Volcan Project

NI 43-101 Technical Report on Preliminary Economic Assessment

Tierra Amarilla, Atacama Region, Chile

Effective Date: March 15, 2023

Prepared for:
Tiernan Gold Corporation
666 Burrard Street, suite 1700,
Vancouver BC, V6C2X8, Canada

Prepared by:
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List of Qualified Persons:

- Francisco Castillo, B.Sc., RM CMC, Ausenco
- Scott Elfen, P.E., Ausenco
- James Millard, P.Geo., Ausenco
- Kevin Murray, P.Eng., Ausenco
- Bruno Yoshida Tomaselli, FAusIMM, Deswik
- Alan J. San Martin, MAusIMM(CP), Micon
- William J Lewis, B.Sc., P.Geo., Micon

CERTIFICATE OF QUALIFIED PERSON
Francisco Castillo Merlez, B.Sc., RM CMC

I, Francisco Castillo Merlez, Mining Engineer, certify that I am employed as a Principal Resources Engineer with Ausenco Chile Ltda. ("Ausenco"), with an office address of Av. Las Condes 11283, Las Condes, Santiago.

1. This certificate applies to the technical report titled "Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile," (the "Technical Report") prepared for Tiernan Gold Corporation (the "Company"), with an effective date of March 15, 2023 (the "Effective Date").
2. I graduated from the University of Santiago de Chile in 2011 with a Bachelor of Engineering Science in Mining Engineering.
3. I am a Competent Person registered with the Chilean Mining Commission Member number 0179.
4. I have practiced my profession for 20 years. I have been directly involved mineral resource and reserves estimation, operation and construction of mine, and mining project evaluations for copper, gold, silver, iron in numerous countries. Previous projects that I have worked with that have similar Infrastructure features to the Volcan Project are the Marimaca Project and the Aclara Project, both located in Chile.
5. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.
6. I visited the Volcan Project site between November 29 and 30, 2022 for a visit duration of 2 days. I also visited the Volcan Project site on March 3, 2023 for a visit duration of 1 day.
7. I am responsible for sections 4 and 5, and sub-sections 1.3, 1.13, 1.18, 1.19, 4, 5, 18.1, 18.2, 18.5, 18.7 to 18.8, 18.9.5 to 18.14, 25.2, 25.9, 25.15, and 27 of the Technical Report.
8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
9. I have had no previous involvement with the Volcan Project.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

"Signed and sealed"

Francisco Castillo Merlez, Competent Person in Mining Resources and Reserves No. 0179.

CERTIFICATE OF QUALIFIED PERSON

Scott C. Elfen, P.E.

I, Scott C. Elfen, P.E., certify that I am employed as the Global Lead Geotechnical and Civil Services of Ausenco Engineering Canada Inc. ("Ausenco"), with an office address of 855 Homer Street, Vancouver, BC V6B 2W2, Canada.

1. This certificate applies to the technical report titled, "Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile," (the "Technical Report") prepared for Tiernan Gold Corporation (the "Company"), with an effective date of March 15, 2023 (the "Effective Date").
2. I graduated from the University of California, Davis, CA, in 1991 with Bachelor of Science degree in Civil Engineering (Geotechnical).
3. I am a Registered Civil Engineer in the State of California (No. C56527) by exam since 1996 and I am also a member in good standing of the American Society of Civil Engineers (ASCE), and the Society for Mining, Metallurgy & Exploration (SME).
4. I have practiced my profession continuously for 28 years. I have been directly involved in geotechnical, civil, hydrological, and environmental aspects for the development of mining projects; including feasibility studies on numerous underground and open pit base metal and precious metal deposits in North America, Central and South America, Africa and Australia.
5. I have practiced my profession continuously for 28 years with experience in the development, design, construction and operations of mine waste storage facilities, such as waste rock storage facilities and tailings storage facilities, and heap leach facilities focusing on precious and base metals, both domestic and international. In addition, I have developed geotechnical and civil design parameters for pit slope design, plant foundation design, heap leach facilities and other supporting infrastructure. Examples of projects I have worked on include: Barrick Gold's Pierina Gold Mine (Peru) detail design of phases 1 through 7 leach pad, Filo Mining's Filo Copper-Gold-Silver Project PFS on-off and static leach pads, Project BHP's Escondida Copper Mine (Chile) detail design of the sulfide leach pads, and Charaat's Tulkubash Gold Project FS design of leach pad.
6. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.
7. I have not visited the Volcan Project.
8. I am responsible for sub-sections 1.13, 18.6, 25.9, 25.15, and 27 of the Technical Report.
9. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
10. I have had no previous involvement with Volcan Project.
11. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

"Signed and sealed"

Scott Elfen, P.E.

CERTIFICATE OF QUALIFIED PERSON
James Millard, P. Geo.

I, James Millard, P. Geo., certify that I am employed as a Director, Strategic Projects with Ausenco Sustainability Inc ("Ausenco"), with an office address of Suite 100, 2 Ralston Avenue, Darthmouth, NS B3B 1H7, Canada.

1. This certificate applies to the technical report titled "Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile," (the "Technical Report") prepared for Tiernan Gold Corporation (the "Company"), with an effective date of March 15, 2023 (the "Effective Date").
2. I graduated from Brock University in St. Catharines, Ontario in 1986 with a Bachelor of Science in Geological Sciences, and from Queen's University in Kingston, Ontario in 1995 with a Master of Science in Environmental Engineering.
3. I am a member (P. Geo.) of the Association of Professional Geoscientists of Nova Scotia, Membership No. 021.
4. I have practiced my profession for 25 years. I have worked for mid- and large-size mining companies where I have acted in senior technical and management roles, in senior environmental consulting roles, and provided advise and/or expertise. These key areas include: feasibility-level study reviews; NI 43-101 report writing and review; due diligence review of environmental, social, and governance areas for proposed mining operations and acquisitions, and directing environmental impact assessments and permitting applications to support construction, operations, and closure of mining projects. In addition to the above, I have been responsible for conducting baseline data assessments, surface and groundwater quantity and quality studies, mine rock geochemistry and water quality predictions, mine reclamation and closure plan development, and community stakeholder and Indigenous peoples' engagement initiatives. Recently, I acted in the following project roles: Qualified Person for the environmental/sustainability aspects for Puquios Project, Feasibility Study Report, La Higuera, Coquimbo Region, Chile; Principal author for the environmental/sustainability sections for the Kwanika-Stardust Project, NI 43-101 Technical Report and, Preliminary Economic Assessment, British Columbia, Canada; and Expert Advisor on regulatory matters and sustainability aspects for the Preliminary Economic Assessment for the Indin Lake Gold Project, Northwest Territories, Canada.
5. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.
6. I have not visited the Volcan Project site.
7. I am responsible for section 20 and sub-sections 1.15, 1.18, 1.19, 25.10, 25.14.1.5, 25.14.2.3, 25.15, 26.4, 26.5, and 27 of the Technical Report. For the purpose of those sections, and as outlined in Section 2.6, I have fully relied on information supplied by Gestaciones Ambientales Consultores (GAC) regarding environmental studies, environmental permitting, other permitting, closure planning and related cost estimation, and social and community impacts.
8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
9. I have had no previous involvement with the Volcan Project.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

"Signed and sealed"
James Millard, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

Kevin Murray, P. Eng.

I, Kevin Murray, P. Eng., certify that I am employed as a Manager Process Engineering with Ausenco Engineering Canada Inc. (“Ausenco”), with an office address of 1050 West Pender Street, Suite 1200, Vancouver, BC Canada, V6E 3S7.

1. This certificate applies to the technical report titled, “Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile” (the “Technical Report”) prepared for Tiernan Gold Corporation (the “Company”), with an effective date of March 15, 2023 (the “Effective Date”).
2. I graduated from the University of New Brunswick, Fredericton NB, in 1995 with a Bachelor of Science in Chemical Engineering.
3. I am a member in good standing of Engineers and Geoscientists British Columbia, License# 32350, and Northwest Territories Association of Professional Engineers and Geoscientists’ Registration# L4940.
4. I have practiced my profession for 22 years. I have been directly involved in all levels of engineering studies from preliminary economic analysis (PEA) to feasibility studies including being a Qualified Person for flotation projects including Ero Copper Corp.’s Boa Esperança Feasibility Study and NorZinc Ltd.’s Prairie Creek PEA as well as for Cerro Negro gold/ silver leach operation. I have been directly involved with test work and flowsheet development from preliminary testing through to detailed design and construction including my direct experience at Red Lake Gold Mine, Porcupine Gold Mine and Éléonore Gold mine while working for Goldcorp/Newmont.
5. I have read the definition of “Qualified Person” set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects (“NI 43-101”) and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for those sections of the Technical Report that I am responsible for preparing.
6. I have not visited the Volcan Project.
7. I am responsible for sections 2, 3, 13, 17, 19, 22, 24, and sub-sections 1.1, 1.2, 1.9, 1.12, 1.14, 1.17 to 1.19, 21.1 to 21.2.3, 21.2.3.2 to 21.2.6, 21.2.6.2 to 21.3.1, 21.3.3, 21.3.4, 25.1, 25.5, 25.8, 25.11 to 25.13, 25.14.1.3, 25.14.1.4, 25.14.2.2, 25.15, 26.3, 26.5, 27 of the Technical Report.
8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
9. I have had no previous involvement with the Volcan Project.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

“Signed and sealed”

Kevin Murray, P. Eng.

CERTIFICATE OF QUALIFIED PERSON
Bruno Yoshida Tomaselli, FAusIMM

I, Bruno Yoshida Tomaselli, FAusIMM, certify that I am employed as a Consulting Manager with Deswik Brazil ("Deswik"), with an office address of Rua Antonio de Albuquerque, 330, Belo Horizonte-MG, Brazil, 30112-010.

1. This certificate applies to the technical report titled, "Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile," (the "Technical Report") prepared for Tiernan Gold Corporation (the "Company"), with an effective date of March 15, 2023 (the "Effective Date").

2. I graduated from the University of São Paulo, São Paulo, Brazil, in 2004 with a Bachelor of Science degree in Mining Engineering.

3. I am a Fellow Member of the Australasian Institute of Mining and Metallurgy (FAusIMM).

4. I have practiced my profession for a total of 18 years since graduation. I have been directly involved in:

   - mine planning for several mines in Brazil and Latin America;
   - review and report as a consultant on many mining operations and projects around the world for due diligence;
   - feasibility study project work on many mining projects including site infrastructure. My projects include Nexa Aripuanã, Minesa Soto Norte, and Sigma Xuxa; and
   - work as a mining engineer consultant on various projects around the world.

5. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.

6. I visited the Volcan Project on November 29, 2022 for a visit duration of two days.

7. I am responsible for sections 15, 16 and relevant disclosure in subsections 1.11, 1.13, 1.16, 1.18, 1.19, 18.3, 18.4, 18.9.1 to 18.9.4, 18.9.9, 21.1 to 21.2.3.1, 21.2.5 to 21.2.6.1, 21.3.1, 21.3.2, 25.7, 25.12, 25.14.1.2, 25.15, 26.2, 26.5, and 27 of the Technical Report.

8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.

9. I have had no previous involvement with the Volcan Project.

10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

"Signed and sealed"

Bruno Yoshida Tomaselli, FAusIMM

CERTIFICATE OF QUALIFIED PERSON
Alan J. San Martin, MAusIMM (CP)

I, Alan J. San Martin, MAusIMM (CP), certify that I am employed as a Mineral Resource Specialist with Micon International Limited ("Micon"), with an office address of Suite 601, 90 Eglinton Avenue East, Toronto, Ontario M4P 2Y3, tel. (416) 362-5135, e-mail: asanmartin@micon-international.com.

1. This certificate applies to the technical report titled, "Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile," (the "Technical Report") prepared for Tiernan Gold Corporation (the "Company"), with an effective date of March 15, 2023 (the "Effective Date").
2. I graduated from the National University of Piura, Peru, in 1999 with a bachelor's degree in mining engineering (equivalent to a Bachelor of Science).
3. I am a member in good standing of the following professional entities:
    - The Australasian Institute of Mining and Metallurgy (AusIMM), Chartered Professional #301778.
    - Canadian Institute of Mining, Metallurgy and Petroleum, Member ID 151724.
    - Colegio de Ingenieros del Perú (CIP), Membership # 79184.
4. I have practiced my profession as a mining engineer and geoscientist in the mineral industry for 23 years since graduation. My work experience includes 5 years as Mining Engineer in exploration (Peru), 4 years as Resource Modeller in exploration (Ecuador) and 10 years plus as Mineral Resource Specialist and mining consultant in Canada. My projects have included Volcan in Chile, San Francisco, Bonanza, and Margarita in Mexico, as well as numerous other projects.
5. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.
6. I visited the Volcan Project site on March 29, 2010 for a visit duration of two days.
7. I am responsible for sub-sections12.2, 14.4, and 27 of the Technical Report.
8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
9. I have co-authored previous technical reports for the Volcan Project; these include the 2010 report titled, "Technical Report and Updated Mineral Resource Estimate for the Dorado Gold Deposits, Volcan Gold Project, Region III, Chile," and the 2011 report titled, "Technical Report on the Results of the Pre-Feasibility Study on the Dorado Gold Deposits, Volcan Gold Project, Region III, Chile."
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

"Signed and sealed"

Alan J. San Martin, MAusIMM (CP)

CERTIFICATE OF QUALIFIED PERSON
William J. Lewis, B.Sc., P.Geo.

I, William J. Lewis, B.Sc., P.Geo., certify that I am employed as a Senior Geologist with Micon International Limited (“Micon”), with an office address of Suite 601, 90 Eglinton Avenue East, Toronto, Ontario M4P 2Y3, tel. (416) 362-5135, e-mail: wlewis@micon-international.com.

1. This certificate applies to the technical report titled “Volcan Project, NI 43-101 Technical Report on Preliminary Economic Assessment, Tierra Amarilla, Atacama Region, Chile,” (the “Technical Report”) prepared for Tiernan Gold Corporation (the “Company”), with an effective date of March 15, 2023 (the “Effective Date”).
2. I graduated from the University of British Columbia in 1985 with a Bachelor of Science degree in Geology.
3. I am a registered Professional Geoscientist with the Association of Professional Engineers and Geoscientists of Manitoba (membership # 20480); as well, I am a member in good standing of several other technical associations and societies, including:
   - Association of Professional Engineers and Geoscientists of British Columbia (Membership # 20333).
   - Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories (Membership # 1450).
   - Professional Association of Geoscientists of Ontario (Membership # 1522).
   - The Canadian Institute of Mining, Metallurgy and Petroleum (Member # 94758).
4. I have practiced my profession as a geologist in the minerals industry for over 35 years. My work experience includes 4 years as an exploration geologist looking for gold and base metal deposits, more than 11 years as a mine geologist in underground mines estimating mineral resources and reserves and over 20 years as a surficial geologist and consulting geologist on precious and base metals and industrial minerals. Projects have included, Volcan and El Espino in Chile, Marmato in Colombia, Zun Holba, Irokinda and Prognoz in Russia, San Francisco and Margarita in Mexico, as well as numerous other projects,
5. I have read the definition of “Qualified Person” set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects (“NI 43-101”) and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for those sections of the Technical Report that I am responsible for preparing.
6. I visited the Volcan Project site on April 17, 2010 for a visit duration of three days.
7. I am responsible for sections 6 to 11, and 23, and sub-sections 1.4 to 1.8, 1.10, 1.18, 1.19, 6 to 11, 12.1, 14.1 to 14.3, 14.5, 23, 25.3, 25.4, 25.6, 25.9, 25.14.1.1, 25.14.2.1, 25.15, 26.1, 26.5, 27 of the Technical Report.
8. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.
9. I have co-authored previous technical reports for the Volcan Project; these include the 2010 report titled, “Technical Report and Updated Mineral Resource Estimate for the Dorado Gold Deposits, Volcan Gold Project, Region III, Chile,” and the 2011 report titled, “Technical Report on the Results of the Pre-Feasibility Study on the Dorado Gold Deposits, Volcan Gold Project, Region III, Chile.”
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Dated this 15th day of March, 2023.

“Signed and sealed”

William J. Lewis, B.Sc., P.Geo.

Senior Geologist and Director

Important Notice

This report was prepared as National Instrument 43-101 Technical Report for Tiernan Gold Corporation (Tiernan) by Ausenco Chile Limitada (Ausenco), Micon International Limited (Micon), Deswik Brasil (Deswik), Gestión Ambiental Consultores (GAC) collectively the Report Authors. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in the Report Authors' services, based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Tiernan subject to terms and conditions of its contracts with each of the Report Authors. Except for the purposed legislated under Canadian provincial and territorial securities law, any other uses of this report by any third party is at that party's sole risk.

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1 SUMMARY

1.1 Introduction

Tiernan Gold Corp. (Tiernan) commissioned Ausenco Chile (Ausenco) to compile a preliminary economic assessment (PEA) of the Volcan Project. The PEA was prepared in accordance with the Canadian disclosure requirements of National Instrument 43-101 (NI 43-101) and in accordance with the requirements of Form 43-101 F1.

The responsibilities of the engineering companies who were contracted by Tiernan to prepare this report are as follows:

- Ausenco managed and coordinated the work related to the report, reviewed the metallurgical test results and developed PEA-level design and cost estimate for the process plant, general site infrastructure, environmental and economic analysis.
- Deswik Brazil (Deswik) designed the mine pit, mine production schedule, and mine capital and operating costs.
- Micon International Limited (Micon) completed the work related to geological setting, deposit type, exploration work, drilling, exploration works, sample preparation and analysis, data verification and developed the mineral resource estimate for the Project.
- Gestión Ambiental Consultores (GAC) conducted a review of the environmental studies of the Project.

1.2 Terms of Reference

The purpose of this Report is to present the results of the PEA and to support Tiernan's disclosure in connection with a potential listing application on a Canadian stock exchange.

All measure units used in this Report are metric unless otherwise noted currency is expressed in United States dollars (US$). The Report uses English.

Mineral Resources are estimated in accordance with the 2019 edition of the Canadian Institute of Mining, Metallurgy and Exploration (CIM) Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines (2019 CIM Best Practice Guidelines) and are reported using the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards).

Readers are cautioned that the PEA is preliminary in nature. It includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

1.2.1 Effective Dates

This Technical Report has a number of significant dates, as follows:

- Volcan mineral resource estimate: July 22, 2022.
- Financial analysis: December 15, 2022.
- Project Ownership: March 15, 2023.

The overall effective date of this report, which is March 15, 2023, is the first full day after written confirmation became available of the completion of the corporate restructuring by which Tiernan Gold became the registered owners of Andina Minerals Chile.

1.3 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Volcan property is located approximately 700 km north of Santiago, the capital of Chile, approximately 170 km by road east of the mining and agricultural city of Copiapo and approximately 40 km west of the border with Argentina. The property is located in Region III of northern Chile in the Province of Copiapo and political subdivision of Comuna Tierra Amarilla.

The total area controlled comprising the Volcan Project is 45,289 ha, corresponding to the actual property boundaries. However, a title and claim search indicates that Tiernan, through its subsidiary Andina Chile, holds 55,172 ha because several areas have duplicate (overlapping) registered concessions under the various Chilean categories of mineral rights holdings. The 55,172 ha are made up of 55 mining properties, 139 exploration concessions and 1 exploration applications owned by Andina.

