352.96 |
| TU-12-187 | 618408.00 | 2176026.90 | 2274.59 | 200.56 |
| TU-12-188 | 618416.10 | 2175932.00 | 2276.54 | 443.79 |
| TU-12-189 | 618404.50 | 2176024.40 | 2274.44 | 490.12 |
| TU-12-190 | 619006.00 | 2176498.30 | 2315.06 | 413.92 |
| TU-12-191 | 619165.40 | 2176319.80 | 2268.98 | 395.63 |
| TU-12-192 | 618446.00 | 2175860.50 | 2276.22 | 316.38 |
| TU-12-193 | 618427.70 | 2176204.10 | 2302.63 | 130.45 |
| TU-12-194 | 619006.00 | 2176498.30 | 2315.06 | 407.82 |
| TU-12-195 | 618427.70 | 2176204.10 | 2302.63 | 325.53 |
| TU-12-196 | 619074.90 | 2176389.50 | 2276.67 | 383.44 |
| TU-12-197 | 618423.40 | 2176205.70 | 2301.64 | 215.80 |
| TU-12-198 | 618417.50 | 2176112.00 | 2290.81 | 316.38 |
| TU-12-199 | 619006.00 | 2176498.30 | 2315.06 | 480.97 |
| TU-12-200 | 618417.50 | 2176112.00 | 2290.81 | 160.93 |
| TU-12-201 | 619074.90 | 2176389.50 | 2276.67 | 413.92 |
| TU-12-202 | 618568.40 | 2176189.60 | 2330.17 | 484.03 |
| TU-12-203 | 618414.40 | 2176115.20 | 2290.56 | 182.27 |
| TU-12-204 | 619074.90 | 2176389.50 | 2276.67 | 453.54 |
| TU-12-205 | 619002.20 | 2176499.80 | 2315.91 | 368.20 |
| TU-12-206 | 618675.70 | 2176200.30 | 2362.60 | 205.13 |
| TU-12-207 | 618565.40 | 2176189.80 | 2329.93 | 263.96 |
| TU-12-208 | 619083.80 | 2176389.60 | 2275.09 | 368.20 |
| TU-12-209 | 618675.70 | 2176200.30 | 2362.60 | 258.47 |
| TU-12-210 | 619049.20 | 2176453.30 | 2295.06 | 319.43 |
| TU-12-211 | 618703.40 | 2175953.70 | 2243.89 | 322.48 |
| TU-12-212 | 618808.70 | 2176079.40 | 2247.17 | 313.33 |
| TU-12-213 | 619214.50 | 2176220.80 | 2302.38 | 304.19 |
| TU-12-214 | 619046.70 | 2176450.80 | 2295.09 | 337.72 |
| TU-12-215 | 618948.30 | 2176416.70 | 2312.78 | 605.94 |
| TU-12-216 | 619214.50 | 2176220.80 | 2302.38 | 404.77 |
| TU-12-217 | 618808.70 | 2176079.40 | 2247.17 | 235.61 |
| TU-12-218 | 619049.78 | 2176453.73 | 2295.09 | 295.05 |

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| TU-12-219 | 619211.60 | 2176220.30 | 2302.02 | 203.61 |
| TU-12-220 | 619211.60 | 2176220.30 | 2302.02 | 282.85 |
| TU-12-221 | 618948.30 | 2176416.70 | 2312.78 | 548.03 |
| TU-12-222 | 619243.40 | 2176274.20 | 2306.80 | 200.56 |
| TU-12-223 | 618943.70 | 2176588.20 | 2339.80 | 377.34 |
| TU-12-224 | 619243.40 | 2176274.20 | 2306.80 | 371.25 |
| TU-12-225 | 619240.90 | 2176281.30 | 2306.18 | 176.17 |
| TU-12-226 | 619033.90 | 2176362.00 | 2284.93 | 590.70 |
| TU-12-227 | 619240.90 | 2176281.30 | 2306.18 | 197.51 |
| TU-12-228 | 618943.70 | 2176588.20 | 2339.80 | 398.68 |
| TU-12-229 | 619243.70 | 2176279.70 | 2307.03 | 420.01 |
| TU-12-230 | 618943.70 | 2176588.20 | 2339.80 | 477.93 |
| TU-12-231 | 619295.40 | 2176093.20 | 2338.44 | 209.70 |
| TU-12-232 | 619243.70 | 2176279.70 | 2307.03 | 416.97 |
| TU-12-233 | 619295.40 | 2176093.20 | 2338.44 | 264.57 |
| TU-12-234 | 619280.30 | 2176314.26 | 2323.09 | 154.84 |