Andina Chile owns water rights which have been developed in two wells located approximately 21 km from the Dorado deposits and 5 km east of the northern end corner of the Volcan concessions. These wells are nominally referred to as Wells 3 and 4.

There are two royalty agreements which apply to the concessions of the Volcan Project. First, there is a royalty agreement dated May 19, 2004 between Andina Chile and "Sociedad Legal Minera Volcan Una De La Sierra Del Volcan Copiapo y Otras" which is a consortium of local individuals. The royalty agreement states a Nil on first 2 million ounces of gold production; US$5 for each ounce of gold produced after the first 2 million ounces and up to the 4 millionth ounce; and 1% of the Net Smelter Return (NSR) for gold production from the Mining Concessions above 4 millionth ounce. Second, Barrick retained an NSR royalty of 1.5% on all metals produced from the exploration concessions acquired from Barrick in 2009, should they be developed.

1.4 Geology and Mineralization

1.4.1 Regional Geology

The Maricunga gold belt extends over a distance of approximately 150 km from north to south and is approximately 30 km wide, close to the border with Argentina. Mineralization is related to the emplacement of Miocene age calc-alkaline volcanic and sub-volcanic units over basement rocks of Paleozoic to Cenozoic age. The Maricunga belt hosts a number of gold and gold-copper (silver) deposits including La Coipa, Maricunga, Aldebaran, La Pepa, Soledad, Pantanillo, Lobo, Escondido and Marte.

1.4.2 Volcan Property Geology

The structural setting of the Volcan property is related to, and associated with, the formation of the Copiapo stratovolcano (Volcan Copiapo) and may also be related to regional northerly-trending high-angle reverse faulting. Cameco originally identified three generally moderate to steeply dipping fault systems, trending northwest-southeast, northeast-southwest and east-west, and considered the northeast-southwest and east-west trending systems to be the more important structural controls on alteration and mineralization.

The principal rock types identified on the Volcan property are:

- Dacite, rhyodacite and andesite lavas

- Volcanic flow and dome complex rocks
- Pyroclastic flows
- Hydrothermal breccias
- Sub-volcanic porphyry.

1.4.3 Mineralization

Gold-copper mineralization at Volcan is related to the intensely developed hydrothermal alteration that gave rise to the native sulphur deposits in the area. The hydrothermal system was a consequence of the sub-volcanic intrusion of dacitic to microdioritic porphyry into a complex of domes and lava flows of dacitic composition.

1.5 History

1.5.1 Early Exploration History

The first formal evaluation of the gold potential of the Volcan area was carried out by Zentilli (1990) who recognized that sulphur mineralization and the surrounding alteration were the result of high-level, high sulphidation hydrothermal systems related to deeper intrusive activity, and who established that the sulphur carried anomalous arsenic, antimony, mercury and gold.

The property was optioned by the Chilean subsidiary of Homestake Mining Company (Homestake) in 1990, which identified a gold geochemical anomaly and then conducted mapping and a reverse circulation (RC) drill program. Further work, including a 15 line-km IP geophysical survey, resulted in identification of three target areas that are equivalent to the Dorado Central, Oeste and Norte nomenclature adopted later by Cameco Corp. (Cameco). The property was returned to the owners by Homestake in 1993 as not meeting corporate objectives.

In 1994, the property was optioned to Compañía Minera Cameco (Chile) Ltda., the Chilean subsidiary of Cameco, which carried out exploration work until 1997. This work included mapping, re-logging of some drill material, additional assaying and metallurgical and petrographic studies. The option was dropped for reasons including the then perceived low tonnage and grade potential and unfavourable metallurgical results.

1.5.2 Andina Minerals Inc. Exploration History

The Volcan property originally comprised four contiguous mining concessions (also referred to as exploitation concessions) covering an area totalling 5,455 hectares (ha). Andina Minerals Inc. (Andina) entered into an option to purchase the four mining concessions in May, 2004 (revised in May, 2005). The final option payment under the agreement was made in June, 2007.

During the first half of 2006, Andina, acting through an agent, acquired an additional 41 exploration concessions totalling approximately 9,800 ha. These exploration concessions and the underlying mining concessions were overlain by exploration concessions acquired in early 2008. The prior exploration concessions were allowed to lapse. On May 20, 2009, Andina announced that, through its Chilean subsidiary, it would acquire the exploration rights to certain properties held by Barrick Gold Corporation (Barrick) and a number of exploration concessions surrounding the Volcan property.

Andina has carried out seven phases of exploration at the Volcan property, starting with the 2004 to 2005 field season and ending in the 2010 to 2011 field season.

During its exploration period from 2004 to 2011, Andina conducted geochemical surveys, geophysical surveys, trenching, as well as both infill and exploration reverse circulation (RC) and diamond drilling on the deposits associated with the Volcan Project. In total, Andina conducted over 102,000 m of drilling over the Dorado Oeste, Dorado Central, Dorado Este and Ojo de Agua Este (ODAE) deposits.

Since Hochschild acquired Andina in 2013, no further physical exploration has been conducted on the Volcan Project.

1.6 Exploration

Since 2013, neither Hochschild, after it acquired Andina Chile, nor Tiernan has conducted exploration at Volcan. However, some work has been conducted regarding the metallurgical aspects of the Project. Andina Chile has been working on a new geo-metallurgical model for the Volcan Project but it remains at a very early stage and further work is necessary in order for the new model to be used as the basis for further exploration or studies.

1.7 Drilling and Sampling

Since 2013, neither Hochschild, after it acquired Andina Chile, nor Tiernan has conducted any drilling or sampling programs at the Volcan Project.

1.8 Data Verification

1.8.1 Micon

Micon's QP conducted a site visit to the Volcan Project, as well as to the core logging and Geoanalítica assay preparation facilities in Copiapo, between April 17 and 19, 2010. During this period, the field procedures for the drilling program were examined, examples of the host rock types, alteration and veining were observed in outcrop and representative sections of drill core were reviewed. In addition, the QA/QC program, incorporation of data into the electronic database and backup of the database were discussed. The April, 2010, site visit was conducted by William J. Lewis, B.Sc., P.Geo., a Senior Geologist with Micon.

For the mineral resource update no site visit was conducted primarily because no further exploration or drilling programs had been conducted since Andina had produced the previous mineral resource estimate. However, extensive discussions with Tiernan personnel were conducted regarding the geological model and the database which the QP deemed sufficient for the current work, given no new data has been generated since the previous site visit.

1.9 Metallurgical Testwork

Three major phases of test work were conducted. The first consisted of initial leach, flotation tests, and comminution tests to assess the potential of the Volcan Project. This early phase of work culminated in the last published NI 43-101 Technical Report entitled "Technical Report on the Results of the Pre-Feasibility Study on the Dorado Deposits, Volcan Gold Project, Region III, Chile" dated January 31, 2011 (the "PFS") and published on SEDAR by Andina Minerals Inc.

This was followed by more detailed work to optimize process conditions and considerations., Andina carried out a further phase of test work in 2010, 2011 and 2012 to support a potential feasibility study for the Project.

Following its acquisition of Andina in 2012, Hochschild undertook further rounds of metallurgical testing in 2017, to develop a geometallurgical model; and in 2020, to evaluate ore sorting technology and copper flotation, and also to determine gold recovery and reagent consumption (lime and cyanide).

The testwork recommended key design parameters, as follows:

- The feed grades for the heap leach range from 0.4 to 1.2 g/t Au.
- Particle size has an inverse linear relationship with recovery. Recovery increases as the particle size diminish.
- The copper present in the sample present as cyanide soluble is sufficient to affect cyanide consumption. Evaluation of specific process steps to remove copper and minimize cyanide consumption is required.
- The impact of three potential mineralized material pre-treatments was determined. The selection of crusher technology was conducted, conventional tertiary crushing products or high pressure grinding roll (HPGR), and the removal of fines from HPGR products affect the gold size distribution in the heap feed for material with the same P80 size distribution.
- The use of HPGR shows an improvement in recovery. However, the effect of additional fines reporting to the heap leach must be determined to ensure no permeability issues are observed.
- Geometallurgical model indicated that >90% of the deposit is contained in two main breccia units.

1.10 Mineral Resource Estimation

1.10.1 General Information and Database

The database used for the mineral estimate was provided to Micon by Andina Chile back in 2010. The database underwent an exhaustive validation at the time was used as the basis of a mineral resource estimate. Micon re-examined the database when it was submitted to Micon by Tiernan and confirmed it was the same database used by Micon previously.

The gold mineralization at the Volcan Project is an example of a Maricunga-style deposit. This style of deposit is typified by the presence of a system of quartz veinlets and stockworks that are typically formed at relatively shallow levels in a porphyry-style environment. The veinlets are associated with a number of different styles of porphyry-associated alteration, including argillic, potassic and propylitic, and can also be associated with minor amounts of disseminated, patchy and stringer sulphide minerals. Field observations at Volcan have shown that the gold contents do not have a consistent relationship with either the primary rock type or alteration style.

However, analysis of the data gathered from the exploration programs has shown that, while gold grades do not show any consistent relationships with many of the different types of veinlet compositions, a distinct association can be seen between the intensity of veinlets/stockworks of Black Banded Veins (BBV), Grey Banded Veins (GBV) and Quartz-Rich Veins (QV). Due to the complexity of these individual gold/veinlets intensity associations, the BBV, GBV and QV were combined into one and were expressed as 0, Tr (trace), 1, 2, and 3 intensity levels related to every sample of the assay table in the database. An assay investigation was conducted on the entire assay table to determine whether or not this association could be demonstrated statistically. Encouraging results were obtained indicating that gold, in the majority of the cases, is directly associated with the combined veinlet intensity throughout the Dorado Oeste deposit. This finding led to the creation of a model in three-dimensions, in which if veinlet intensity was equal to 1, 2, or 3 it was labelled "Mineralization with Veins". The resulting solid or domain was later constrained with the 100 ppb Au grade envelope and the 300 ppb Au envelope, in Dorado Este. Dorado Central and Dorado Este. If veinlet intensity was equal to 0 or Tr, those intervals were labelled "Mineralization No Veins", representing mineralized material outside of the veinlet zone solid.

An analysis of the lengths for all samples contained within the drill hole database was conducted. This analysis revealed that the majority of the samples were 2 m in length. No compositing was required on this data set, and the raw samples were used for the preparation of the mineral resource estimate.

The Project topography was provided by Hochschild as a digital terrain model (DTM) in DXF format. It was used for the open pit optimization for the Dorado deposits.

The database contains 809 density measurements. The overall average density value for the entire Volcan Project is 2.46 grams per cubic centimetre (g/cm^3).

Hochschild provided Micon with the wireframes provided for the Dorado mineralization. Micon reviewed and agreed with all of the wireframes.

1.10.2 Prospects for Economic Extraction, Pit Optimization

Open pit optimization was completed using Datamine NPVS open pit optimization program. This program uses the Lerchs-Grossmann algorithm to determine the optimal economic open pit limit for a given set of economic assumptions. For the pit shell resource, the Volcan resource block model was used as a basis for the pit optimization.

Resource classifications and mineralized domains were used to develop rock codes which determined the possible routing of an individual block during optimization (process feed or non-economic rock). Because a variable metallurgical recovery was used for the Dorado Oeste and Este deposits, a recovered gold grade was also calculated. Lastly, using the Vector recommended pit slopes, each block was flagged by its individual slope sector. Bench heights of 10 m were used for all optimization runs in all types of material.

Table 1-1 summarizes the Input Parameters for the Volcan Project.

Table 1-1: Summary of Input Parameters, Volcan Project

Area	Units	$/Unit	Source
Mineralized Material Mining Cost	US$/Tonne	2.22	Deswik 2022
Rehandle Cost	US$/Tonne	1.00	Deswik 2022
Heap Leach Cost	US$/Tonne	6.15	Ausenco 2022
G & A	US$/Tonne	1.40	Hochschild Finance Team
Met. Recovery (DC)	%	25.00	Ausenco 2022
Met. Recovery (DE & DO)	%	64.00	Ausenco 2022
Base Gold Price	US$/Troy Ounce	1,800.00	Hochschild Finance Team
Gold Refining Cost	US$/Troy Ounce	5.00	Hochschild Finance Team
Gold Payable	%	99.50	Hochschild Finance Team

The estimates of the economic parameters presented above were used to establish a gold cut-off grade for reporting purposes. A summary of the estimated cut-off grades by deposit is presented in Table 1-2. For the purposes of preparation of the updated mineral resource estimate, a gold price of US$1,800/oz was selected.

Table 1-2: Summary of Cut-off Grades for the Dorado Sector Deposits, Volcan Project (using US$1,800/oz Au)

Domain	Cut-off Grade (g/t Au)
Dorado Oeste (Norte, 100/101)	0.29
Dorado Oeste (Sur, 120/121)	0.29
Dorado Central (2002)	0.75
Dorado Este (3003)	0.29

The mineralized material was either classified into the Measured, Indicated or Inferred Mineral Resource category on the basis of the geostatistical analysis presented in Magri (2010) and then cleaned up by Micon doing a detailed 3D visual inspection of the final resource categorization. The initial classification criteria are summarized in Table 1-3.

Table 1-3: Summary of the Classification Criteria for the Dorado Sector Deposits, Volcan Project

Domain	Drill Spacing	Classification
Dorado Oeste (Norte, Codes 100 and 101)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	50 x 50 m	Measured
Dorado Oeste (Sur, Codes 120, 121)	Inside the Domain Model	Inferred
	100 x 100 m	Indicated
	50 x 50 m	Measured
Dorado Central (Codes 2000, 2002)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	Less than 50 x 50 m	Measured
Dorado Este (Codes 3000, 3003)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	50 x 50 m	Measured

In the construction of block model estimates, a lack of information resulting from a slight data gap generated by drill hole deviation is often encountered. This can result in a small number of blocks that are required to have their grades estimated using a larger search ellipse, with a subsequent reduction in their classification.

1.10.3 Mineral Resource Statement

As a result of the concepts and processes described previously, the mineral resources are considered as all potentially profitable blocks using the base case input parameters that are contained within the US$1,800/oz Au optimized open pit shell and below the topographic surface. The mineral resources are stated using the gold grades estimated by the Ordinary Kriging interpolation method and using the capped metal grades. The tabulated mineral resources for the Dorado sector deposits of the Volcan Project are set out in Table 1-4.

The mineral resource estimate is effective as of July 22, 2022. Mineral resources which are not mineral reserves do not have demonstrated economic viability.

Micon has considered the mineral resource estimates in light of known environmental, permitting, legal, title, taxation, socio-economic, marketing, political and other relevant issues and has no reason to believe at this time that the mineral resources will be materially affected by these items.

Table 1-4: Mineral Resources Volcan, Summarized by Deposit, Effective Date July 22, 2022

Deposit	Au Cut-off (g/t)	Category	Tonnage (kt)	Au Grade (g/t)	Au Content (k. oz)
Dorado Oeste (DO)	0.29	Measured	97,194	0.698	2,181
		Indicated	337,820	0.643	6,980
		M+I	435,014	0.655	9,160
		Inferred	74,724	0.517	1,241
Dorado Este (DE)		Measured	24,276	0.673	525
		Indicated	1,113	0.639	23
		M+I	25,389	0.672	548
		Inferred	235	0.357	3
Dorado Central (DC)	0.75	Measured	2,509	1.064	86
		Indicated	341	0.909	10
		M+I	2,849	1.045	96
		Inferred	59	0.850	2
Total		**Measured**	**123,979**	**0.700**	**2,792**
		Indicated	**339,274**	**0.643**	**7,013**
		M+I	**463,253**	**0.658**	**9,804**
		Inferred	**75,018**	**0.516**	**1,246**

Notes:
1. The updated mineral resources are reported at a cut-off grade of 0.29 g/t gold for the Dorado Oeste (DO) and Dorado Este (DE) and are reported at a cut-off of 0.75 g/t for Dorado Central.
2. The cut-off grade was calculated using a gold price of US$1,800 per ounce, mining cost is US$2.22 per tonne rehandling cost is US$1.00 per tonne, heap leach cost is US$6.15 per tonne and G&A cost is US$1.40/tonne.
3. The effective date of the updated mineral resource estimate is July 22, 2022. Tonnages and metal content in the table are rounded to the nearest thousand, thus, numbers may not total precisely due to rounding.
4. The mineral resources are reported according to the latest edition of the CIM definitions and standards which was adopted by the CIM council on May 10, 2014.
5. Mineral resources which are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal title, market conditions and other modifying factors. At the time of this report, Micon's QPs have not been able to determine any factors that would adversely impact the current mineral resource estimate.

1.11 Mining Methods

The mine layout and operation are based on the following criteria:

- Two independent open-pit areas named Dorado Oeste/Central and Dorado Este, each one with a dedicated Non-Economic Rock Storage Facility.
- Independent access from both pits to the mine run of mine (ROM)/crushing pad.
- Low-grade stockpiling strategy near the ROM/crushing pad.
- 20-m height benches.

The life of mine (LOM) runs for 14 years. The basis for the scheduling includes:

- Plant feed of 60 ktpd.
- Maximum 85 Mt of material movement.
- Low-grade stockpile to increase head grade for initial years.

In Deswik's opinion, the proposed mining methods are appropriate and reasonable for the anticipated conditions.

1.12 Recovery Methods

The plant is designed to process material at a rate of 60,000 t/d with an average head grade of 0.63 g/t of Au. The plant is designed to be operated 24 hours per day, 365 days per year.

The process plant includes the following units, processes, and facilities:

- primary crushing of ROM;
- overland conveyor system to transport coarse material
- coarse material stockpile;
- secondary crushing and screening in closed circuit;
- tertiary crushing (HPGR);
- agglomeration and heap stacking;
- heap leach pad and ponds
- sulphidization, acidification, recycling, and thickening (SART) plant;
- Adsorption, Desorption, and Recovery (ADR) - carbon-in-column (CIC), Desorption and Regeneration, and Refinery.

1.13 Project Infrastructure

Infrastructure to support the Volcan Project will consist of mine area, process plant area and complementary infrastructure.

The mine area will have the following infrastructure in addition to that described above in Section 1.11:

- Mine Truckshop including Electromechanical, Welding shop, Tire changing & Truckwash facilities
- Mine Warehouse
- Diesel Fuel Storage & filling station
- Mine haul roads
- Mine Administrative Offices
- Explosive & emulsion storage
- Mine Electrical Substation

The process plant area will have the following infrastructure in addition to that described above in 1.12:

- Plant Electrical Substation
- Reagents warehouse
- Cyanide handling facilities
- Propane Storage Tank
- Laboratory

- Administrative Offices
- Gatehouse

Complementary infrastructure will consist of the following:

- Accommodation Camp
- Fresh Water Supply (water pipeline and pumping station)
- Potable Water System, and Sewage Treatment Systems
- High-Voltage Electrical Power Line
- Access Roads
- Interior roads
- Surface water management
- Solid waste disposal landfill area

The Project is approximately 170 km by road from Copiapo. Some existing road sections will be upgraded to handle project traffic. The Atacama Desert Airport (CPO) services Copiapo with multiple daily commercial flights to Santiago (SCL). Port facilities exist in central & northern Chile which are suited to servicing the well-established mining industry. These port facilities are well connected by road to Copiapo

For the present PEA-level study, the project considers a stockpile for low grade mineralized material, two Non-Economic Rock Storage Facilities (NERSF) with 255 Mm^3 and 11 Mm^3 capacities respectively and a heap leach pad with estimated capacity of 293 Mt. A Tailing Storage Facility was not considered in this study as the process does not produce tailings.

Fresh water supply for the Project will be sources from wells and pumped via a 24km pipeline to the site. Potable water systems will be installed in the process plant & camp areas. Sewage treatment system will be installed in the camp area, in the process area and in the mine workshop area to treat wastewater generated on the site. Fire water storage tanks and pumping systems will be installed in the process plant area, in the camp area and in the mine shop area, for fire emergencies.

Surface water will be managed in accordance with relevant legislation. Non-contact water will be diverted around project infrastructure using diversion systems & sedimentation ponds as required. Contact water will be captured & evaporated or utilized in haul road dust suppression, truck wash facilities and/or incorporated into the process.

Operational support facilities, such as workshops, warehouses & process plant buildings will be of conventional or modular construction. Construction materials will generally be metal structures with metal cladding or tensioned membrane shells. Administration offices, First Aid Clinic & laboratory will be modular buildings.

The explosives magazine & emulsion plant will be sited in accordance with local regulations for the storage of explosives.

Allowable products will be disposed of in a solid waste landfill constructed on site. Products not allowed to be disposed of in the landfill will be transported to appropriate facilities off site.

Haul roads a minimum width of 32 m will be constructed within the mine area, which will connect the pit, low-grade stockpile NERSFs, mine workshop and primary crusher. Access roads for light vehicles will be built to connect the various plant & infrastructure locations.

A gatehouse will be staffed at the entry to the property and will be manned 24 hours per day.

An accommodation camp will be constructed at the site, initially for housing of construction personnel & later for operational personnel.

The off-site power supply infrastructure is 38 km of new 110 kV power lines from Maricunga to a new Volcan Main plant substation, and a new switching substation adjacent to existing Maricunga substation.

On-site power supply infrastructure considers 23 kV distribution from main project site substation to area substations. Diesel-fired backup generators will provide emergency power for project safety & security.

Diesel fuel will be delivered to the mine site via tanker trucks and stored in tanks on site. The storage tanks will be in placed in lined bunded areas to assure no fuel is leaked to the environment.

Propane Gas for process heating will be delivered to the mine site via tanker trucks and stored in tanks on site.

1.14 Markets and Contracts

The main product planned from the Volcan Project is gold and economically insignificant amounts of silver contained in doré bars. A small quantity of copper precipitate as generated from the SART process will also be produced.

No market studies were completed in support of this Technical Report. Gold doré production can generally be sent to any number of refining operations and refined into gold and silver. Gold and silver are readily traded commodities and, for the purposes of this Technical Report, it is appropriate to assume that the products can be sold freely and at standard market rates.

Pricing of the products is shown in Table 1-5; these values were used in the economic analysis. These prices are in accordance with historic prices for these commodities. The QP also considers the prices used in this study to be consistent with the range of prices being used for other project studies. Silver is not present in any significant quantity and is not relevant economically to the Project.

Table 1-5: Pricing Assumptions for Economic Analysis

Commodity	Price
Gold (Au)	$1,800/oz
Copper (Cu)	$3.50/lb

Copper is recovered in the SART process, as a high-grade copper sulphide precipitate. Key assumptions for the sale of the precipitate are similar to a traditional copper concentrate and are summarized in Table 1-6 below.

Table 1-6: Copper Concentrate Terms

Description	Units	Value
Copper Concentrate Grade	% Cu	65
Copper Concentrate Moisture Content	% w/w	8
Copper payability	% of contained	96.5
Freight Charges	$/wmt	125

Description	Units	Value
Treatment Charges (TC)	$/dmt	75
Losses	%	0.25
Refining Charges (RC)	$/lb Cu	0.075
Penalties	$/dmt	nil

No deleterious elements are expected to be produced in quantities which would result in material selling penalties. Due to small volumes, the precipitate is to be packaged in one-tonne bags ("maxi sacks") and transported to local Chilean copper smelters by truck.

The company has no relevant contracts in place.

1.15 Environmental, Permitting and Social Considerations

The Project is in the Andean highlands area of the Atacama Region, which is characterized by extreme environmental conditions for biotic development. In this area, hyper-arid conditions, intense solar radiation, high wind speeds and daily surface freezing of watercourses constitute adverse conditions for ecosystems. Human settlements are also scarce, due to the lack of available water resources and the hostile climatic conditions during the winter, with the exception of lands used by Indigenous communities, some tourism and conservation activities.

1.15.1 Environmental Considerations

The main environmental consideration for the Project is its location near protected areas, whose main objective is the protection of flora and fauna species and water resources that sustain the ecosystems. The protected areas in proximity to the Project are the Nevado Tres Cruces National Park, the Laguna del Negro Francisco and Laguna Santa Rosa Ramsar site and the Priority Sites for Biodiversity Conservation Nevado Tres Cruces and Corredor Biológico Pantanillo. Chilean legislation states different categories of protected areas with corresponding levels of restrictions for land usage associated with development projects; in this case, Priority Sites do not possess the same level of protection and restriction as the other areas.

Environmental baseline studies were conducted between 2009 and 2011 and presented in an Environmental Impact Study (EIA) submission in 2012 (EIA *Proyecto Minero Volcan*, GHD, 2012). Additionally, an Environment Scoping Study was completed by consultants to the Company (GAC, Scoping Ambiental Proyecto El Volcan, June 2022) which included site visits and desktop studies based on other work completed by the consultants in the Project area. These studies indicate that the most relevant environmental issues are the proximity to glaciers (due to potential impacts to the existing water balance for the area), the effects on the landscape (considering the visibility of the proposed site infrastructure from one of the lookouts with the National Park area), flora and fauna species that are present in the sensitive ecosystems, particularly in the wetland area (with some fauna species under conservation category), the possible effects on surface or underground water resources (water quality and balance) due to water use for the Project and land use by Indigenous peoples in proximity to the Project area.

The adequacy of previously completed baseline studies and collected information (mainly from 2009 to 2011) will be reviewed as part of the future Environmental Impact Assessment (EIA) scoping efforts in consideration of updated guidance for baseline studies provided by the Chilean environmental authority. Based on the review of the results for existing and new baseline studies that may be required, the Project will establish an environmental monitoring and management system to confirm environmental impact predictions, prevent additional impacts and manage risks affecting the different environmental components of the Project area. Any monitoring measures/commitments that are outlined in the environmental assessment will have a corresponding periodic reporting requirement (e.g., annually or biannually) to the Environmental Assessment Service (SEA) and/or other authorities.

In terms of water management, the current water source is from two wells located north of the mine area, for which the Project has extraction rights. A preliminary evaluation carried out in 2008, concluded that the wells supply could last for 30 years (under the approved extraction rates), but the evaluation recommended additional and more detailed hydrological studies to confirm this initial estimate. Given the hyper-arid conditions of the area and subject to the results of further hydrogeological studies planned for the water extraction sites (to be conducted to support the preparation of the future EIA), there may be regulatory expectations in the future to minimize the use of water rights for continental water or groundwater and to review and assess options for other water sources.

Contour channels will be installed around mine areas, non-economic rock storage facilities and infrastructure. Collection channels have been designed at the base of uncontacted areas to pass “non-contact” water (clean surface runoff water) to discharge points downstream of the property. For the management of “contact” mine waters and along the roads, these will be collected and directed to settling ponds to allow for sediments to settle and to provide the opportunity to monitor water quality prior to being released to the environment. Where runoff water from the Project interacts with facilities that could result in contamination impact, such as pits, mineralized material stockpiles and non-economic rock storage facilities, each of these facilities will have a designed ditching system that will capture and direct contact water to collection ponds where it can be appropriately managed. Potentially impacted water will be monitored and treated, if necessary, prior to being released to the receiving environment.

Project activities during the construction, operation, and closure phases will generate different types of wastes and emissions. Atmospheric emissions will be mostly managed through mitigation measures and monitoring in nearby receptors. Domestic, industrial and hazardous wastes will be managed according to legal requirements in the appropriate facilities, which include a landfill in the Project area. Mining wastes (low grade mineralized material and sterile rock) will be managed at specially designed dumps located next the open pit areas. Generation or acid rock drainage (ARD) could occur if materials are exposed to water, so this impact will be managed by reducing contact between the material and water through contour channels and collection systems. Any ARD will be collected and recirculated into the process. More specific measures will be established during the future environmental impact assessment.

1.15.2 Closure and Reclamation Considerations

In Chile, Law 20.551 requires that a closure plan and accompanying cost estimate is submitted to and approved by the National Geology and Mining Service (SERNAGEOMIN) to ensure the physical and chemical stability of the areas in which mining is developed and establish guarantees for the effective closure of mining facilities. The closure plan will be developed and designed to ensure long-term stability of both physical and chemical properties of the site, and to blend with the high-altitude, rocky environment. The main closure measures shall include:

- Above ground facilities will be dismantled or demolished and foundations below ground level will be covered.
- Drainage from spent mineralized material on the heaps shall be managed in accordance with locally accepted best practice in consideration of the hyper-arid conditions and requirement to protect the downstream receiving environment.
- Heaps will be covered to isolate spent mineralized material, limit influx of atmospheric water and oxygen, and control upward movement of oxidation products.
- Long-term stabilization of all exposed erodible materials.
- Access to areas such as the open pit, non-economic rock storage facilities and the heap leach facilities shall be restricted.

Based on the aforementioned and other closure measures, a preliminary estimate for closure costs, net of salvage value, of $30 million has been incorporated in the Project economics for this PEA. This cost will be refined further during the

PFS and FS stage of the Project, since a detailed closure cost will need to be developed to support the mine closure sectorial permit application, supported by feasibility level design.

1.15.3 Permitting Considerations

Permits required for mining projects in Chile are classified in two categories: Environmental Permits and Sectorial Permits. The Environmental Permits comprise the Environmental Licence (RCA for its abbreviation in Spanish) and the Sectorial Environmental Permits (PAS for its abbreviation in Spanish) which cover relevant environmental aspects. On the other hand, Sectorial Permits (PS) cover non-environmental topics and need to be applied for separately with the corresponding government authority. Once the RCA is issued, the proponent can seek individual sectorial permits for construction and operation, some of which are an extension of a PAS.

The exploration drilling phase of the Project was environmentally approved through RCA No. 363/2008 (El Volcan Project Prospecting Drilling) and RCA No. 270/2011 (Volcan Project Prospecting Drilling Modification), but a valid RCA has not yet been obtained for the execution of Volcan Project. An EIA was submitted by Andina Chile for evaluation by the environmental authority in July 2012, but Andina Chile, following its acquisition by Hochschild, decided to withdraw the Volcan Project EIA submission from the Environmental Impact Assessment System (SEIA). Considering this, the Volcan Project will be required to submit an EIA compiled under current regulations and with updated baseline information. The Project may also trigger the requirement for an Indigenous People Consultation Process under the requirements of the International Labour Organization (ILO) Indigenous and Tribal Peoples Convention 169[1].

The EIA must also contain the technical and formal contents to comply with the requirements for each of the PAS. The most relevant PAS that will likely apply to the Project are related to the approval for: non-economic rock and low-grade storage facilities, closure plan, liquid and solid waste management facilities and water management infrastructure, among others. The list of applicable PAS is presented in section 20.3.1.

Sectorial Permits are granted by different government authorities. The ones associated with mining operations are granted by SERNAGEOMIN, and the most relevant ones, based on the engineering at this stage, are:

- Authorization to establish a non-economic rock storage facility (NERSF) or mineral stockpile.
- Authorization of open-pit exploitation method.
- Mineral Treatment or Benefit Plants Project Approval.
- Authorization of the Project's Mine Closure Plan.

Several other permits and notifications are also required at the beginning of the construction or operation phases that do not relate to the design of infrastructure, deposits, or the mining process, such as for water diversion infrastructure, operation of waste storage, wastewater and drinking water facilities, waste transport, permits for minor support infrastructure like fuel tanks, electric systems, gas systems and roads and sanitary permits, among others. The list of the most relevant sectorial permits is shown in Section 20.3.3.

1.15.4 Social Considerations

Social baseline studies were conducted as part of the 2012 EIA preparation. Based on the most recent information available, there are at least nine community groups within the Project area: one non-Indigenous group at La Puerta sector in Quebrada Paipote (community of Copiapo), seven Indigenous communities (communes of Copiapo and Tierra Amarilla), and one Indigenous association (registered in the commune of Tierra Amarilla).

[1] The ILO Indigenous and Tribal Peoples Convention 169 was subscribed by Chile in 2009 and establishes a mandatory consultation of indigenous people for measures that affect them.

The non-Indigenous group is a family located in the sector called La Puerta, located immediately adjacent to Route C-341 (Project access road). Their activities include agricultural production and livestock grazing. Although their permanent residence is in La Puerta, the residents constantly move between there and urban sectors of Copiapo as well as other higher areas, where they move their cattle in summer.

The Indigenous communities of the Project area (as of 2021) are part of the Colla ethnic group. These communities have a settlement pattern that combines residences in urban and rural areas with traditional territorial practices, such as the cultural practice of transhumance along ravines and meadows. The distribution of water, flora, and fauna on the land define the boundaries for areas that communities utilize. For some of the Indigenous communities (Comuna de Copiapo, Pastos Grandes and Sol Naciente) these areas include portions of the Project area. The situation of land ownership and water rights varies among the communities. Some Indigenous communities in the Project area are in the process of requesting land and water rights.

As part of the new EIA for the Volcan Project, human environment baseline studies will need to be conducted to clearly identify the surrounding community and its characteristics, economic activities and their relevant cultural heritage sites and traditions. Based on these results, a Community Relations Plan and Strategy will be developed that will include details such as stages of stakeholder communication, meetings, stakeholder information and participation methods.

In terms of legal requirements, part of the environmental permitting process of an EIA is the Community Consultation Process, where the community (Indigenous and non-Indigenous) will become familiar with the Project and can communicate (or later submit) their questions and concerns. Additionally, the Project may be required to conduct an Indigenous Peoples Consultation Process, given its location within Indigenous territory.

1.16 Capital and Operating Cost Estimates

The capital and operating cost estimates presented in this PEA provide substantiated costs that can be used to assess the preliminary economics of the Volcan Project. The estimates are based on open pit mining operations, construction of a process plant and infrastructure, as well as Owner's costs and provisions.

The following basic information pertains to the estimate of both capital and operating costs:

- Base date for these estimates is Q4 – 2022;
- All costs are expressed in United States dollars (US$);
- United States to Chilean currency exchange rate used is US$1.00 = 870 CLP$;
- Unit of measurement is metric (unless otherwise indicated); and
- Operating and sustaining capital costs are based on an estimated mine life of 14 years.

1.16.1 Capital Cost Estimates

The cost estimates were developed according to the requirements for a AACE Class 5 Estimate, with an expected accuracy range of -30% to +50%.

The total initial capital cost estimate for the Volcan Project is US$900.1 M; sustaining capital cost is US$276.4 M; and the total project cost is US$1,176.5 M. Table 1-7 provides the Project cost summary for initial and sustaining capital cost.

Table 1-7: Summary of Capital Costs

Description	Initial 60 kt/d	Sustaining Capital 60 kt/d	Total 60 kt/d
Mining	71.0	16.0	87.0
Process	331.7	146.2	477.9
Infrastructure – On site	58.1	-	58.1
Infrastructure – Off site	75.9	-	75.9
Total Direct US$M	**536.8**	**162.2**	**699.0**
Project Indirect Cost	143.4	52.4	195.7
Owner Cost	38.8	13.2	52.0
Contingency	181.1	48.7	229.8
Total Capex Class 5 – US$M	**900.1**	**276.4**	**1,176.5**

1.16.2 Operating Cost Estimates

A summary of the individual components that make up the LOM operating costs is presented in Table 1-8. Mine operating cost weighted averages are indicated separately for the Years 1-10 which correspond to the active mining period and Years 11-14 which corresponds to low grade stockpile rehandle only.

Table 1-8: Summary of Operating Cost Estimate

Area	Units	Avg. Y 1 – Y10	Avg. Y11 - Y14	Avg. LOM
Mining	US$/t moved	1.88	0.66	1.76
Mining	US$/t processed	6.48	0.66	4.94
Processing	US$/t processed	6.61	6.60	6.61
G&A	US$/t processed	0.99	0.59	0.88
Total Operating Cost	**US$/t processed**	**14.08**	**7.86**	**12.44**

1.17 Economic Analysis

The economic analysis was performed assuming an 5% discount rate. Cash flows have been discounted to the beginning of construction on January 1, 2028, assuming that the Project execution decision will be made and major project financing will be carried out at this time.

The pre-tax net present value (NPV) discounted at 5% (NPV5%) is US$1,254 M, the internal rate of return (IRR) is 25.0%, and payback is 3.4 years. On an after-tax basis, the NPV5% is US$826 M, the IRR is 20.5%, and the payback period is 3.6 years. A summary of the Project economics is included in Table 1-9

Readers are cautioned that the PEA is preliminary in nature. It includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the PEA will be realized.

Commodity prices can be volatile, and there is the potential for deviation from the forecast

Table 1-9: Economic Analysis Summary

General	LOM Total / Avg
Gold Price (US$/oz)	$1,800
Copper Price (US$/lb)	$3.5
Mine Life (years)	13.6
Production	**LOM Total / Avg**
Total Plant Feed Tonnes (kt)	293,165
Plant Feed Head Grade Au (g/t)	0.63
Plant Feed Head Grade Cu (%)	0.05%
Leach Recovery Rate Au (%)	64.2%
Overall Recovery Cu (%)	16.2%
Total Gold Ounces Recovered (koz)	3,820
Total Copper Recovered (klb)	49,994
Total Average Annual Gold Production (koz)	281
Average Year 1 to 10 Annual Gold Production (koz)	332
Total Average Annual Copper Production (klb)	3,675
Operating Costs	**LOM Total / Avg**
Mining Cost (USD$/t Mined)	$1.8
Processing Cost (US$/t Processed)	$6.6
G&A Cost (US$/t Processed)	$0.9
Refining & Transport Cost (US$/oz)	$8.0
Total Operating Costs (US$/t Processed)	$12.4
Cash Costs* (US$/oz Au)	$921
AISC** (US$/oz Au)	$1,002
Capital Costs	**LOM Total / Avg**
Initial Capital (US$M)	$900
Sustaining Capital (US$M)	$276
Closure Costs (US$M)	$30
Financials - Pre-Tax	**LOM Total / Avg**
NPV (5%) (US$M)	$1,254
IRR (%)	25.0%
Payback (years)	3.4
Financials - Post-Tax	**LOM Total Avg**
NPV (5%) (US$M)	$826
IRR (%)	20.5%
Payback (years)	3.6

* Cash costs consist of mining costs, processing costs, mine-level G&A, copper revenue credit, refining charges and royalties over payable gold ounces
** AISC includes cash costs plus sustaining capital and closure cost over payable gold ounces

1.17.1 Sensitivity Analysis

A sensitivity analysis was conducted on the base case pre-tax and after-tax NPV, IRR, and Payback of the Project, using the following variables: metal price, discount rate, leach recovery, initial capital costs, and operating costs. Analysis revealed that the Project is most sensitive to changes in metal price, leach recovery, then, to a lesser extent, to operating costs and initial capital costs.