| TU-12-235 | 618899.10 | 2176653.80 | 2344.89 | 499.26 |
| TU-12-236 | 619393.90 | 2176045.20 | 2345.02 | 252.37 |
| TU-12-237 | 619280.30 | 2176314.26 | 2323.09 | 279.81 |
| TU-12-238 | 619393.90 | 2176045.20 | 2345.02 | 313.33 |
| TU-12-239 | 619278.54 | 2176317.79 | 2323.47 | 145.69 |
| TU-12-240 | 619395.80 | 2176041.50 | 2345.42 | 316.38 |
| TU-12-241 | 619278.54 | 2176317.79 | 2323.47 | 203.61 |
| TU-12-242 | 619395.80 | 2176041.50 | 2345.42 | 237.13 |
| TU-12-243 | 619280.01 | 2176316.64 | 2323.54 | 218.85 |
| TU-12-244 | 618899.10 | 2176653.80 | 2344.89 | 413.92 |
| TU-12-245 | 619292.50 | 2176097.11 | 2336.64 | 221.89 |
| TU-12-246 | 619132.90 | 2176271.90 | 2264.59 | 325.53 |
| TU-12-247 | 619292.50 | 2176097.11 | 2336.64 | 148.74 |
| TU-13-248 | 618609.90 | 2175819.30 | 2245.51 | 508.41 |
| TU-13-249 | 619005.20 | 2176207.80 | 2256.46 | 343.81 |
| TU-13-250 | 619343.10 | 2176562.90 | 2360.98 | 267.61 |
| TU-13-251 | 619005.20 | 2176207.80 | 2256.46 | 392.58 |
| TU-13-252 | 619343.10 | 2176562.90 | 2360.98 | 319.43 |
| TU-13-253 | 618609.90 | 2175819.30 | 2245.51 | 159.41 |
| TU-13-254 | 619092.50 | 2176352.10 | 2273.00 | 413.92 |
| TU-13-255 | 619343.10 | 2176562.90 | 2360.98 | 237.13 |
| TU-13-256 | 618490.60 | 2175939.60 | 2281.00 | 441.35 |
| TU-13-257 | 619092.50 | 2176352.10 | 2273.00 | 383.44 |
| TU-13-258 | 619338.60 | 2176565.00 | 2359.28 | 325.53 |
| TU-13-259 | 619092.50 | 2176352.10 | 2273.00 | 426.11 |
| TU-13-260 | 618490.60 | 2175939.60 | 2281.00 | 468.78 |
| TU-13-261 | 619294.10 | 2176541.10 | 2334.98 | 257.56 |
| TU-13-262 | 618927.30 | 2176480.60 | 2318.30 | 444.40 |
| TU-13-263 | 619294.10 | 2176541.10 | 2334.98 | 334.98 |
| TU-13-264 | 619393.90 | 2176045.20 | 2345.02 | 425.20 |
| TU-13-265 | 618927.30 | 2176480.60 | 2318.30 | 593.75 |
| TU-13-266 | 619294.10 | 2176541.10 | 2334.98 | 322.48 |
| TU-13-267 | 619212.10 | 2176127.50 | 2325.29 | 234.09 |
| TU-13-268 | 619269.80 | 2176598.90 | 2338.83 | 377.34 |
| TU-13-269 | 619213.20 | 2176122.60 | 2328.32 | 261.52 |

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| TU-13-270 | 619429.30 | 2176595.30 | 2386.59 | 288.95 |
| TU-13-271 | 619213.10 | 2176122.60 | 2328.34 | 285.90 |
| TU-13-272 | 619269.80 | 2176598.90 | 2338.83 | 301.14 |
| TU-13-273 | 619213.20 | 2176122.60 | 2328.32 | 292.00 |
| TU-13-274 | 619429.30 | 2176595.30 | 2386.59 | 218.85 |
| TU-13-275 | 619269.80 | 2176598.90 | 2338.83 | 298.09 |
| TU-13-276 | 619326.36 | 2176662.64 | 2380.00 | 200.70 |
| TU-13-277 | 619392.20 | 2176044.40 | 2345.03 | 87.78 |
| TU-13-278 | 619306.40 | 2176485.60 | 2332.99 | 292.00 |
| TU-13-279 | 619326.36 | 2176662.64 | 2380.00 | 282.85 |
| TU-13-280 | 619306.40 | 2176485.60 | 2332.99 | 340.77 |
| TU-13-281 | 619306.40 | 2176485.60 | 2332.99 | 209.70 |
| TU-13-282 | 619326.36 | 2176662.64 | 2380.00 | 279.81 |
| TU-13-283 | 619558.60 | 2176556.30 | 2405.99 | 209.70 |
| TU-13-284 | 619327.00 | 2176663.10 | 2380.00 | 215.80 |
| TU-13-285 | 619558.60 | 2176556.30 | 2405.99 | 193.85 |
| TU-13-286 | 619552.60 | 2176557.30 | 2404.90 | 231.04 |
| TU-13-287 | 619393.70 | 2176645.40 | 2388.20 | 221.89 |
| TU-13-288 | 618555.60 | 2176341.20 | 2343.26 | 292.00 |
| TU-13-289 | 619393.70 | 2176645.40 | 2388.20 | 243.23 |
| TU-13-290 | 618526.50 | 2176246.50 | 2336.24 | 401.73 |
| TU-13-291 | 619386.30 | 2176743.80 | 2360.40 | 227.99 |
| TU-13-292 | 618523.80 | 2176244.30 | 2335.85 | 499.26 |
| TU-13-293 | 619386.30 | 2176743.80 | 2360.40 | 139.60 |
| TU-13-294 | 619384.80 | 2176741.50 | 2360.40 | 167.03 |
| TU-13-295 | 619384.80 | 2176741.50 | 2360.40 | 290.78 |
| TU-13-296 | 619384.80 | 2176741.50 | 2360.40 | 200.56 |
| TU-13-297 | 618423.50 | 2176206.60 | 2301.67 | 474.88 |
| TU-13-298 | 619384.80 | 2176741.50 | 2360.40 | 282.85 |
| TU-13-299 | 619407.10 | 2176807.40 | 2358.20 | 154.84 |
| TU-13-300MET | 618505.90 | 2176041.03 | 2288.64 | 75.59 |
| TU-13-301MET | 619242.70 | 2176277.30 | 2306.62 | 145.69 |
| TU-13-302 | 619407.10 | 2176807.40 | 2358.20 | 170.08 |
| TU-13-303MET | 618808.30 | 2176044.00 | 2248.30 | 264.57 |
| TU-13-304 | 619407.10 | 2176807.40 | 2358.20 | 96.93 |
| TU-13-305 | 619407.10 | 2176807.40 | 2358.20 | 118.26 |
| TU-13-306 | 618890.30 | 2176135.40 | 2251.05 | 200.56 |
| TU-13-307 | 619407.10 | 2176807.40 | 2358.20 | 398.68 |
| TU-13-308 | 619010.90 | 2176472.30 | 2309.36 | 441.35 |
| TU-13-309 | 618890.30 | 2176135.40 | 2251.05 | 337.72 |
| TU-13-310 | 619326.58 | 2176221.67 | 2355.81 | 240.18 |
| TU-13-311 | 619010.90 | 2176472.00 | 2309.20 | 420.01 |
| TU-13-312 | 619328.02 | 2176218.23 | 2355.64 | 221.89 |
| TU-13-313 | 618847.70 | 2176108.90 | 2249.81 | 212.75 |
| TU-13-314 | 619328.02 | 2176218.23 | 2355.64 | 246.28 |
| TU-13-315 | 619010.90 | 2176472.30 | 2309.36 | 383.44 |
| TU-13-316 | 618847.70 | 2176108.90 | 2249.81 | 267.61 |
| TU-13-317 | 619328.04 | 2176220.10 | 2355.91 | 307.24 |
| TU-13-318 | 618829.70 | 2176092.00 | 2249.25 | 197.51 |
| TU-13-319 | 619010.90 | 2176472.00 | 2309.20 | 334.67 |
| TU-13-320 | 619328.02 | 2176218.23 | 2355.64 | 206.65 |

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| TU-13-321 | 618911.97 | 2176142.43 | 2252.37 | 227.99 |
| TU-13-322 | 619338.50 | 2176311.50 | 2357.41 | 191.41 |
| TU-13-323MET | 619006.80 | 2176499.40 | 2314.77 | 377.34 |
| TU-13-324 | 618950.00 | 2176147.00 | 2254.00 | 218.85 |
| TU-13-325 | 618950.00 | 2176147.00 | 2254.00 | 243.23 |
| TU-13-326 | 619338.50 | 2176311.50 | 2357.41 | 209.70 |
| TU-13-327 | 619338.50 | 2176311.50 | 2357.41 | 185.32 |
| TU-13-328 | 618982.60 | 2176522.90 | 2322.36 | 374.29 |
| TU-13-329 | 619338.50 | 2176311.50 | 2357.41 | 209.70 |
| TU-13-330 | 618982.30 | 2176187.20 | 2256.37 | 234.09 |
| TU-13-331 | 619387.90 | 2176281.00 | 2385.68 | 197.51 |