Table 1-10 and Table 1-11 presents a summary of the Sensitivity Analysis.

Table 1-10: Sensitivity Analysis Pre-Tax Summary

Gold Price	Base Case		Total Capex		Total Opex	
	NPV(5%)	IRR	-30%	30%	-30%	30%
$1,400	$202	8.8%	$521	($118)	$947	($543)
$1,600	$728	17.4%	$1,047	$408	$1,473	($18)
$1,800	$1,254	25.0%	$1,573	$934	$1,999	$508
$2,000	$1,780	31.9%	$2,099	$1,460	$2,525	$1,034
$2,200	$2,305	38.4%	$2,625	$1,986	$3,051	$1,560

Table 1-11: Sensitivity Analysis Post-Tax Summary

Gold Price	Base Case		Total Capex		Total Opex	
	NPV(5%)	IRR	-30%	30%	-30%	30%
$1,400	$82	6.7%	$330	($175)	$609	($551)
$1,600	$459	14.1%	$697	$213	$972	($81)
$1,800	$826	20.5%	$1,058	$587	$1,328	$305
$2,000	$1,188	26.3%	$1,415	$954	$1,678	$676
$2,200	$1,544	31.5%	$1,767	$1,316	$2,023	$1,041

1.18 Interpretations and Conclusions

Based on the assumptions and parameters presented in this report, the PEA shows positive economics (i.e., $826 M post-tax NPV (5%) and 20.5% post-tax IRR). The PEA supports a decision to carry out additional detailed studies.

1.19 Recommendations

Based on the assumptions and parameters presented in this report, the PEA shows positive economics (i.e., $826 million post-tax NPV (5%) and 20.5% post-tax IRR). The PEA supports a decision to carry out additional detailed studies. There is a recommended work program in two phases totalling $13,500,000 including geological modelling, confirmation drilling and met sample collection, geotechnical and hydrology, metallurgical testwork and supervision, environmental base line and social programs, and execution of a pre-feasibility study.

2 INTRODUCTION

2.1 Introduction

Tiernan Gold Corp. (Tiernan) commissioned Ausenco Chile (Ausenco) to compile a preliminary economic assessment (PEA) of the Volcan Project. The PEA was prepared in accordance with the Canadian disclosure requirements of National Instrument 43-101 (NI 43-101) and in accordance with the requirements of Form 43-101 F1.

The responsibilities of the engineering companies who were contracted by Tiernan to prepare this report are as follows:

- Ausenco managed and coordinated the work related to the report, reviewed the metallurgical test results and developed PEA-level design and cost estimate for the process plant infrastructure, general site infrastructure, environmental and economic analysis.
- Deswik Brazil (Deswik) designed the mine pit, mine production schedule, and mine capital and operating costs.
- Micon International Limited (Micon) completed the work related to geological setting, deposit type, exploration work, drilling, exploration works, sample preparation and analysis, data verification and developed the mineral resource estimate for the Project.
- Gestión Ambiental Consultores (GAC) conducted a review of the environmental studies of the Project.

2.2 Terms of Reference

The purpose of this report is to present the results of the PEA and to support Tiernan's disclosure in connection with a potential listing application on a Canadian stock exchange.

All measure units used in this Report are metric unless otherwise noted currency is expressed in United States dollars (US$). The Report uses English.

Mineral Resources are estimated in accordance with the 2019 edition of the Canadian Institute of Mining, Metallurgy and Exploration (CIM) Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines (2019 CIM Best Practice Guidelines) and are reported using the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards).

Readers are cautioned that the PEA is preliminary in nature. It includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

2.3 Qualified Persons

The following serve as the qualified persons for this Technical Report as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

Table 2-1: Qualified Person

Qualified Person	Professional Designation	Position	Employer	Independent of Tiernan Gold Corporation	Report Sections
Francisco Castillo	B.Sc., RM CMC	Senior Mining Engineer	Ausenco	Yes	1.3, 1.13, 1.18, 1.19, 4, 5, 18.1, 18.2, 18.5, 18.7 to 18.8, 18.9.5 to 18.14, 25.2, 25.9, 25.15, 27
Scott Elfen	P.Eng.	Global Lead – Geotechnical Services	Ausenco	Yes	1.13, 18.6, 25.9, 25.15, 27
James Millard	P.Geo.	Director, Strategic Projects	Ausenco	Yes	1.15, 1.18, 1.19, 20, 25.10, 25.14.1.5, 25.14.2.3, 25.15, 26.4, 26.5, 27
Kevin Murray	P.Eng.	Manager – Process Engineering,	Ausenco	Yes	1.1, 1.2, 1.9, 1.12, 1.14, 1.17 to 1.19, 2, 3, 13, 17, 19, 21.1 to 21.2.3, 21.2.3.2 to 21.2.6, 21.2.6.2 to 21.3.1, 21.3.3, 21.3.4, 22, 24, 25.1, 25.5, 25.8, 25.11 to 25.13, 25.14.1.3, 25.14.1.4, 25.14.2.2, 25.15, 26.3, 26.5, 27
Bruno Yoshida Tomaselli	B.Sc., FAusIMM,	Consulting Manager	Deswik Brazil	Yes	1.11, 1.13, 1.16, 1.18, 1.19, 15, 16, 18.3, 18.4, 18.9.1 to 18.9.4, 18.9.9, 21.1 to 21.2.3.1, 21.2.5 to 21.2.6.1, 21.3.1, 21.3.2, 25.7, 25.12, 25.14.1.2, 25.15, 26.2, 26.5, 27
Alan J. San Martin	BSc., MAusIMM(CP)	Mineral Resource Specialist	Micon	Yes	12.2, 14.4, 27
William J. Lewis	P.Geo.	Senior Geologist	Micon	Yes	1.4 to 1.8, 1.10, 1.18, 1.19, 6 to 11, 12.1, 14.1 to 14.3, 14.5, 23, 25.3, 25.4, 25.6, 25.9, 25.14.1.1, 25.14.2.1, 25.15, 26.1, 26.5, 27

2.4 Site Visits and Scope of Personal Inspection

Mr. San Martin visited the Volcan property for 2 days from March 29 to 30, 2010. At site, Mr. San Martin reviewed the drill hole database, QA/QC procedures and field procedures, and discussed the geology of the deposit with the field geologist team.

Mr. Lewis conducted a site visit to the Volcan Project, as well as to the core logging and geoanalytical assay preparation facilities in Copiapo, between April 17 and 19, 2010. During this period, the field procedures for the drilling program were examined, examples of the host rock types, alteration and veining were observed in outcrop and representative sections of drill core were reviewed. In addition, the QA/QC program, incorporation of data into the electronic database and backup of the database were discussed.

Mr. Castillo visited the Volcan property for 2 days between November 29 and 30, 2022, and for 1 day on March 3, 2023 During which time he inspected the existing infrastructure and toured the Project site to view potential locations for future infrastructure.

Mr. Tomaselli visited the Volcan property for 2 days between November 29 and 30, 2022. During this period the following were evaluated; road conditions, possible accesses to the site, potential location for the processing plant and for infrastructure.

2.5 Effective Dates

This Technical Report has a number of significant dates, as follows:

- Volcan mineral resource estimate: July 22, 2022
- Financial analysis: December 15, 2022
- Project Ownership: March 15, 2023.

The overall effective date of this report, which is March 15, 2023, is the first full day after written confirmation became available of the completion of the corporate restructuring by which Tiernan Gold became the registered owners of Andina Minerals Chile.

2.6 Information Sources and References

All references were listed in Section 27 of the present Report.

2.7 Previous Technical Reports

The following Technical Report related with the Volcan Project were filed on SEDAR:

- Micon. 2011. Technical Report on the results of the Pre-Feasibility Study on the dorado deposits, Volcan Gold Project, Region III, Chile. Prepared for Andina Minerals Inc, effective date is September 16, 2010.
- Micon. 2010. Technical Report on the Volcan Gold Project, Region III Chile and updated Mineral Resource Estimate for the Dorado Gold Deposits. Prepared for Andina Minerals Inc, effective date is September 16, 2010.
- Micon. 2009. Technical Report on the Volcan Gold Project, Region III Chile and updated Mineral Resource Estimate for the Dorado Gold Deposits. Prepared for Andina Minerals Inc, effective date is October 23, 2009.

2.8 Unit and Name Abbreviations

Unit and name abbreviations used in the Report are presented in Table 2-2 and Table 2-3.

Table 2-2: Unit Abbreviations

Abbreviation	Description	Abbreviation	Description
USD/US$	United States dollar	mi	mile
°C	degree Celsius	Mt	million (or mega) metric tonnes
°F	degree Fahrenheit	Mtpa	million tons per annum
%	percent	M_w	magnitude
µm	micron	Oz	ounce
g	gram	Moz	million ounces
g/t	grams per metric tonne		
ha	hectare	t	metric tonne
hr	hour	st	short ton
hp	horsepower	oz	ounce
in	inch	ppb	parts per billion
kg	kilogram	ppm	parts per million
kg/t	kilogram per metric tonne	ton	short ton (imperial)
km	kilometer	t/h	metric tonnes per hour
kN	kilonewton	t/d	metric tonnes per day
koz	thousand ounces	t/y	metric tonnes per year
kPa	kilopascal	w/w/ w/s	gravimetric moisture content (weight of water/weight of soil)
kV	kilovolt	wt	weight
kW	kilowatt	y	year
kWh	kilowatt-hour		
kWh/t	kilowatt-hour per metric tonne		
kN/m^3	kilonewton per cubic meter		
MW	megawatt		
L/s	liters per second		
M	million		
m	meter		
m^2	square meter		
m^3	cubic meter		
m^3/t	cubic meters per metric tonne		
m^3/y	cubic meters per year		
masl	meters above sea level		
mg/L	milligrams per liter		

Table 2-3: Acronyms and Nomenclature

Abbreviation	Description	Abbreviation	Description
		MWMT	meteoric water mobility tests
AAS	Atomic Absorption Spectroscopy	NaCN	sodium cyanide
ABA	acid base accounting	NaHS	sodium hydrosulfide
ADR	adsorption, desorption, and recovery	NERSF	Non-Economic Rock Storage Facilities
AENOR	Spanish Association for Standardization	Ni	nickel
Ag	silver	NPV	net present value
AMTEL	AMTEL Laboratories	OEM	original equipment manufacturer
As	arsenic	PAS	Spanish acronym for Sectorial Environmental Permits
ASTM	American Society of Testing Materials	PEA	preliminary economic assessment
Au	gold	PFS	Pre-feasibility study
BBV	Black Banded Veins	PLS	Pregnant leach solution
CIC	Carbon-in-column	PPV	peak particle velocity
CIL	Carbon-in-leach	PSI	PSI Water Technologies
COG	Cut-off grades	QP	Qualified Person
CSV	Comma Separated Value (file format)	QV	Quartz-Rich Veins
Cu	copper	RC	reverse circulation
DC	Dorado Central	RF	Revenue factor
DD	diamond drilling	ROM	Run of Mine
DE	Dorado Este (East)	RMR	Rock mass rating
DGA	The Chilean General Directorate of Water	RQD	rock quality designation
DIA	Spanish acronym for Environmental Impact Declaration	SART	sulphidization, acidification, recycling, and thickening
DO	Dorado Oeste (West)	Sb	antimony
EIA	Environmental Impact Assessment	SEA	Spanish acronym for Environmental Assessment Services
EPC	Engineering, Procurement and Construction	SEIA	Spanish acronym for Environmental Impact Assessment System
EW	electrowinning	SG	specific gravity
Fe	Iron	SPLP	Synthetic precipitation leaching procedure
GAC	GAC Consulting	SPM	sedimentable particulate matter
GBV	Grey Banded Veins	SRK	SRK Consulting Chile S.A.
GCL	Geosynthetic Clay Liner	Tiernan	Tiernan Gold Corp.
GU	Geometallurgical units	TLCP	Toxicity characteristic leaching procedure
HCN	Hydrocyanic acid	UTM	Universal Transverse Mercator
HDPE	High-density polyethylene	VFD	Variable-frequency drive
Hg	mercury	WAD	Weak acid dissociable
Homestake	Homestake Mining Company	ZOIT	Spanish acronym for Touristic Interest Zone
ICP	Inductively coupled plasma		

Abbreviation	Description	Abbreviation	Description
IFC	Spanish acronym for Favourable Report for Construction		
ISRM	International Society of Rock Mechanics		
IRA	Inter-ramp slope angles		
IRR	Internal rate of return		
IUCN	International Union for Conservation of Nature		
KCA	Kappes, Cassidy and Associates		
KHD	KHD Humboldt Wedag International AG		
LG	Lerchs-Grossmann 3D algorithm		
LLDPE	Linear Low-Density Polyethylene		
Micon	Micon International Limited		

3 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs have relied upon the following reports by other experts, which provided information regarding mineral rights, surface rights, property agreements, royalties, environmental, permitting, social licence, closure, taxation, and marketing for sections of this Report.

3.2 Property Agreements, Mineral Tenure, Surface Rights and Royalties

The QPs have not independently reviewed ownership of the Project area and any underlying property agreements, mineral tenure, surface rights, or royalties. The QPs have fully relied upon, and disclaim responsibility for information derived from Tiernan and legal experts retained by Tiernan for this information through the following documents:

- Quinzio & Olivares Abogados, date: January 25, 2023, report title: VOLCAN PROJECT, Title Opinion prepared for Andina Minerals SpA, 19 pages.
- Quinzio & Olivares Abogados, date: March 14, 2023, letter title: Legal Corporate Opinion – Andina Minerals Chile SpA prepared for Andina Minerals Chile SpA, 2 pages.

This information is used in Section 4, and in support of Sections 14, 22 and 23 of the Report.

3.3 Environmental, Permitting, Closure, Social and Community Impacts

The QPs have fully relied upon, and disclaim responsibility for, information supplied by experts retained by Tiernan for information related to closure cost estimate. Information was provided by Email in the following document:

- “November 2022: Volcan Report” by Gestión Ambiental Consultores (R. A. Katz, personal communication, November 16, 2022).

This information is used in Section 20 of the report. The information is also used in support of Section 22.

3.4 Taxation

The QPs have fully relied upon, and disclaim responsibility for, information supplied by experts retained by Tiernan for information related to taxation as applied to the financial model as follows:

- PricewaterhouseCoopers Consultores Auditores SpA, (December 2022): Comments Review Model El Volcan. Prepared for Tiernan, December 19, 2022.

This information is used in Section 22 of the Report.

3.5 Markets

The QPs have fully relied upon and disclaim responsibility for information derived from Tiernan. Information regarding gold and copper price projections, copper concentrate marketing, refining and treatment cost and contracts information was provided by email in the following:

- “October 2022: Handling of SART Plant in Model and PEA Report" by Tiernan Gold, (G. McCunn, personal communication, October 13, 2022).
- “November 2022: Volcan Financial Model – DRAFT” by Tiernan Gold (G. McCunn, personal communication, November 14, 2022).

This information is used in Section 19 of this report. The information is also used in support of Section 22.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The Volcan property is located approximately 700 km north of Santiago, the capital of Chile, approximately 170 km by road east of the mining and agricultural city of Copiapo and approximately 40 km west of the border with Argentina. The property is located in Region III of northern Chile in the Province of Copiapo and political subdivision of Comuna Tierra Amarilla (Figure 4-1).

Figure 4-1: Location Map for the Volcan Project

Note: Figure supplied by Tiernan Gold Corp.

The Volcan property is located east of the headwaters of Quebrada de Paipote and lies between Laguna Santa Rosa and Laguna del Negro Francisco along the western flanks of the Chilean Andes at a mean elevation of approximately 4,800 m.

The Volcan exploration and exploitation concessions are approximately centred on latitude 27° 20' south and longitude 69° 8.5' west, and at UTM (Zone 19) coordinates N6,972,500 and E486,500. The property is situated within the Maricunga (gold, silver, copper) mineral belt and is located 23 km northeast of the Maricunga gold mine (previously known as Refugio) and 20 km southwest of the Lobo-Marte Gold Project, both of which are owned by Kinross Gold Corporation (Kinross).

4.2 Property and Title in Chile

In 2007, the Volcan property originally comprised four contiguous mining concessions (also referred to as exploitation concessions) covering an area totalling 5,455 ha. These include the Volcan 1-30 and Maria Eliana 1-10 mining concessions in the northern portion of the property, and the Demanda 1-20 and America del Sur 1-50 mining concessions in the southern part.

In 2008, an additional 41 exploration concessions totalling approximately 9,800 ha were acquired. In 2009, a number of additional exploration concessions surrounding the Volcan property were acquired from Barrick Gold Corporation (Barrick). Barrick retained an NSR royalty of 1.5% on all metals produced from the lands acquired from Barrick, should they be developed. The property acquired from Barrick totalled approximately 15,040 ha, bringing the exploration concessions on the Volcan Project area to 24,840 ha in a contiguous block around the Volcan deposit.