| TU-13-332 | 618982.60 | 2176522.90 | 2322.36 | 356.01 |
| TU-13-333 | 618982.30 | 2176187.20 | 2256.37 | 267.61 |
| TU-13-334 | 619387.90 | 2176281.00 | 2385.68 | 224.94 |
| TU-13-335 | 619387.90 | 2176281.00 | 2385.68 | 231.04 |
| TU-13-336 | 618982.60 | 2176522.90 | 2322.36 | 368.20 |
| TU-13-337 | 619019.90 | 2176205.90 | 2257.78 | 200.56 |
| TU-13-338 | 619387.90 | 2176281.00 | 2385.68 | 234.09 |
| TU-13-339 | 619019.90 | 2176205.90 | 2257.78 | 246.28 |
| TU-13-340MET | 619328.04 | 2176220.10 | 2355.91 | 60.35 |
| TU-13-341MET | 619326.60 | 2176221.50 | 2355.79 | 151.79 |
| TU-13-342 | 619059.40 | 2176426.30 | 2286.13 | 371.25 |
| TU-13-343 | 619019.90 | 2176205.90 | 2257.78 | 231.04 |
| TU-13-344 | 619083.42 | 2176029.75 | 2391.26 | 243.23 |
| TU-13-345 | 619408.90 | 2176341.60 | 2406.91 | 206.65 |
| TU-13-346 | 619019.90 | 2176205.90 | 2257.78 | 227.99 |
| TU-13-347 | 619059.40 | 2176426.30 | 2286.13 | 365.15 |
| TU-13-348 | 619408.90 | 2176341.60 | 2406.91 | 215.80 |
| TU-13-349 | 619134.70 | 2176035.00 | 2392.53 | 259.69 |
| TU-13-350 | 619408.90 | 2176341.60 | 2406.91 | 276.76 |
| TU-13-351 | 618771.70 | 2176041.40 | 2245.15 | 279.81 |
| TU-13-352 | 619059.40 | 2176426.30 | 2286.13 | 346.86 |
| TU-13-353 | 619134.70 | 2176035.00 | 2392.53 | 199.64 |
| TU-13-354 | 618771.70 | 2176041.40 | 2245.15 | 313.33 |
| TU-13-355 | 619059.40 | 2176426.30 | 2286.13 | 349.00 |
| TU-13-356 | 619408.90 | 2176341.60 | 2406.91 | 255.42 |
| TU-13-357 | 619134.70 | 2176035.00 | 2392.53 | 310.29 |
| TU-13-358 | 619408.90 | 2176341.60 | 2406.91 | 313.33 |
| TU-13-359 | 618771.70 | 2176041.40 | 2245.15 | 200.56 |
| TU-13-360 | 618982.90 | 2176389.60 | 2302.25 | 279.81 |
| TU-13-361 | 619134.70 | 2176035.00 | 2392.53 | 298.09 |
| TU-13-362 | 618771.70 | 2176041.40 | 2245.15 | 246.28 |
| TU-13-363 | 619456.80 | 2176366.00 | 2419.38 | 212.75 |
| TU-13-364 | 618982.90 | 2176389.60 | 2302.25 | 252.37 |
| TU-13-365 | 619457.90 | 2176362.50 | 2419.70 | 243.23 |
| TU-13-366 | 618771.70 | 2176041.40 | 2245.15 | 157.58 |
| TU-13-367 | 618982.90 | 2176389.60 | 2302.25 | 322.48 |
| TU-13-368 | 619194.10 | 2176027.40 | 2392.22 | 322.48 |
| TU-13-369 | 619457.90 | 2176364.30 | 2419.65 | 362.10 |
| TU-13-370 | 618801.10 | 2176022.90 | 2249.65 | 342.29 |
| TU-13-371 | 618918.70 | 2176381.20 | 2322.98 | 346.86 |

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|---|---|---|---|---|
| TU-13-372 | 619194.10 | 2176027.40 | 2392.22 | 288.95 |
| TU-13-373MET | 618801.00 | 2176024.30 | 2249.24 | 319.43 |
| TU-13-374 | 619562.90 | 2176432.70 | 2445.26 | 270.66 |
| TU-13-375 | 618964.10 | 2176158.20 | 2255.19 | 258.47 |
| TU-13-376 | 619059.20 | 2175862.20 | 2396.69 | 447.45 |
| TU-13-377 | 619562.90 | 2176432.70 | 2445.26 | 316.38 |
| TU-13-378 | 618801.00 | 2176024.30 | 2249.24 | 212.75 |
| TU-13-379 | 618964.10 | 2176158.20 | 2255.19 | 151.79 |
| TU-13-380 | 618760.35 | 2175981.43 | 2244.79 | 234.09 |
| TU-13-381 | 618698.00 | 2175921.90 | 2242.82 | 182.27 |
| TU-13-382 | 619264.17 | 2176491.06 | 2327.64 | 170.08 |
| TU-13-383 | 618698.00 | 2175921.90 | 2242.82 | 151.79 |
| TU-13-384 | 618760.80 | 2175980.78 | 2244.84 | 151.79 |
| TU-13-385 | 619261.40 | 2176493.20 | 2327.99 | 285.90 |
| TU-13-386 | 618735.40 | 2175849.70 | 2239.67 | 163.98 |
| TU-13-387 | 618778.70 | 2175991.00 | 2249.29 | 298.09 |
| TU-13-388 | 619116.80 | 2175832.30 | 2390.29 | 420.01 |
| TU-13-389 | 618755.40 | 2175859.30 | 2247.13 | 151.79 |
| TU-13-390 | 619226.40 | 2176543.40 | 2330.64 | 252.37 |
| TU-13-391 | 618755.40 | 2175859.30 | 2247.13 | 142.65 |
| TU-13-392 | 618778.70 | 2175991.00 | 2249.29 | 188.37 |
| TU-13-393 | 618731.20 | 2175905.00 | 2241.88 | 204.52 |
| TU-13-394 | 619226.40 | 2176543.30 | 2330.64 | 234.09 |
| TU-13-395 | 618746.10 | 2175926.10 | 2246.18 | 234.09 |
| TU-13-396MET | 619226.40 | 2176543.30 | 2330.64 | 206.65 |
| TU-13-397 | 618644.05 | 2175732.88 | 2240.19 | 386.49 |
| TU-13-398 | 618542.10 | 2175897.50 | 2266.19 | 383.44 |
| TU-13-399 | 619148.90 | 2175939.50 | 2425.08 | 261.52 |
| TU-13-400 | 619198.10 | 2176586.10 | 2314.56 | 240.18 |
| TU-13-401 | 619198.10 | 2176586.10 | 2314.56 | 243.23 |
| TU-13-402 | 618409.17 | 2176028.57 | 2274.64 | 401.73 |
| TU-13-403 | 618833.60 | 2176836.90 | 2363.00 | 608.99 |
| TU-13-404 | 619198.20 | 2176586.20 | 2314.56 | 270.66 |
| TU-13-405 | 619214.15 | 2176123.00 | 2328.01 | 252.37 |
| TU-13-406 | 619149.20 | 2176033.00 | 2392.64 | 197.51 |
| TU-13-407 | 619196.60 | 2175488.90 | 2312.34 | 369.72 |
| TU-13-408 | 618834.70 | 2176833.20 | 2362.78 | 426.11 |
| TU-13-409 | 619149.20 | 2176033.00 | 2392.64 | 246.28 |
| TU-13-410 | 619214.15 | 2176123.00 | 2328.01 | 288.95 |
| TU-13-411 | 619084.10 | 2176030.50 | 2391.19 | 224.94 |
| TU-13-412 | 619199.10 | 2175486.90 | 2312.34 | 325.53 |
| TU-14-413 | 619058.35 | 2176422.70 | 2284.68 | 334.67 |
| TU-14-414 | 619058.35 | 2176422.70 | 2284.68 | 343.81 |
| TU-14-415 | 619050.94 | 2176455.30 | 2295.21 | 322.48 |
| TU-14-416 | 619313.75 | 2176680.90 | 2379.14 | 209.70 |
| TU-14-417 | 619313.75 | 2176680.90 | 2379.14 | 200.56 |
| TU-14-418 | 619261.88 | 2176489.60 | 2327.33 | 304.19 |
| TU-14-419 | 619268.19 | 2176598.00 | 2338.26 | 218.85 |
| TU-14-420 | 619268.19 | 2176598.00 | 2338.26 | 231.04 |
| TU-14-421 | 619228.24 | 2176542.50 | 2330.74 | 182.27 |
| TU-14-422 | 618800.48 | 2176022.90 | 2249.30 | 276.76 |

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|---|---|---|---|---|
| TU-14-423 | 619244.17 | 2176278.60 | 2306.97 | 156.67 |
| TU-14-424 | 619392.60 | 2176045.50 | 2344.91 | 493.17 |
| TU-14-425 | 618824.70 | 2175618.40 | 2243.40 | 310.29 |
| TU-14-426 | 619448.70 | 2175866.80 | 2370.63 | 501.70 |
| TU-14-427 | 618841.90 | 2175570.30 | 2244.28 | 252.37 |