The total area controlled comprising the Volcan Project is 45,289 ha, corresponding to the actual property boundaries. However, a title and claim search will indicate that Tiernan, through its subsidiary Andina Chile, holds 55,172 ha because several areas have duplicate (overlapping) registered concessions under the various Chilean categories of mineral rights holdings. The 55,172 ha are made up of 55 mining properties, 139 exploration concessions and 1 exploration applications owned by Andina, which are summarized in the Table 4-1

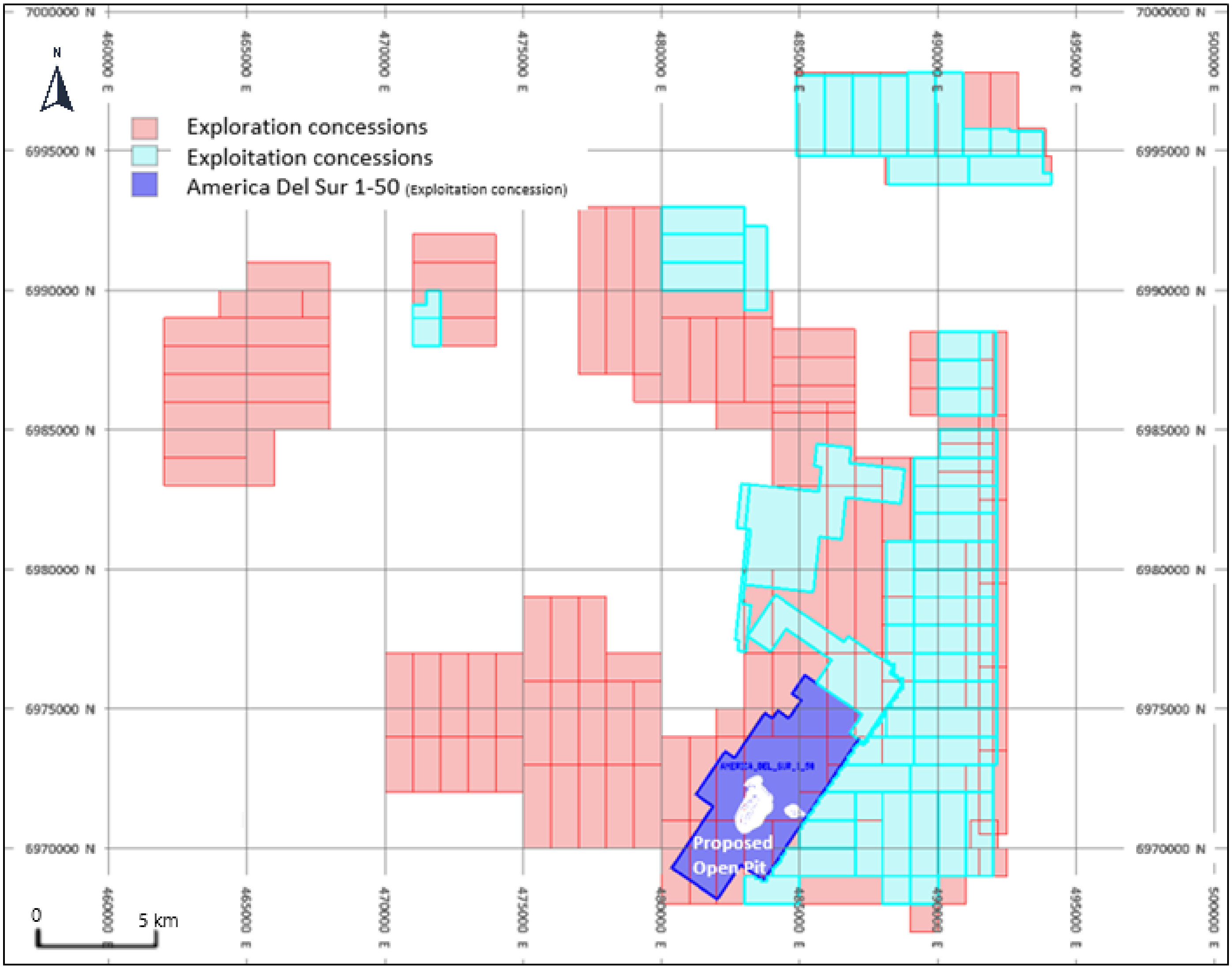
Figure 4-2 is a property map showing the location of the four mining concessions, the exploration concessions acquired originally in 2004, those concessions acquired from Barrick in 2009 and the location of the known mineralized areas relative to the property boundaries.

Under the mining laws of Chile, mining concessions can be held in perpetuity, provided that the appropriate annual payments have been made. There is no requirement that the property be put into production within a specified time frame and there is no requirement to reduce concession sizes as the exploration process advances.

Payments to maintain concessions are made annually in March. The property payments, as made to date, will maintain the Volcan property in good standing until April, 2023. The total cost to maintain the mining and exploration concessions as they are currently constituted for the period 2023 to 2024 is estimated to be approximately US$715,000.

The land on which the Volcan Project sits is the equivalent of government owned land. Surface rights to the property can be obtained as part of the permitting process through a judicial easement on the property, only when a mining project is expected to be built. Surface rights cannot be obtained in the exploration stage of the Project by Tiernan nor third parties. Surface rights are not required for the drilling programs, Field Investigations or Environmental Baseline studies considered in the recommendations Section 26.5 of this report.

Figure 4-2: Mineral Tenure Map of the Volcan Property, Chile



Note: Figure supplied by Tiernan Gold Corp.

Table 4-1: List of Mining and Exploration Concessions Comprising the Volcan Project

Mining/Exploration Concessions	Area (ha)	Year Constituted
Mining Concessions Mining Code 1932		
Volcan 1-30	1,500	1937
Maria Eliana 1-10	455	1955
Demanda 1-20	1,000	1977
America del Sur 1-50	2,500	1977
Total	**5,455**	
Mining Concessions Current Mining Code	**Area (ha)**	**Year Constituted**
Crater	900	2012
Azufre 7 1/30	240	2012
Flamenco	1710	2014
Ojo de Agua	5,370	2014
Demanda Segunda 13	194	2015
Chinchilla 1/10	89	2014
Mastodonte 1/100	100	2014
Andes Norte	175	2016
Volcan VI	3,239	2021
Total	12,017	
Exploration Concessions	**Area (ha)**	**Year Constituted**
Ander Sur IV	500	2022
Volcan VIII	37,200	2022
Total	**37700**	
Total Concessions	**55,172**	

Note: Table supplied by Tiernan Gold Corp.

4.3 Project Ownership

Andina Minerals Inc (Andina), a Canadian company listed on the Toronto Stock Exchange, entered into an option to purchase the four mining concessions listed above in May, 2004 (revised in May, 2005). The final option payment under the agreement was made in June, 2007, as described in Andina's press release dated 19 June, 2007.

During the first half of 2006, Andina, acting through an agent, acquired an additional 41 exploration concessions totalling approximately 9,800 ha. These exploration concessions and the underlying mining concessions were overlain by exploration concessions acquired in early 2008. The prior exploration concessions were allowed to lapse.

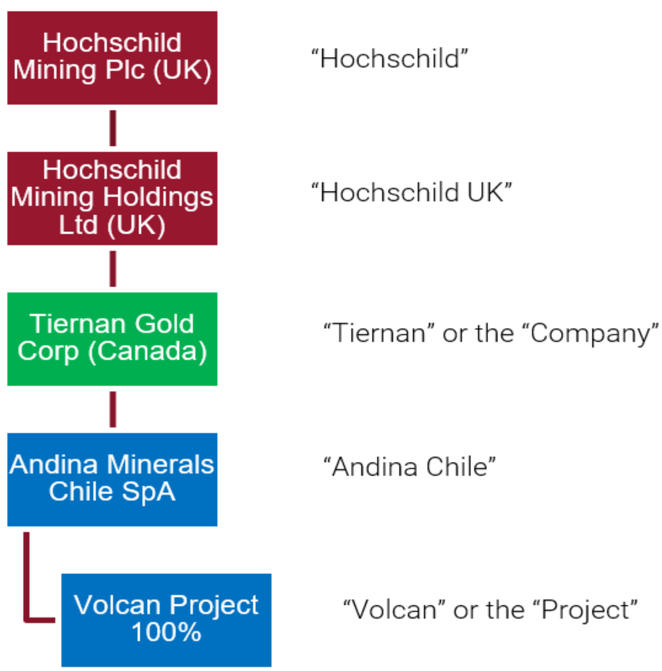
On May 20, 2009, Andina announced that, through its Chilean subsidiary, it would acquire the exploration rights to certain properties held by Barrick and a number of exploration concessions surrounding the Volcan property. Andina issued

2.0 million shares, valued at $2.66 million, to Barrick on transference of ownership of the concessions, to be followed by a second instalment of Andina common shares with a value of $1.5 million one year after closing of the transaction. Barrick retained an NSR royalty of 1.5% on all metals produced from the lands acquired from Barrick, should they be developed. The property acquired from Barrick totalled approximately 15,040 ha, bringing the area held by Andina as of June, 2009 to 24,840 ha in a contiguous block around the Volcan deposit.

On November 8, 2012, Andina announced that it has entered into a binding agreement with Hochschild Mining PLC (Hochschild) pursuant to which Hochschild agreed to make an offer to purchase all of the outstanding common shares of Andina by way of a friendly take-over bid at a price of C$0.80 per share in cash for approximate total consideration of US$105 million. The acquisition was completed on February 20, 2013. Subsequent to the acquisition, Andina was wound up and Andina's Chilean subsidiary, Andina Minerals Chile SpA (Andina Chile) became a direct subsidiary of Hochschild Mining Holdings Ltd UK (Hochschild UK).

In March 2022, Hochschild established a new Canadian company, Tiernan Gold Corp (Tiernan), and on 14th March 2023 completed a restructuring where Tiernan became 100% owner of Andina Chile and a subsidiary of Hochschild UK. The corporate ownership structure is shown in Figure 4-3.

Figure 4-3: Corporate Ownership Structure of the Volcan Project

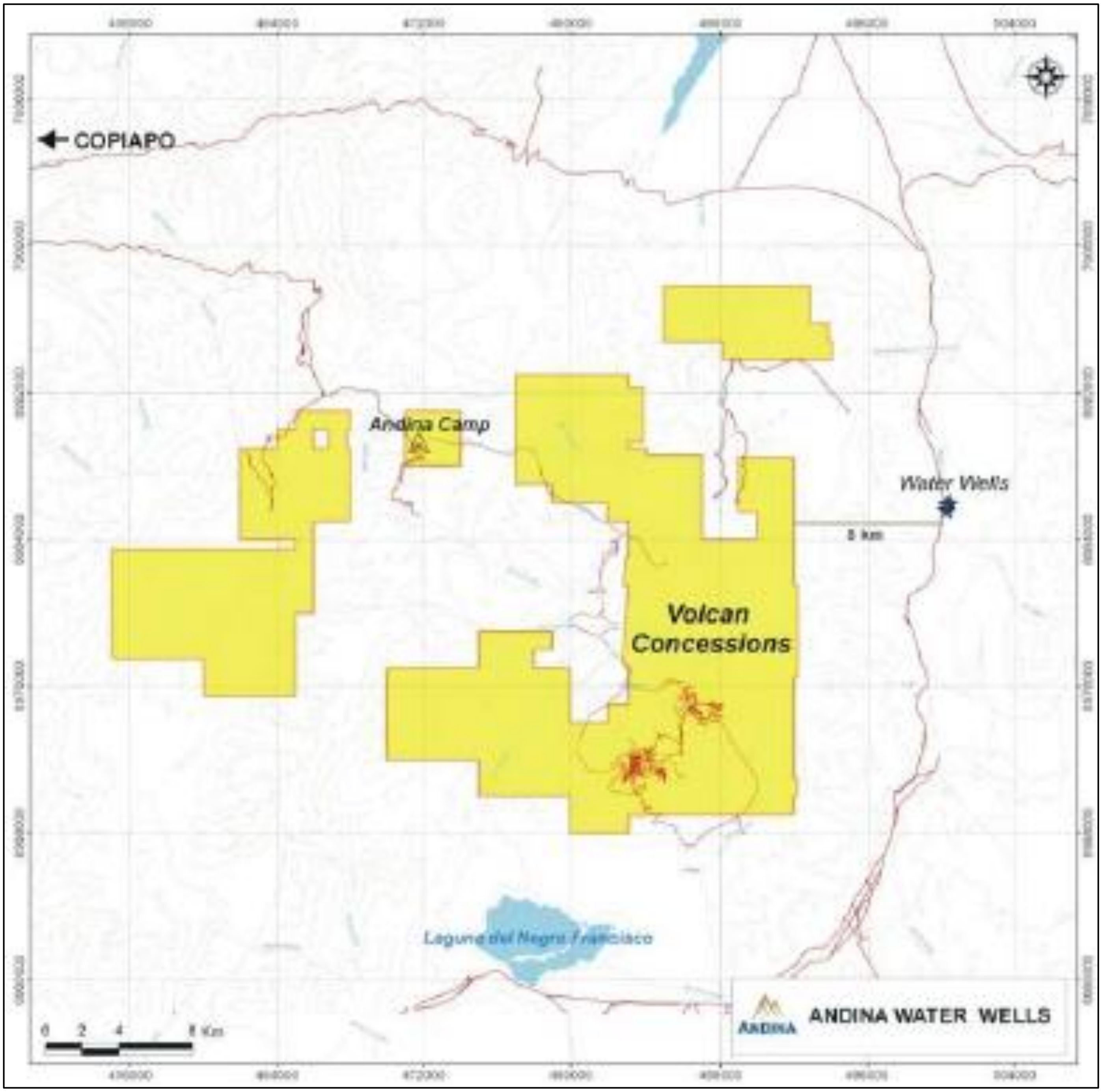


4.4 Water Rights

Andina Chile owns water rights which have been developed in two wells located approximately 21 km from the Dorado deposits and 5 km east of the northern end corner of the Volcan concessions (Figure 4-4). These wells are nominally referred to as Wells 3 and 4.

The extraction rights from Wells 3 and 4, as authorized by the Dirección General de Aguas (DGA), are for 3,894,696 m^3/y per well, for a total of 7,789,392 m^3/y at an average pumping rate of 123.5 L/s per well, with a permitted maximum pumping rate of 170 L/s. Golder Associates (Golder) was contracted in 2008 to prepare a preliminary evaluation of the characteristics of the wells and concluded that the wells could last for 30 years if water was produced at a rate of not more than 124 L/s. The evaluation recommended additional and more detailed hydrological studies in order to confirm this initial estimate.

Figure 4-4: Location Map of Water Wells with Extraction Rights



Note: Figure prepared by Tiernan, 2011.

Andina Chile has continue to make annual payments for maintenance of the water rights and maintains the cased wells in good operating condition (capped, locked and protected with security fencing). The wells are inspected by Andina Chile personnel every two to four weeks. In addition, the wells were inspected by a field team in March 2022 and levels were recorded at the edge of the head of each well, along with the UTM coordinates referred to Datum WGS 84, Huso 19. Well levels as at March 8, 2022 are shown in Table 4-2.

Table 4-2: Water Wells with Extraction Rights Measured Levels as at March 8, 2022

Well Name	Level (m)	North UTM	East UTM	Elevation (masl)
WELL 3	17.38	6,985,282	500,084	4,075
WELL 4	13.72	6,985,604	500,107	4,062

In April 4th 2022, the Chilean government enacted a reform of the water use regulations in Chile with the objective of protecting the continental water ecosystem. In general, there is a moratorium on the granting of new water extraction in Chile. Existing water extraction rights, such as those held by Andina Chile for Wells 3 and 4, continue to be valid and in force. The use of continental water for mining must not endanger the sustainability of aquifers or the rights of third parties, which must be verified by the DGA.

For the purposes of this Technical Report, water from Wells 3 and 4 are the only currently available source of water for the mining operations. However, a number of commercial ventures are currently being proposed which could bring desalinated sea water to the project area via pipeline.

Tiernan will be required to file an Environmental Impact Assessment (EIA) as the Volcan Project proceeds, and it is anticipated that the EIA and future studies will include some future commitment by the Company to take desalinated water for use in the processing facilities when and if it becomes available in the region.

4.5 Royalties and Encumbrances

There are two royalty agreements which apply to the concessions of the Volcan Project which are described in Section 4.2 above.

First, there is a royalty agreement dated May 19, 2004 between Andina Chile and “Sociedad Legal Minera Volcan Una De La Sierra Del Volcan Copiapo y Otras” which is a consortium of local individuals. The royalty agreement states that a variable royalty will apply on gold produced from the Mining Concessions which include the Mineral Resource area considered for extraction in this Technical Report; specifically, the America del Sur 1-50 concession which contains the Dorado deposits. The variable scale to be applied is, as follows:

- Nil on first 2 million ounces of gold production;
- US$5 for each ounce of gold produced after the first 2 million ounces and up to the 4 millionth ounce; and
- 1% of the Net Smelter Return (NSR) for gold production from the Mining Concessions above 4 millionth ounce.

Second, as described in Section 4.3 above, Barrick retained an NSR royalty of 1.5% on all metals produced from the exploration concessions acquired from Barrick in 2009, should they be developed. The exploration concessions form a contiguous block around the Volcan deposit and include the prospective Ojo de Agua exploration target. In 2013, Franco-Nevada acquired the royalty from Barrick as part of a portfolio. In accordance with the underlying Royalty Agreement Franco-Nevada provided a Notice Letter to Andina Chile, dated December 3, 2013, along with a Royalty Assignment effective as of November 4, 2013. This Technical Report does not contemplate any production from the Franco-Nevada royalty concessions and there are currently no known Mineral Resources stated on the Volcan Project that are subject to this Royalty.

4.6 Permitting Considerations

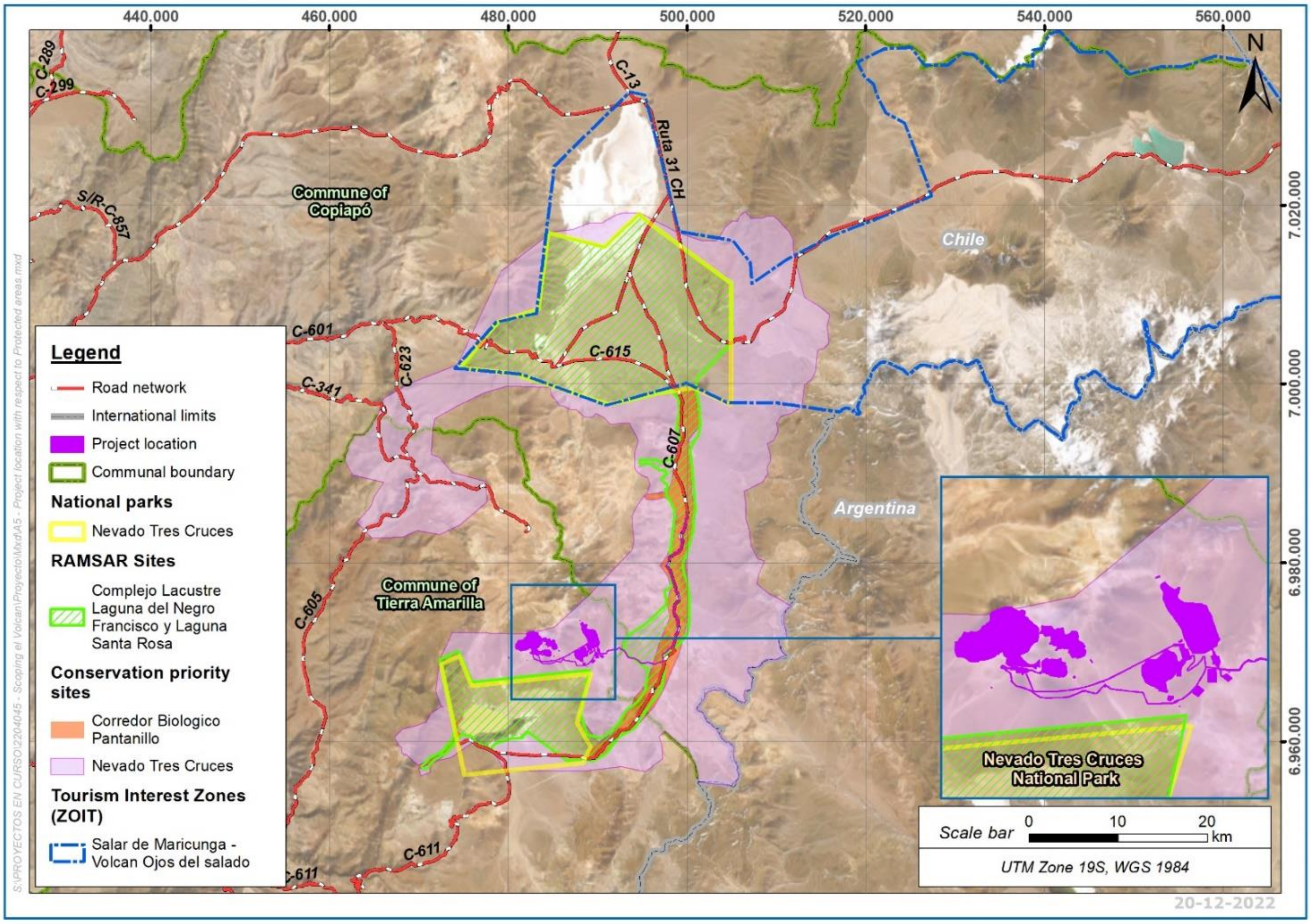
An Environmental Impact Assessment (EIA) of the Volcan Project was submitted by Andina Chile for evaluation by the Environmental Assessment Service (SEA) of the Atacama Region in July 2012. The Baseline studies considered data from 2009 to 2011 for the main environmental components: biota, hydrology, hydrogeology, archaeology, paleontology, social, air quality, noise, vibrations and landscape, among others. These studies were considered for the mine-plant area and for the linear works area, based on the environmental impact analysis, mitigation, compensation and/or repair measures defined.