| TU-14-428 | 618795.00 | 2175700.90 | 2244.12 | 255.42 |
| TU-14-429 | 619214.00 | 2175773.00 | 2367.54 | 501.70 |
| TU-14-430 | 618485.00 | 2176612.80 | 2386.08 | 349.91 |
| TU-14-431 | 618483.70 | 2176612.50 | 2386.00 | 349.91 |
| TU-14-432 | 619212.10 | 2175771.30 | 2367.46 | 294.44 |
| TU-14-433 | 619126.50 | 2175570.00 | 2322.67 | 502.31 |
| TU-14-434 | 618489.80 | 2176609.70 | 2386.08 | 252.37 |
| TU-14-435 | 618489.80 | 2176609.70 | 2386.08 | 322.48 |
| TU-14-436 | 619740.20 | 2175937.70 | 2390.72 | 544.98 |
| TU-14-437 | 619002.50 | 2177254.10 | 2463.56 | 543.00 |
| TU-14-438 | 619150.40 | 2175936.60 | 2425.48 | 453.54 |
| TU-14-439 | 619077.70 | 2177139.10 | 2456.64 | 520.60 |
| TU-14-440 | 619413.10 | 2175488.20 | 2324.16 | 310.29 |
| TU-14-441 | 620322.30 | 2176936.90 | 2507.18 | 351.13 |
| TU-14-442 | 619077.70 | 2177139.10 | 2456.64 | 349.91 |
| TU-14-443 | 619076.10 | 2177137.40 | 2456.26 | 154.23 |
| TU-14-444 | 620322.30 | 2176936.90 | 2507.18 | 310.29 |
| TU-14-445 | 618662.30 | 2176518.60 | 2397.96 | 395.63 |
| TU-14-446 | 618665.20 | 2176398.60 | 2390.00 | 551.08 |
| TU-14-447 | 619263.96 | 2176006.00 | 2383.64 | 279.81 |
| TU-14-448 | 619715.20 | 2175888.90 | 2390.74 | 346.86 |
| TU-14-449 | 619082.76 | 2176820.38 | 2395.64 | 328.57 |
| TU-15-450 | 619125.32 | 2176655.55 | 2351.65 | 266.70 |
| TU-15-451 | 619124.00 | 2176655.65 | 2351.18 | 274.62 |
| TU-15-452 | 619120.11 | 2176709.10 | 2368.23 | 234.09 |
| TU-15-453 | 619120.12 | 2176709.11 | 2368.23 | 301.14 |
| TU-15-454 | 618522.43 | 2175499.34 | 2238.78 | 418.89 |
| TU-15-455 | 618800.48 | 2176022.90 | 2249.30 | 316.38 |
| TU-15-456 | 619226.40 | 2176543.30 | 2330.64 | 231.04 |
| TU-15-457 | 618800.48 | 2176022.90 | 2249.30 | 261.52 |
| TU-15-458 | 619226.40 | 2176543.30 | 2330.64 | 243.23 |
| TU-15-459 | 619244.17 | 2176278.60 | 2306.97 | 179.22 |
| TU-15-460 | 618813.24 | 2176076.15 | 2247.70 | 282.85 |
| TU-15-461 | 619244.17 | 2176278.60 | 2306.97 | 151.79 |
| TU-16-318A | 618830.12 | 2176092.04 | 2249.33 | 371.25 |
| TU-16-462 | 618830.96 | 2176092.86 | 2249.48 | 304.19 |
| TU-16-463 | 618831.49 | 2176091.92 | 2249.67 | 505.36 |
| TU-16-464 | 618830.06 | 2176092.77 | 2249.27 | 313.33 |
| TU-16-465 | 618829.84 | 2176092.44 | 2249.23 | 365.15 |
| TU-16-466 | 618702.17 | 2175993.78 | 2248.41 | 398.68 |
| TU-16-467 | 618888.88 | 2176133.89 | 2251.00 | 389.53 |
| TU-16-468 | 618888.88 | 2176133.89 | 2251.00 | 298.09 |
| TU-16-469 | 618888.88 | 2176133.89 | 2251.00 | 362.10 |
| TU-16-470 | 618888.88 | 2176133.89 | 2251.00 | 285.90 |
| TU-16-471 | 618801.00 | 2176022.00 | 2249.92 | 346.86 |
| TU-16-472 | 618888.88 | 2176133.89 | 2251.00 | 322.48 |

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|---|---|---|---|---|
| TU-16-473 | 618801.00 | 2176022.00 | 2249.92 | 320.34 |
| TU-16-474 | 618801.00 | 2176022.00 | 2249.92 | 325.53 |