As part of the EIA review process, the regulatory authorities sent the Consolidated Report Requesting Clarifications, Rectifications and/or Extensions (ICSARA), to Andina Chile dated November 28, 2012. A number of comments were included in the report, which was received by Andina Chile following its acquisition by Hochschild. After receiving the ICSARA, Hochschild decided to withdraw the Volcan Project EIA submission from the SEA. In accordance with the provisions of the existing Mining Law, the Volcan Project will be required to submit an EIA compiled under current regulations. Based on recent experience, the estimated time needed to obtain an Environmental Assessment Resolution within SEA ranges between 18 and 24 months; however, such term is understood to be an estimate only and timeframes required to permit the Volcan Project may vary.

4.7 Environmental Considerations

The main environmental consideration for the Project is derived from its location near protected areas. The main protected areas in proximity to the Project area are the Nevado Tres Cruces National Park and the Laguna del Negro Francisco and Laguna Santa Rosa "Ramsar" site.

Figure 4-5: Project Location



Note: Figure prepared by GAC, 2022.

4.7.1 Nevado Tres Cruces National Park

Nevado Tres Cruces National Park is formalized as a National Park site in Chile. The park's protected vegetation formation is the Desert Steppe of the Andean Salt Flats, which contains the Maricunga Salt Flat and the Santa Rosa and Negro Francisco lagoons. The Project area concessions edges are located 13.1 km from the northern zone of the park and about 900 m from the southern zone of the park near Laguna Negro Francisco.

4.7.2 Ramsar site Laguna del Negro Francisco and Laguna Santa Rosa

According to the Ramsar Sites Information Service, the Laguna del Negro Francisco and Laguna Santa Rosa Lake Complex were designated by Chile as wetlands of International Importance in 1996. The Ramsar site covers a large part of the territory already enacted as a the Nevado Tres Cruces National Park and adds the creek that interconnects the two areas of the park, integrating them as part of the same system. The site includes the area surrounding the two saltwater lagoons connected by the Pantanillo-Ciénaga Redonda biological corridor.

4.8 Social License Considerations

There are several local stakeholders who use the natural resources of the Volcan project area and belong to the area of influence of the project, whom are part of the Colla ethnic group. The Colla ethnic group is recognized by Indigenous Law No. 19,253, which requires the application of Indigenous Consultation, within the framework of ILO Convention 169, among other regulations corresponding to native peoples in Chile.

4.9 Comments on Property Description and Location

The QP is not aware of any significant factors or risks that may affect access, title or right or ability to perform work on the Volcan property by Tiernan. It is the QP's understanding that further permitting and environmental studies will be required in conjunction with further economic studies to demonstrate that the Project is viable.

The Volcan property is large enough to accommodate the infrastructure necessary to host the proposed future mining operations.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The Volcan Project is located approximately 170 kilometers (by road) east of Copiapo in the Atacama Region of Chile. Copiapo lies along the Pan American Highway (Ruta 5 Norte), approximately 800 kilometers north of Santiago. Copiapo has daily air service from Santiago. For access to the Volcan Project from Copiapo, the main route used is Route CH-31, which connects with Routes C-601, C-341 and finally a section of private road to reach the property. Section 18: Project Infrastructure includes additional information regarding access road improvements that are required for the Volcan Project.

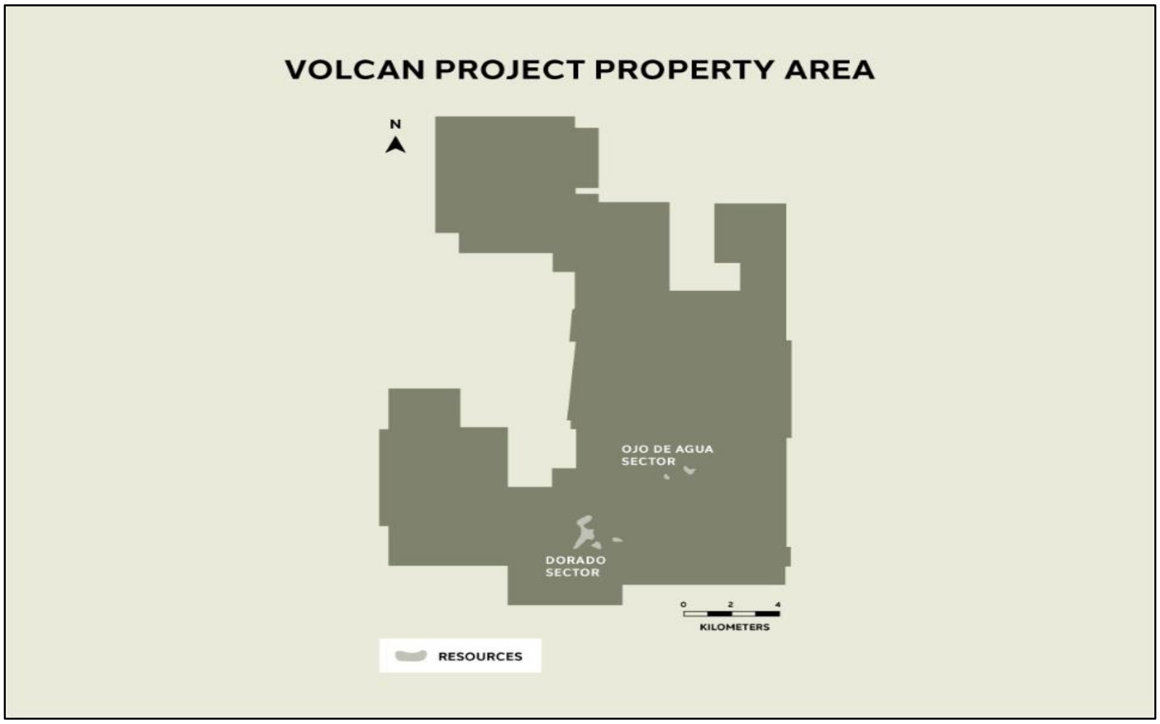
Experienced mine and plant personnel should be readily sourced from Copiapo, or elsewhere in Chile where a generally well trained and experienced workforce exists. Furthermore, Copiapo is a well-established support and logistics center for mining activities in the region.

The property is situated within the Maricunga (gold, silver, copper) mineral belt which contains several operating mines and new mining projects under development as shown in Figure 5-1.

Figure 5-1: Location of Volcan Project

Note: Figure prepared by Tiernan Gold Corp, 2022

Figure 5-2: Volcan Project Property Area



Note: Figure prepared by Tiernan Gold Corp, 2022

5.2 Climate

The Volcan Project lies in a cold tundra climate zone due to the altitude (over 4000 masl) with little or no rainfall. This type of climate is characteristic of the high peaks of the Andes Mountains, where snow and ice persist throughout the year. The average annual temperature is on the order of 11°C and ranges between -30°C at night in the winter months to 20°C during the summer months.

Precipitation in the area is reported to be on the order of 100 mm/y (Geoexploraciones, 2003) and consists largely of snow during the South American winter months of June through September, with sporadic, but intense, rainstorms of short duration occurring during the summer months (January to May).

Because of the high altitudes, strong winds frequently develop in the afternoons and evenings. White outs, which can create hazardous conditions, occur most commonly during the summer months, or what is termed the "Bolivian Winter."

5.3 Local Resources and Infrastructure

Apart from minor secondary roads, there is only limited infrastructure near the Volcan Project area. Copiapo is the nearest regional town for reliable food supplies and potable water. Experienced mine and plant personnel are readily available in the region, especially in Copiapo.

5.4 Physiography

The Volcan property lies in the high Andes between 4,500 and 5,300 meters above mean sea level (masl). The topography is dominated by the Miocene Volcan Copiapo (also known as Volcan or Cerro Azufre) which attains an elevation of 6,052 meters. The main drainage in the area is to the south into Laguna del Negro Francisco at an elevation of 4,130 meters. The northern slopes of the volcano drain northward into Laguna de Santa Rosa and Salar de Maricunga. The principal topographic features of the region are the result of the combination of the horst and graben block tectonics of the Cordillera Occidental and the Cenozoic to Recent volcanism that produced the Volcan Copiapo strato-volcano. The arid climate has preserved the volcanic geomorphology by minimizing erosion.

Due to its geographical configuration, this area has very little vegetation. The most representative species are the cachiyuyos (Atriplex deserticola), calpiche (Lycium minutifolium), tola vaca (Parestrephia lepidopylla) and brea (Tessaria absinthioides).

5.5 Seismicity

The Volcan Project site is located in a complex and active geological and seismic region, to the east of one of the most active plate boundaries on Earth where numerous destructive earthquakes have occurred. A brief description of the main tectonic, geological and seismic features that characterize the project site region is presented below

Seismic and tectonic activity in the surroundings of the Volcan mining project region is governed by the convergence and interaction of the Nazca oceanic plate and the South American continental plate along the Peru-Chile rift. The Nazca plate converges towards the South American plate at an average displacement rate of 80 mm/y and a strike of 80 degrees (east-northeast) in the Volcan Project area.

The continuous convergence and interaction between the Nazca and South American plates has developed progressive deformation and earthquakes along the Peru-Chile subduction trench. These tectonic features, as well as the epicenters and magnitudes of the most destructive past earthquakes in the region.

Due to the above, the configuration and geometry of the seismotectonic model of the subduction zone and its potential to produce significant earthquakes in shallow regions of the Nazca plate and in deeper regions beneath the project site are important features to quantify the level of seismic hazard expected at the Volcan Project site.

In order to understand and characterize the seismic hazard at the project site, information about the major tectonic regions contributing to the seismic hazard has been compiled and interpreted. Based on the tectonic review of the project site surroundings, the seismotectonic model includes:

- The seismic interface region between the Nazca plate and the South American plate. This tectonic region is where shallow seismic events occur (approximately 30- to 50-km depth) and associated with events with large magnitudes (moment magnitude [M_w] greater than 9.0). The February 2010 M_w 8.8 earthquake in southern Chile occurred in this region of the Nazca plate interface, approximately 900 km southwest of the project site.
- The subducted portion of the Nazca plate that lies beneath the western margin of South America. In this portion, earthquakes with deep focus (greater than 50 km depth) and with magnitudes that can reach values of M_w 7.0 to 8.0 occur.
- The South American plate cortex zone. In this region, surface events occur (shallower than 40 km depth) and with magnitudes ranging from M_w 6.0 to M 8.0.

6 HISTORY

6.1 Exploration History

The first formal evaluation of the gold potential of the Volcan area was carried out by Zentilli (1990), who recognized that sulphur mineralization and the surrounding alteration were the result of high-level, high sulphidation hydrothermal systems related to deeper intrusive activity, and established that the sulphur carried anomalous arsenic, antimony, mercury and gold.

The property was optioned by the Chilean subsidiary of Homestake Mining Company (Homestake) in 1990, which identified a gold geochemical anomaly and then conducted mapping and Reverse Circulation (RC) drill program. Further work, including a 15 line-km IP geophysical survey, resulted in identification of three target areas that are equivalent to the Dorado Central, Oeste and Norte nomenclature adopted later by Cameco Corp. (Cameco). The property was returned to the owners by Homestake in 1993 as not meeting corporate objectives.

In 1994, the property was optioned to Compañía Minera Cameco (Chile) Ltda., the Chilean subsidiary of Cameco, which carried out exploration work until 1997. This work included mapping, re-logging of some drill material, additional assaying and metallurgical and petrographic studies. The option was dropped for reasons including the then perceived low tonnage and grade potential and unfavourable metallurgical results.

The QP has no knowledge of the drilling contractor(s) which executed the drilling program for Homestake. On behalf of Cameco, Harris y Compañía Ltda. of Antofagasta performed the RC drilling and Geo Operaciones S.A. of Copiapo performed the diamond drilling (DD).

The exploration programs conducted by Homestake and Cameco are summarized in Table 6-1.

Table 6-1: Homestake and Cameco Exploration History

Area Drilled	Drill Hole Information	Homestake/Cameco
Dorado Oeste	No. of holes	29
	RC holes (m)	3,724.00
	DD holes (m)	1,008.00
	Mixed (m)	0.00
	Total (m)	**4,732.00**
Dorado Este	No. of holes	27
	RC holes (m)	2,260.00
	DD holes (m)	2,288.85
	Mixed (m)	0.00
	Total (m)	**4,548.85**
Dorado Central	No. of holes	6
	RC holes (m)	928.00
	DD holes (m)	0.00
	Total (m)	**928.00**
Total drilling	No. of holes	62
	RC holes (m)	6,912.00
	DD holes (m)	3,296.85
	Mixed	0.00
	Total (m)	**10,208.85**

Andina Chile carried out seven phases of exploration at the Volcan property, starting with the 2004 to 2005 field season and ending in the 2010 to 2011 field season. These are described in Sections 9 and 10 of this Report.

Andina Minerals Inc. was acquired by Hochschild in 2013 and as a result Andina Chile has been owned by Hochschild since 2013.

6.2 Mineral Resource Estimates

There are a number of previously published resource estimates which were included in the Technical Reports posted by Andina Minerals on the SEDAR website up to the time Andina Minerals was acquired by Hochschild. All of these mineral resource estimates have been superseded by the one contained in Section 14 of this Technical Report and will not be discussed further in this Report.

6.3 Production

There has been no mineral production from the Volcan property.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Maricunga gold belt extends over a distance of approximately 150 km from north to south and is approximately 30 km wide, close to the border with Argentina. Mineralization is related to the emplacement of Miocene age calc-alkaline volcanic and sub-volcanic units over basement rocks of Paleozoic to Cenozoic age. The Maricunga belt hosts a number of gold and gold-copper (silver) deposits including La Coipa, Maricunga, Aldebaran, La Pepa, Soledad, Pantanillo, Lobo, Escondido and Marte.

Figure 7-1 depicts the regional geology and relates the location of the Volcan Project to other gold-silver (copper) deposits of the Maricunga metallogenic belt.

7.2 Property Geology

The structural setting of the Volcan property is related to, and associated with, the formation of the Copiapo stratovolcano (Volcan Copiapo) and may also be related to regional northerly-trending high-angle reverse faulting (Figure 7-2). Cameco identified three generally moderate to steeply dipping fault systems, trending northwest-southeast, northeast-southwest and east-west, and considered the northeast-southwest and east-west trending systems to be the more important structural controls on alteration and mineralization.

The principal rock types identified on the Volcan property are:

- dacite, rhyodacite and andesite lavas;
- volcanic flow and dome complex rocks;
- pyroclastic flows;
- hydrothermal breccias; and
- sub-volcanic porphyry.

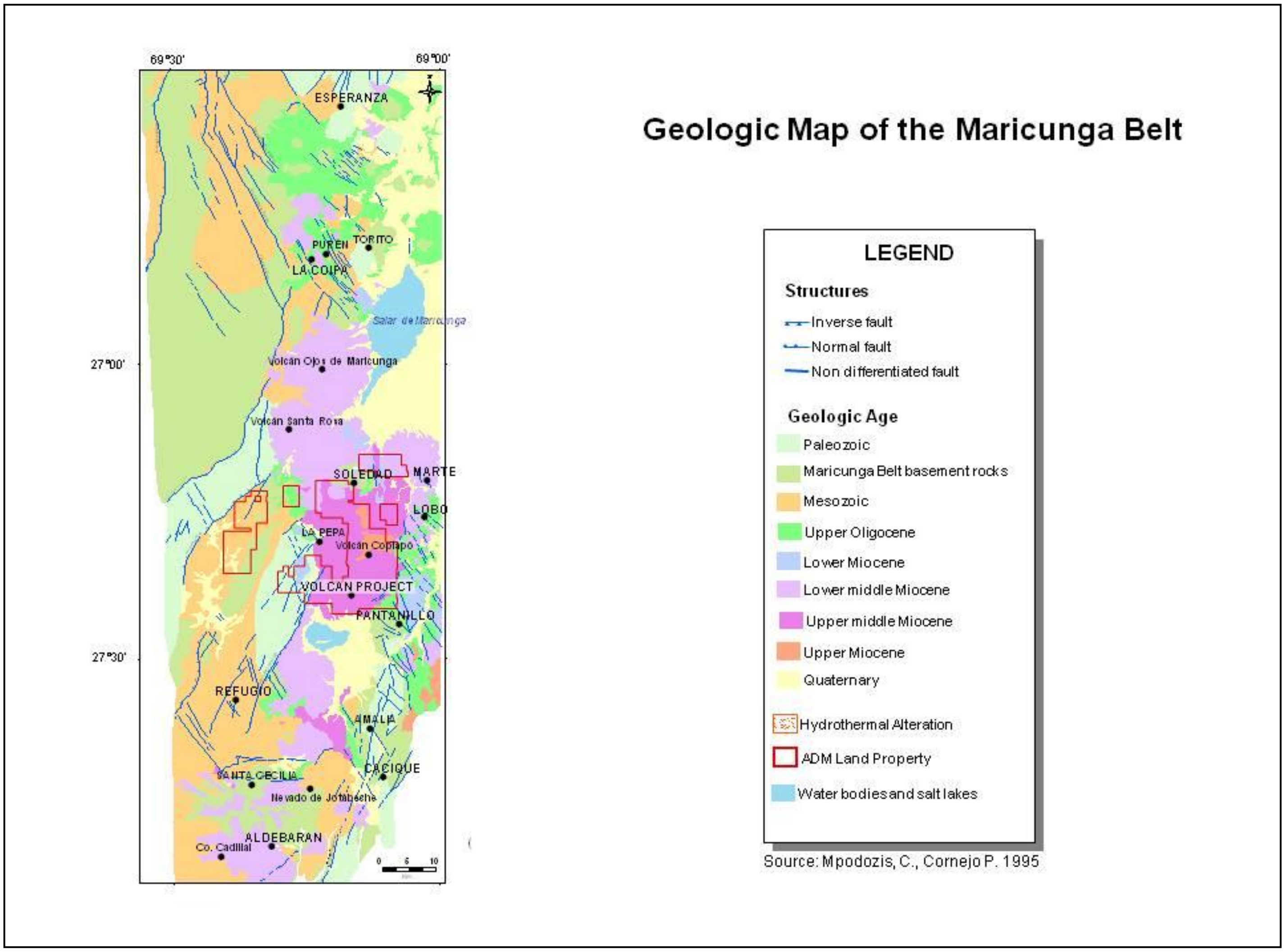
Each of these rock types has a number of sub-units.

Alteration is prevalent and has been divided into the following principal categories:

- Acid leaching with silica, alunite, gypsum, pyrophyllite and sulphur.
- Intermediate to advanced argillic alteration represented by a quartz-alunite-illite-smectite-kaolinite-chlorite assemblage.
- Moderate to intense silicification resulting in cryptocrystalline silica with lesser alunite and clay minerals.
- Transitional alteration between potassic, chloritic and argillic alteration, most commonly visible affecting feldspars hosted in dacite and andesite.

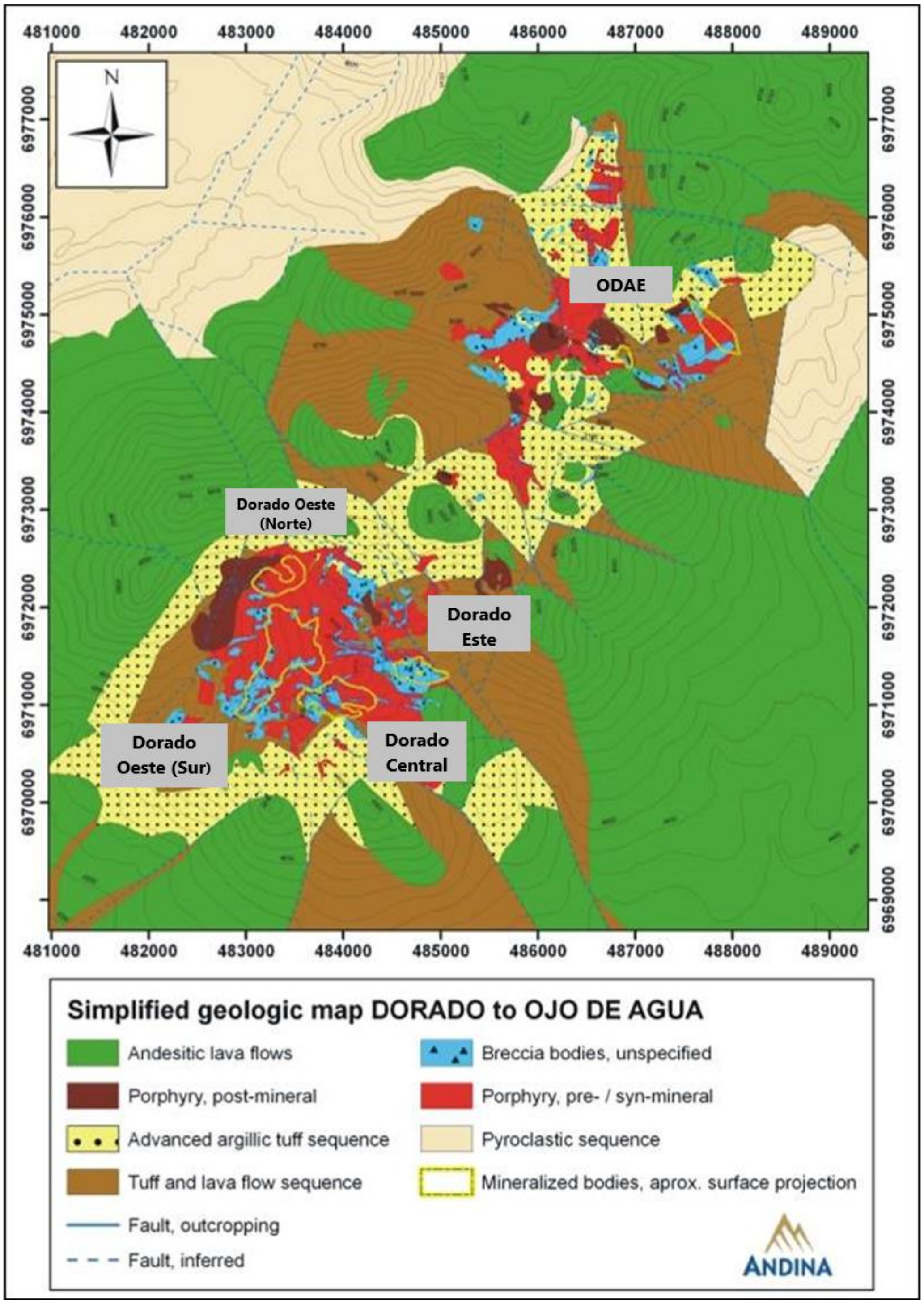
- Potassic alteration, the presence of remnant secondary biotite and potassium feldspar as halos around quartz veinlets.
- Propylitic alteration which is only present in volcanic flows surrounding the principal alteration zones.

Figure 7-1: Generalized Map of Regional Geology and Location of Maricunga Metallogenic Belt



Note: Figure taken from the 2011 Micon Technical Report.

Figure 7-2: Simplified Geological Map of the Dorado to Ojo de Agua Este (ODAE) of the Volcan Property (Dorado Deposits outlined at bottom left, ODAE outlined at top right)



Note: Figure taken from the 2011 Micon Technical Report.

Gold-copper mineralization at Volcan is related to the intensely developed hydrothermal alteration that gave rise to the native sulphur deposits (Bartlett, 2004). The hydrothermal system was a consequence of the sub-volcanic intrusion of dacitic to microdioritic porphyry into a complex of domes and lava flows of dacitic composition.

7.3 Mineralization

Easdon (2005) describes the gold mineralization as follows:

"The generation of this sulphur [i.e., the native sulphur], with associated and anomalous mercury, arsenic, antimony and gold, was recognized (Zentilli, 1990) to be related to near-surface, but deeper seated multiple hydrothermal high sulphidation epithermal systems which are developed in a complex of domes and lava flows of dacitic composition. The hydrothermal system(s) are considered to be related to sub-volcanic intrusion of dacitic to (micro)-dioritic porphyries into the volcanic dome complex. These systems have resulted in (probably) several episodes of very high-level acid leaching of the host rocks (with the resultant advanced argillic and argillic-silicic style of alteration) and the development of quartz-alunite-gypsum, as well as silicified vents with hydrothermal explosion breccias which may be impregnated with sulphur. Gold-(copper) mineralization, which occurs at some depth (dependent on the degree of telescoping of the system) below the surface manifestation of the solfataric systems, is "often identified in "swarms" of banded quartz veinlets" and which may occur "within transitional potassic-argillic altered rock" (Bartlett, 2004). Magnetite (partially to totally martite-altered) and secondary biotite are also described as alteration products (Geoexploraciones, 2003). Lower grade gold mineralization appears to be related to a phase of disseminated sulphide (primarily pyrite) mineralization which is typically associated with an argillic-silicic alteration."

"The mineral occurrences in the Dorado Sector of the Volcan Property comprise a combination of primarily gold bearing quartz-sulphide (predominantly pyrite) veinlets with peripheral lower (< 0.5 g/t Au) grade gold associated with disseminated pyrite developed in largely advanced argillic-silica altered fragmental tuffaceous and porphyritic dacitic volcanic, as well as in dacitic dome complex rocks. Similar style mineralization is encountered in ODAE in which exploration was initiated in 2006. The mineralization is variously hosted in (or intimately related to) silicified hydrothermal breccias, in the permeable tuffs and otherwise previously prepared and permeable altered volcanics, and in dacitic dome breccias which may have formed peripheral to the dome cores. These occurrences are associated with the + 8-10 Ma Miocene formation and subsequent partial destruction of the Volcan Copiapo stratovolcano and related sub-volcanic intrusive events which are responsible for the extensive and widespread high-level hydrothermal (high sulphidation epithermal style) alteration and mineralization. The mineralization is contained within the altered dacitic rocks and is associated with faults, hydrothermal breccias and brecciated dome boundaries. The location of the mineralization in part appears to be controlled by the dilational (jog) structures and in part by the permeability/porosity of the dacitic tuffs, including previous alteration events. Andina Chile geologists have constructed graphs of the available drill hole geochemistry and have determined that the metal correlations are more characteristic of Au-Cu-Mo porphyry type mineralization than the metal correlations are for an epithermal type of mineralization for the Dorado Sector. Although Au and As at shallow depths are closely correlative, this correlation appears to fall off/dissipate with depth; mercury has a weak correlation with both Au and As."

The Volcan property covers the Dorado sector (Dorado Este, Central and Oeste zones, of which the latter has been sub-divided into the Oeste Norte and Oeste Sur zones) and ODAE which lies to the northeast of Dorado. The following descriptions of the Dorado deposits have been summarized from Easdon (2005). The mineralized zones, at the moment, are defined by mineralized grade cut-off to constrain the extent of the mineralization and this may be subject to change depending on the interpretation of the mineralization by a QP. Therefore, as the Project is advanced the boundary of the deposits may be subject to change as further information is acquired or the geological interpretation is altered. The extent of the mineralization for each of the interpreted mineralized zones is shown in Figure 7-2, vertical extents of mineralization are indicated in the drilling cross-section figures in section 10.3.1

- **Dorado Este (DE)**

"The Dorado Este mineralization and deposit is contained within dacitic tuffs and dacite porphyries which show extensive advanced argillic and argillic-silica alteration and with the development of a generally centrally located irregularly shaped, hydrothermal breccia pipe. Initial geological mapping indicates that the mineralization is grossly banded in an east-west sense and that the mineralization dips steeply to sub-vertically. The emplacement of the mineralization may be in part controlled by the intersection of WNW and NNW steeply dipping structures; the NNW structures may be terminating, or down dropping, the mineralization on both the east and west sides of the >0.2 g/t Au geochemical anomaly which defines the Dorado Este area. The western extension of the mineralization may also be partially limited by a post-mineral intrusive which is located approximately 200 m to the west of currently [i.e., in 2005] defined western limit of the deposit."

- **Dorado Central (DC)**

"The Dorado Central zone is hosted by the same rocks and has undergone similar alteration to that seen in the Dorado Este zone. Host rocks to the mineralization comprise dacitic domes and dacitic tuffs and dacitic porphyry flows with the accompanying and localized development of hydrothermal breccias. The geochemical sampling that has been done in this zone [i.e., to 2005] indicates that this zone is apparently part of the roughly east-west dilational jog zone as seen at Dorado Este but which is offset approximately 600 m to the SW of the Dorado Este zone and is located approximately 200-300 m west of Dorado Este."

- **Dorado Oeste (DO)**

"The Dorado Oeste zone is defined by what is an essentially northerly (NNE) trending somewhat discontinuous geochemical anomaly (>0.2 g/t Au) which is approximately 1.75 km long (N-S) and up to 500 m wide. Dorado Oeste is predominantly underlain by dacticic tuffs and porphyries and has apparently been intruded by at least two variably continuous NE trending dacitic dikes."

7.4 Geological and Mineralogical Work Conducted Since 2011

Hochschild has conducted a number of studies related to the Project since completing its acquisition of Andina Chile in February, 2013. As a result of this work, a new preliminary model for the Volcan deposit has been proposed. However, both Hochschild and Tiernan believe further work is necessary before this geological and mineralogical model can be used as the basis for the Project. Length, width, depth & continuity of mineralization at Volcan is subject to geological interpretation. The first 2010 model was based on 100ppm & 300ppm grade shells whereas the new preliminary model proposed by Hochschild since acquiring Andina Chile focuses more on a geo-metallurgical interpretation, therefore, at this time, the true extent of the Volcan mineralization will be clarified once the further work has been conducted by Tiernan. Further drilling, metallurgical testwork & geological interpretation of the existing cores will establish which geological interpretation Tiernan will adopt.

7.5 Micon QP Comments

The Maricunga gold belt is a prolific mineral belt in Chile which hosts a number of gold mines. Generally, the style of hydrothermal mineralization found in the Refugio district of the Maricunga belt is well recognized and Andina Chile has based its exploration strategies on this style of mineralization. As with all mineral deposits, there is variation within deposits themselves no matter how well known the deposit or mineralization styles are, and Andina Chile has been taking this into account during its exploration campaigns. Further geological and mineralogical work is warranted as this refines the knowledge of a particular deposit better and can possibly lead to further discoveries of economic mineralization at the Project or optimize the existing economic mineralization.

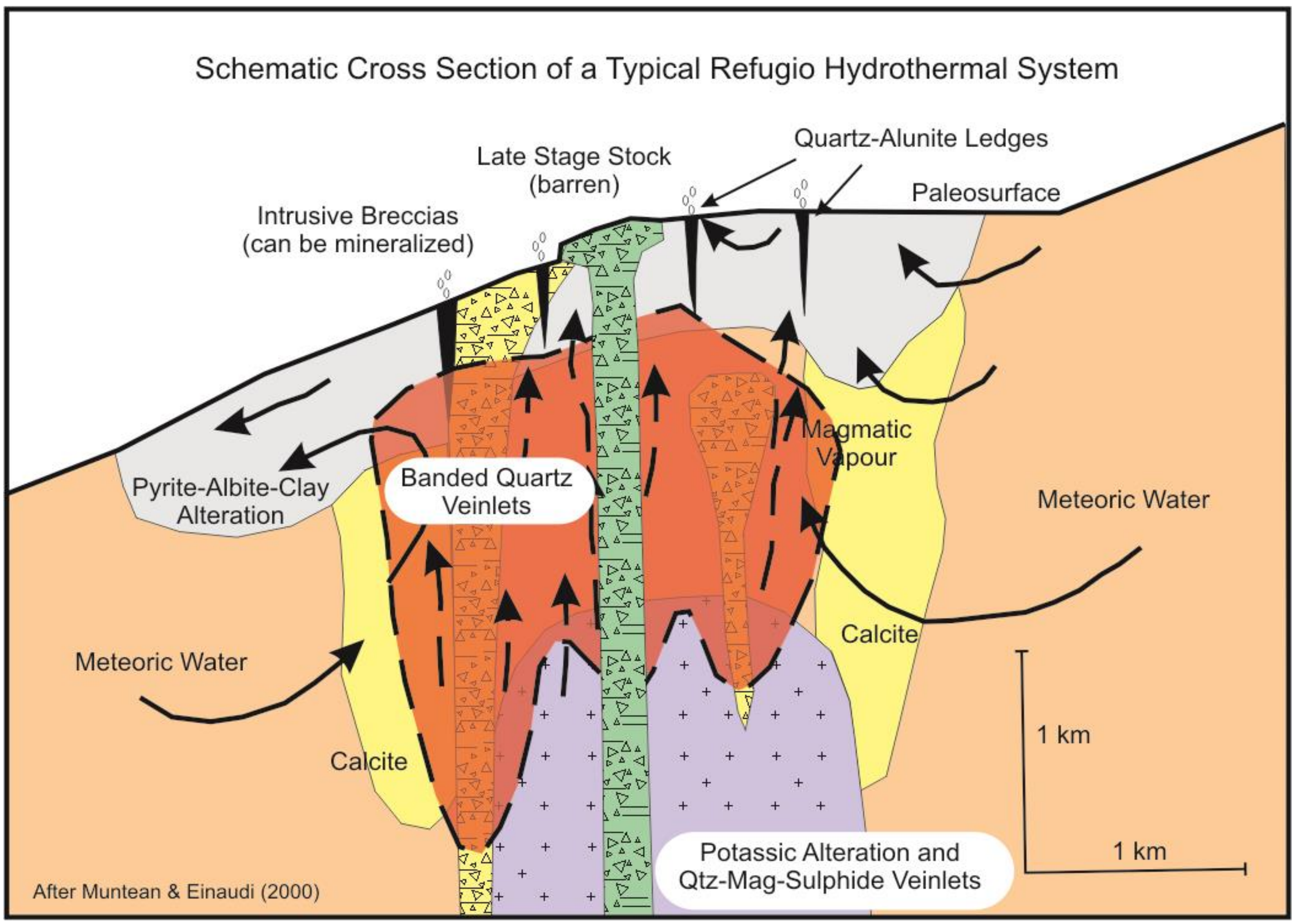
8 DEPOSIT TYPES

This section was extracted from the January, 2011 Volcan Technical Report which drew upon the work on Muntean and Einaudi (2000).

8.1 Deposit Model

A description of the style of hydrothermal mineralization found in the Refugio district of the Maricunga belt is provided by Muntean and Einaudi (2000) as summarized below and is illustrated in Figure 8-1.

Figure 8-1: Schematic Cross-Section Showing Reconstruction of a Typical Refugio Hydrothermal System



Note: Figure taken from After Muntean & Einaudi (2000)

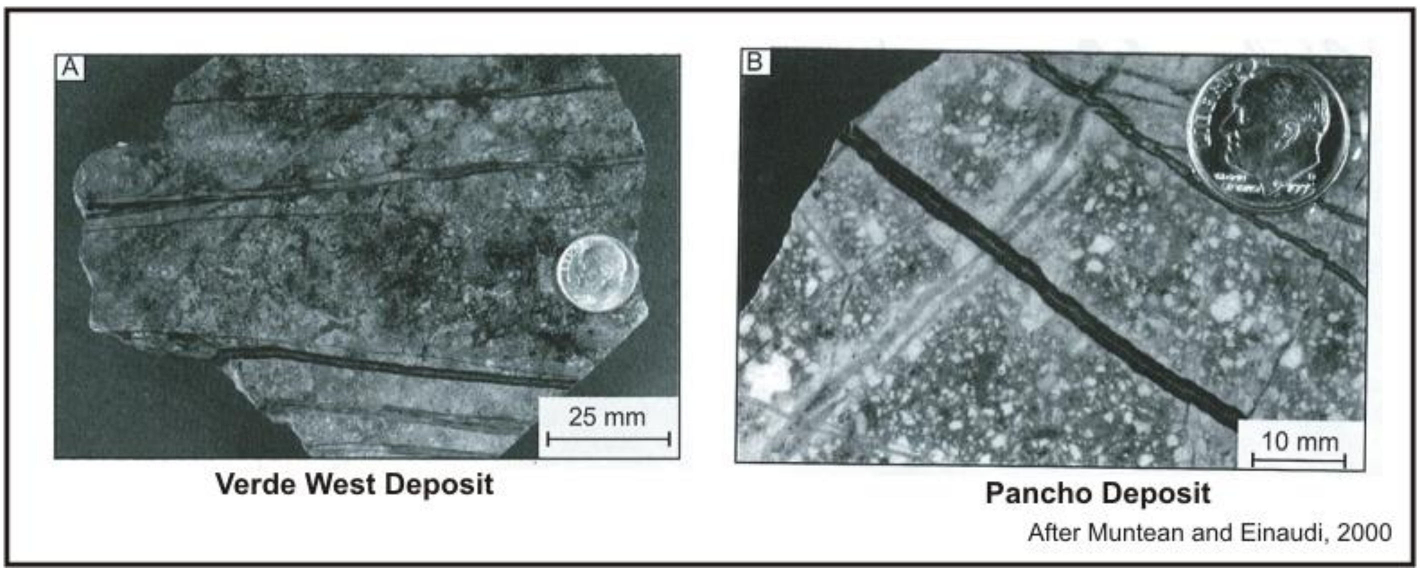
"The Maricunga belt is a region of numerous gold-silver-copper prospects and deposits in the high Andes of northern Chile. Zones of hydrothermally altered rocks give rise to strong colour anomalies detectable by satellite imagery and aerial photography. Several of the altered zones host significant metal concentrations including high sulphidation epithermal gold-silver deposits (La Coipa, La Pepa) and porphyry gold-copper deposits (Refugio, Aldebaran, Marte, Lobo)."