| TU-16-475 | 618916.80 | 2176140.30 | 2252.80 | 325.53 |
| TU-16-476 | 618914.38 | 2176144.01 | 2252.26 | 313.94 |
| TU-16-477 | 618803.13 | 2176077.89 | 2246.74 | 313.33 |
| TU-16-478 | 618940.24 | 2176143.07 | 2253.96 | 301.95 |
| TU-16-479 | 618803.13 | 2176077.89 | 2246.74 | 331.62 |
| TU-16-480 | 618940.24 | 2176143.07 | 2253.96 | 307.24 |
| TU-16-481 | 618803.13 | 2176077.89 | 2246.74 | 325.53 |
| TU-16-482 | 618964.30 | 2176158.12 | 2255.25 | 307.24 |
| TU-16-483 | 618838.47 | 2176099.36 | 2250.40 | 295.05 |
| TU-16-484 | 618982.30 | 2176187.10 | 2256.38 | 273.71 |
| TU-16-485 | 618838.47 | 2176099.36 | 2250.40 | 277.37 |
| TU-16-486 | 618982.30 | 2176187.10 | 2256.38 | 273.71 |
| TU-16-487 | 618883.70 | 2176125.60 | 2250.97 | 307.24 |
| TU-16-488 | 618982.30 | 2176187.10 | 2256.38 | 331.62 |
| TU-16-489 | 618880.88 | 2176125.79 | 2250.72 | 240.18 |
| TU-16-490 | 618984.02 | 2176185.09 | 2256.63 | 270.66 |
| TU-16-491 | 618880.88 | 2176125.79 | 2250.72 | 292.00 |
| TU-16-492 | 619003.57 | 2176203.54 | 2256.65 | 295.05 |
| TU-16-493 | 619018.60 | 2176210.23 | 2257.16 | 221.89 |
| TU-17-125A | 618693.03 | 2176334.38 | 2380.90 | 560.22 |
| TU-17-129A | 618731.30 | 2176363.28 | 2380.17 | 557.17 |
| TU-17-149A | 618852.97 | 2176344.65 | 2356.86 | 523.65 |
| TU-17-494 | 619018.62 | 2176210.36 | 2257.15 | 267.61 |
| TU-17-495 | 618687.30 | 2176260.64 | 2376.92 | 508.41 |
| TU-17-496 | 619018.62 | 2176210.36 | 2257.15 | 215.80 |
| TU-17-497 | 619018.62 | 2176210.36 | 2257.15 | 322.48 |
| TU-17-498 | 619041.22 | 2176207.11 | 2256.96 | 179.22 |
| TU-17-499 | 618693.03 | 2176334.38 | 2380.90 | 502.31 |
| TU-17-500 | 619042.49 | 2176206.49 | 2257.07 | 26.82 |
| TU-17-501 | 618098.27 | 2175860.18 | 2267.80 | 145.39 |
| TU-17-502 | 617946.75 | 2176059.42 | 2300.98 | 499.26 |
| TU-17-503 | 617946.75 | 2176059.42 | 2300.98 | 465.73 |
| TU-17-504 | 618794.84 | 2176338.56 | 2373.58 | 465.73 |
| TU-17-505 | 617947.60 | 2176063.24 | 2301.10 | 154.84 |
| TU-17-506 | 617210.55 | 2175118.94 | 2443.97 | 292.00 |
| TU-17-507 | 617210.55 | 2175118.94 | 2443.97 | 395.63 |
| TU-17-508 | 618852.90 | 2176344.00 | 2356.88 | 529.74 |
| TU-17-509 | 618746.00 | 2175925.10 | 2246.10 | 173.13 |
| TU-17-510 | 618741.27 | 2176032.51 | 2248.94 | 434.04 |
| TU-17-511 | 618880.90 | 2176125.80 | 2250.72 | 313.33 |
| TU-17-512 | 618753.70 | 2176128.70 | 2279.40 | 490.12 |
| TU-17-513 | 618880.90 | 2176125.80 | 2250.72 | 371.25 |
| TU-17-514 | 618753.70 | 2176128.70 | 2279.40 | 441.35 |
| TU-17-515 | 619401.46 | 2175651.52 | 2348.00 | 484.02 |
| TU-17-516 | 619434.85 | 2175739.21 | 2359.50 | 502.31 |
| TU-17-517 | 618794.84 | 2176338.56 | 2373.58 | 200.56 |
| TU-17-518 | 618794.84 | 2176338.56 | 2373.58 | 203.61 |
| TU-17-519 | 619594.88 | 2175833.15 | 2382.00 | 544.98 |
| TU-17-520 | 618820.73 | 2176349.00 | 2370.26 | 200.56 |

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|---|---|---|---|---|
| TU-17-521 | 618820.73 | 2176349.00 | 2370.26 | 200.56 |
| TU-17-522 | 618820.73 | 2176349.00 | 2370.26 | 200.56 |
| TU-17-523 | 618788.81 | 2175447.54 | 2230.58 | 502.31 |
| TU-17-524 | 618820.73 | 2176349.00 | 2370.26 | 200.56 |
| TU-17-525 | 618852.90 | 2176344.00 | 2356.90 | 200.56 |
| TU-17-526 | 618852.90 | 2176344.00 | 2356.90 | 200.56 |
| TU-17-527 | 619474.21 | 2175579.46 | 2348.29 | 438.50 |
| TU-17-528 | 618852.90 | 2176344.00 | 2356.90 | 200.56 |
| TU-17-529 | 619415.88 | 2175458.92 | 2318.91 | 395.63 |
| TU-17-530 | 616925.98 | 2175017.39 | 2439.55 | 410.87 |
| TU-17-531 | 616925.98 | 2175017.39 | 2439.55 | 274.32 |
| TU-17-532 | 619011.80 | 2176471.73 | 2309.28 | 477.93 |
| TU-17-533 | 616925.98 | 2175017.39 | 2439.55 | 234.09 |
| TU-18-534 | 616926.00 | 2175016.20 | 2439.47 | 404.77 |
| TU-18-535 | 619011.80 | 2176471.73 | 2309.28 | 560.22 |
| TU-18-536 | 616926.04 | 2175016.00 | 2439.47 | 391.97 |
| TU-18-537 | 619007.09 | 2176499.87 | 2314.65 | 377.34 |
| TU-18-538 | 616728.67 | 2174997.40 | 2419.43 | 593.75 |
| TU-18-539 | 616728.67 | 2174997.40 | 2419.43 | 352.04 |
| TU-18-540 | 618800.48 | 2176022.90 | 2249.26 | 386.49 |
| TU-18-541 | 616870.09 | 2175372.25 | 2418.76 | 587.65 |
| TU-18-542 | 616870.09 | 2175372.25 | 2418.76 | 395.63 |
| TU-18-543 | 619265.63 | 2176286.34 | 2313.4 | 194.46 |
| TU-18-544 | 619265.63 | 2176286.34 | 2313.4 | 270.66 |
| TU-18-545 | 619265.63 | 2176286.34 | 2313.4 | 103.02 |
| TU-18-546 | 619243.4 | 2176274.2 | 2306.54 | 249.33 |
| TU-18-547 | 619219.38 | 2176282.68 | 2300.16 | 246.28 |
| TU-18-548 | 619219.38 | 2176282.68 | 2300.16 | 170.08 |
| TU-18-549 | 619219.38 | 2176282.68 | 2300.16 | 157.89 |
| TU-18-550 | 619219.38 | 2176282.68 | 2300.16 | 170.08 |
| TZ-12-001 | 616201.40 | 2175374.70 | 2360.11 | 349.91 |
| TZ-12-002 | 616200.50 | 2175375.30 | 2360.22 | 377.34 |
| TZ-12-003 | 616304.20 | 2174967.40 | 2301.44 | 197.51 |
| TZ-12-004 | 616303.30 | 2174966.70 | 2301.31 | 200.56 |
| TZ-12-005 | 616304.50 | 2174967.90 | 2301.49 | 249.33 |
| TZ-16-006 | 616202.30 | 2175380.66 | 2360.40 | 490.12 |
| WW-13-001 | 618662.40 | 2175698.20 | 2238.59 | 215.80 |
| WW-13-002 | 618659.10 | 2175920.60 | 2246.76 | 407.82 |
| WW-13-003 | 619091.80 | 2176350.90 | 2273.00 | 401.73 |
| WW-13-004 | 618958.96 | 2176148.12 | 2255.22 | 401.73 |
| WW-13-005 | 618432.80 | 2174984.20 | 2222.02 | 352.96 |
| WW-13-006 | 618549.80 | 2175398.30 | 2234.55 | 151.18 |
| WW-13-007 | 618614.10 | 2175210.60 | 2225.47 | 221.89 |

## SIGNATURE

The Registrant hereby certifies that it meets all of the requirements for filing on Form 20-F and that it has duly caused and authorized the undersigned to sign this Annual Report on its behalf.

Almaden Minerals Ltd.
Registrant

Dated: April 28, 2022

By /s/Morgan Poliquin
Morgan Poliquin, CEO