"Three main structural trends are present in the Maricunga belt. First, north to northeast-trending high-angle reverse faults that bound basement rocks are probably coincident with the onset of flattening of the subduction zone. A second structural trend consists of northwest-striking normal faults, dikes and veins, suggesting southwest-northeast extension. A third structural trend is defined by east-northeast satellite lineaments interpreted as dexteral shear zones that mark the southern boundary of the Altiplano-Puna plateau."

"Gold mineralization at Verde is hosted by a composite intrusive center consisting of massive dacite porphyry emplaced before mineralization, intrusive breccia bodies emplaced during mineralization, and small stocks of quartz diorite porphyry emplaced during the final stages of mineralization. The main host rock at Verde West is a body of intrusive breccia, 800 m in diameter, with contacts dipping within 10° of vertical. The breccia body cuts dacite porphyry and volcaniclastic breccias of the andesite flow and breccia unit. Quartz veinlets hosted by intrusive breccia and dacite porphyry are commonly truncated at steep contacts with late quartz diorite porphyry. Vein abundance in the quartz diorite porphyry at Verde West decreases from 2.5 volume percent along its margins to mostly less than 0.25 percent in its interior. Quartz diorite porphyry in the center of the Verde East orebody contains no quartz veinlets.

"In addition to containing hydrothermal features similar to those at Verde, the Pancho deposit also contains alteration and veinlet styles that are similar to those observed in porphyry copper and porphyry gold deposits." (See Figure 8-2).

Figure 8-2: Examples of Styles of Quartz Veining at the Verde West and Pancho Deposits, Refugio District



Note: Figure supplied by Andina Minerals Inc. in 2010.

"Sets of early quartz-magnetite-sulfide veinlets, here termed A-veinlets, are associated spatially with potassically altered rocks and are restricted to intrusive rocks. Quartz is pale gray and has a distinct sugary texture in hand sample. Pyrite occurs in some A-veinlets on the outer margins of the deposit. Where pyrite and magnetite are present together, textures indicated replacement of magnetite by pyrite. The progression from discontinuous hairline streaks to more continuous, wider veinlets suggests more sustained brittle behavior with time. However, discontinuous varieties locally crosscut the more continuous, wider veinlets, suggesting A-veinlets could have formed in a cyclical fashion as noted at El Salvador."

"Gold was not directly observed at Pancho. However, its paragenesis can be deduced from the pattern of surface gold grades. A fairly continuous zone of gold grades between 0.5 and 1 ppm coincides closely with pervasive potassic alteration and A-veinlets in the intrusive rocks. Gold grades of >1 ppm occur where there are sets of sheeted banded quartz veinlets. The highest grades in the intrusive rock also coincide with pervasive magnetite-K feldspar-oligoclase alteration. Zones with gold contents greater than 0.5 ppm in the overlying volcanic rocks are mostly less than 10 m wide and are associated directly with sets of sheeted, banded quartz veinlets that decrease in abundance with increasing distance from the intrusion. Zones of >0.05 ppm gold extend to about 150 m beyond the outer limits of banded quartz veinlets.

"The gold deposits at Refugio are hosted by andesitic to dacitic sub-volcanic intrusive centers. There is a close spatial and temporal association between gold and stocks of quartz diorite porphyry with microaplitic groundmass and irregular bodies of intrusive breccia. Gold mineralization is genetically related to a specific type of quartz veinlet, consisting of banded quartz-magnetite. Because other types of quartz veinlets are present at Refugio, recognition of veinlet types is crucial in determining the location of highest gold and copper grades. The deepest zone, as exemplified by Pancho, is similar to gold-rich porphyry copper deposits. It is characterized by sugary, irregular quartz veinlets (A-veinlets) in pervasive potassic alteration. The magnetite content approaches 5 vol percent and the total sulphide content is less than 2 vol percent with chalcopyrite as the main sulphide mineral. Zones of A-veinlets without banded quartz veinlets contain the highest hypogene copper grades at 0.1 wt percent and gold grades range from 0.5 to 1 ppm. Thus, ratios of copper to gold (% Cu/ppm Au = ~0.1) in zones of highest copper grade are lower than those in gold-rich porphyry copper deposits (% Cu/ppm Au = 0.39-1.5).

The porphyry copper-like environment at Pancho is overlain and locally superimposed by an intermediate zone of banded quartz veinlets that appear to be unique to porphyry gold deposits. At Verde, the zone of banded quartz veinlets constitutes the ore zone and is associated spatially with albitic alteration of plagioclase. The banded veinlets, which lack alteration halos, locally occur in sheeted sets with distinct structural orientations, as seen in the radial-concentric patterns at Verde. Gold occurs paragenetically early in dark bands with micron-sized magnetite and rare copper-iron sulphides and paragenetically late with pyrite and gangue minerals in vuggy vein centers, in fractures that cut the dark bands and along the vein margins. In zones of abundant banded veinlets without early A-veinlets, gold grades are commonly 1 ppm and copper grades are <0.05 wt percent. Ratios of copper to gold achieve their lowest values (% Cu/ppm Au = ~0.03) in these zones.

8.2 Micon QP Comments

Andina Chile has conducted its exploration based on the style of hydrothermal mineralization found in the Refugio district of the Maricunga belt. Hochschild has conducted a number of further studies related to the Project since completing its acquisition of Andina Chile in February, 2013. As a result of this work, a new preliminary model for the Volcan deposit has been proposed but still based on the style of mineralization found within the Maricunga belt. However, both Hochschild and Tiernan believe further work is necessary before this geological and mineralogical model can be used as the basis for further exploration and economic studies. Micon's QP has examined the models and agrees that the new model needs further work prior to being used as the basis of further exploration and economic studies and that once it is able to be used it could refine the current model.

9 EXPLORATION

9.1 Andina Chile Exploration Programs

9.1.1 General Property Exploration

Andina Chile has carried out its exploration programs with its own staff supported by SBX Asesorías e Inversiones Ltda. and related company, SBX Consultores Ltda, collectively SBX. Hochschild acquired Andina Chile in 2013.

Most of the exploration programs were related to conducting infill and exploration drilling to expand the resources identified at the Volcan Project, and these are described in Section 10 of this Report. However, Andina Chile's Phase V surface-based exploration activities were undertaken on the Volcan Project between October, 2008 and May, 2009, as follows:

- Azufrera sector (sulphur): Recognition, sampling and evaluation of native sulphur occurrences. A total of 365 samples (trenches and chips) were taken, with maximum assays of 43% S and an average of 17% S found in the Torre Corfo sector. Three RC drill holes were completed (total 192 m) that suggested a thickness of 20 m for this sulphur deposit, with an average of 20% S in the native state and a peak value of 38% S. A weakly anomalous of gold value of 38 ppb was detected.
- Paton Creek sector (limestone): Recognition and evaluation of the calcium carbonate ($CaCO_3$) content of the limestone deposits in the area. The work included sampling of five profiles in a vertical wall and completion of 6 DD holes (total 250 m). The purpose of the drill holes was to define the grade and continuity of the limestone beds at Quebrada Paton (Echaurren).
- Dorado, Florencia and Andrea sectors: Geological mapping completed at a scale of 1:5,000. Selective sampling was undertaken on narrow veins of varying compositions, as well as detailed geological/alteration/structural mapping of trenches and outcrops, refinement of geological unit definitions and stratigraphic relationships.
- A district-scale geological map at a scale of 1:25,000 was prepared, focusing on structures, narrow veins/veinlet distribution and composition, alteration styles, and intensity of silicification of portions of the property.

Between the district-scale and detailed exploration, a total of 251 selective samples (chips of narrow veins of varying compositions) were collected and described, and were analyzed for gold, copper and molybdenum. The gold content was found to reach up to 336 ppb Au.

Phase V was followed by the 2009 to 2010 exploration program (Phase VI) which was conducted between November 16, 2009 and May 4, 2010. In Dorado Oeste (DO) the main focus of this phase was to conduct further infill drilling, as well as to explore the possibility of porphyry copper style mineralization at depth and detect lateral extensions of gold mineralization on Sections 1250, 1200 and 1300. In addition, detailed exploration was started at the ODAE Prospect.

9.2 Ojo de Agua Este Prospect

The Ojo de Agua Este (ODAE) prospect is located 6.5 km northeast of the Dorado deposits and 3 km due east of Andrea and Florencia prospects. Together with the latter two, it is a significantly mineralized area on the Volcan property.

Geological mapping, trenching, a ground magnetic survey and drilling, together with corresponding surface, chip-channel, drill chip and core sampling, were carried out in the exploration program (Table 9-1). Stereoscopic Ikonos satellite imagery of the whole district was taken during the field season and used as a base for mapping.

The area of principal interest in which all the drill holes and most of the trenches are located covers 1.5 km^2.

Table 9-1: Summary of the Exploration Work Undertaken in ODAE during 2009-2010

Work Program	Number	Metres	Number of Samples Taken	Assay Analysis
Drill Holes	10	2,375.45	1,158	Au, Cu, Mo
Trenches in ODAE	23	7,405.00	1,765	Au, Cu, Mo
Surface Samples	132	Na	132	Au, ICP (48 elements)
Ground Magnetic Survey		14.4 km^2		Na

Note: Table supplied by Andina Minerals Inc. for the 2010 Micon Technical Report.

All assays were performed by Geoanalítica Ltda, (Geoanalítica) in Coquimbo (Au, Cu, Mo) and Acme Analytical Laboratories S.A., in Pudahuel (ICP), with the geophysics conducted by Argali Geofísica E.I.R.L. Geoanalítica is an ISO 9000:2001 certified laboratory. Acme stated on its website that its laboratories in Santiago achieved ISO 9001:2000 certification in 2005. Acme was acquired by Bureau Veritas in February, 2012.

9.2.1 Geological Mapping

Large scale geological mapping was carried out over the property (refer to Figure 7-1 and Figure 7-2). In addition, more detailed geological mapping was done over the prospect area and the trenches. Mapping was annotated onto paper copies of the Ikonos image, using a handheld GPS to mark the location. This information was then scanned and transferred to the ArcGis mapping program for digitizing. Data on the geological structures were entered into Excel spreadsheets for incorporation onto the mapping.

9.2.2 Trenching and Channel Sampling

A total of 7.4 km of trenches were cut to bed rock where possible using a bulldozer and, to a lesser extent, a back-hoe and subsequently chip/channel sampled over 5 m continuous intervals. The chip/channel samples consist of one or more continuous samples of mineralized or altered rock collected with hammer and chisel over a measured interval and were from areas of outcrop and/or from trenches. The sample locations were determined during the sample collection using a handheld GPS and subsequently confirmed by surveying the points.

9.2.3 Surface Rock Sampling

A total of 132 rock chip samples were taken over the prospect area. The vast majority of these are selected samples of geological features of special interest (principally veining, alteration and brecciation) taken to establish the presence or lack of gold mineralization.

9.2.4 Drilling Program

Major Drilling Chile S.A. (Major Drilling), located in La Serena, carried out 2,375 m of drilling in 10 holes (2,242 m RC and 133.5 m of DD). Both methods were beset by problems with ground conditions, particularly faulting and high-water pressures and, as a result, the planned depths of most holes were not attained. The early onset of winter finally curtailed the diamond drill program in May, 2010.

The drill holes were situated on the basis of information obtained from the geological mapping and trench and drill sample geochemistry, as these became progressively more available.

All holes were surveyed “down-the-hole” by Servicios Geofísicos Comprobe Limitada from Santiago. The holes were nominally surveyed every 10 m.

The core cuttings and drill core were logged at the camp. Assay samples were taken every 2 m and sent to the Andina Chile’s facilities in Copiapo for the insertion of blanks and standards. In addition, the diamond core was cut using a saw, and sent for preparation and analysis to the laboratory of Geoanalítica Limitada.

The drill data were processed and modeled using GEMS 6.2 (Gemcom software).

9.2.5 Ground Magnetic Survey

Argali Geofísica E.I.R.L. completed 20.4 line-km of a ground magnetic survey of the ODAE Prospect and adjoining areas using a GSM-19W v70 magnetometer. Lines were oriented north-south and spaced at 50 m intervals with readings about every metre. The following products were prepared: Total Field, Pole Reduced, Horizontal and Vertical Derivatives (dX, dY, dZ), Tilt Derivative, Analytic Signal (J. Jordan 2010).

9.2.6 Sample Preparation and Analysis

All of the samples were delivered by the Andina Chile personnel to Geoanalítica Limitada’s sample preparation facility in Copiapo, where they were crushed and then shipped by Geoanalítica to its assay facility located in Coquimbo. Geoanalítica analyzed the drill and trench samples for gold, copper and molybdenum. The gold assays were performed utilizing 50 g fire assay with an Atomic Absorption Spectroscopy (AAS) or gravimetric finish; the Cu and Mo were assayed using standard wet analytical techniques. Sample pulp splits of chip and drill hole samples were subsequently sent by Geoanalítica to the ALS Chemex (ALS) laboratory (also in Coquimbo) for multi-element inductively coupled plasma (ICP) analysis on 48 elements. ALS Quality Management System (QMS) framework follows the most appropriate ISO Standard for the service at hand i.e., ISO 9001:2015 for survey/inspection activity and ISO/IEC 17025:2017 UKAS ref 4028 for laboratory analysis.

9.3 2010 to 2011 (Phase VII) ODAE Prospect Exploration

The description of the Phase VII ODAE Prospect Exploration has been extracted from the September, 2011 Technical Report by Easdon.

During the 2010-2011 exploration field season at ODAE, Andina Chile conducted the following exploration activities: geochemical soil sampling, additional trench sampling, and trench geological mapping (1:1000) scale, and which included RC and DD drilling, as summarized in Table 9-2. This exploration work was designed to further advance the definition of the mineralization that had been discovered in the 2010 field season.

The drilling was performed by Geotec Boyles and the down-the-hole surveying was performed by Data Well Services Ltda. of Copiapo.

Table 9-2: Summary of the 2010 to 2011 Exploration Conducted at the ODAE Prospect

Work Program	Number	Metres	Samples Taken	Assays
Drill Holes (RC, DD and RC-DD)	33	10,831.7	5,211	Au, Cu, Mo
Trenches	16	6,185	1,088	Au, Cu, Mo, ICP 48 elements
Soil Samples	50	na	50	Au, ICP (48 elements)
Thin Section and Polished Sections Studies	13			
Density Studies	76			
Metallurgical Tests (BRTL)	1		1	
IP and Resistivity Survey	10 lines	20.4 km	na	na

Note: Table taken from the September, 2011, ODAE Technical Report.

The approximate area of the geochemical soil sampling, which included the area within which the trenching and sampling was conducted, is approximately 5.5 km x 2.5 km. The soil samples were generally taken as extensions of the previous Barrick sampling grid. The samples were taken on 200 m centres and totaled 50 samples at ODAE. The sampling conducted on the flanks of the principal area of interest were taken at greater interval. Each sample consisted of 12 sub-samples weighing 0.5 kg each, taken at 5 -10 m north, east, south and west of the sample point. The sub-sample was taken from the upper 20 cm of the surface; the material was sieved to -10 mesh with the fine faction being discarded and the coarse faction bagged for assaying. The geochemical soil sampling clearly defined the principal area of interest, as well as two smaller zones with lower grade anomalous gold.

The locations of the soil samples were noted using a handheld GPS unit, and the degree of (high-level) hydrothermal alteration was mapped. This alteration ranged from weak to strong advanced argillic and weak to moderate intermediate argillic, where the Quaternary gravel did not mask any underlying alteration.

A total of 6,185 m of trenches were cut into mineralized or altered rock bedrock (as guided by the geologic mapping and/or by the soil sampling) where possible with a bulldozer and/or a back-hoe and then continuously (hammer and chisel) chip-channel sampled over 5 m intervals to the extent possible. The chip-channel samples were taken from trenches and outcrop. Sample locations were first surveyed by handheld GPS and then by topographic survey. The surface rock chip samples were selectively taken where mineralized and/or altered outcrop was encountered (and mapped).

The assaying for Au, Cu and MO was performed by the Geoanalítica Laboratory in Coquimbo. The gold assays were performed utilizing a 50 g fire assay with an Atomic Absorption Spectroscopy (AAS) or gravimetric finish; the Cu and Mo were assayed using standard wet analysis techniques. The detection limits were 5 ppb Au, 3 ppm Cu and 3 ppm Mo. Sample pulp splits of the soil samples were subsequently sent by Geoanalítica to the ALS Chemex Laboratory, also in Coquimbo, for 48 element ICP analysis.

Andina Chile also contracted Argali to conduct an IP/Resistivity survey across what was originally considered to be the orientation of the mineralized/altered zone. Argali ran ten north-south lines survey for a total of 20.4 km, with readings being taken at 100 m intervals along the lines utilizing an Elrec Pro receiver and a GDD 3600 transmitter. The lines were spaced at 350 m intervals on what was interpreted to be the northern and southern flanks of the principal geochemical anomaly and then at 175 m intervals across the stronger central portion of the anomaly. The area covered by the IP-

Resistivity survey was 2,450 m east-west x 2,100 m north-south, or 5.145 km^2. The IP-Resistivity survey was undertaken to assist in defining the zones of sulphide mineralization and potential deeper seated telescoped Maricunga porphyry style Au + Cu and Mo mineralization, as seen to the west in the Andina Chile Dorado deposits.

The mapping of the 2011 trenches was performed at a scale of 1:1000 on grid paper and the data transferred to geologic maps. A handheld GV mapper devise was used to log the core/cuttings. Structural data were recorded, entered into Excel spreadsheets, and then transferred to the geological maps.

The channel chip sampling provided samples that are considered to be sufficiently representative to aid in the definition of drill targets. The channel sampling was performed across an area 2.5 east-west m x 1.7 north-south m and sampling was guided by the combination of the soil sampling and outcrops. No standards, duplicates, etc., were inserted into the channel samples stream for quality control purposes as these data were not used in the resource estimation. However, the exposure of altered and mineralized surface rocks, along with the alteration recorded in the soil sampling, aided in spotting the drill holes so as to intercept the altered and mineralized zones.

The work that was performed allowed for the interpretation of a northerly-trending, probably steeply west dipping, mineralized zone consisting of a central core of mineralization which comprises Maricunga-style Au porphyry mineralization. The core is flanked by variably continuous, steeply west dipping fault breccia-vein/veinlet systems of varying widths and which have been intersected to depths of up to 300 m.

The exploration that was conducted during the 2010-2011 field season allowed Andina Chile to:

- more properly interpret the data which has defined a central higher grade core;
- define an Inferred and indicated resource; and
- better define the additional required drilling that would allow an upgrade of the resource.

9.4 Hochschild and Tiernan Exploration Programs

Since 2011, neither Hochschild nor Tiernan have conducted exploration at Volcan, after they acquired Andina Chile..

9.5 Micon QP Comments

Based upon a review of the exploration conducted by Andina Chile (Hochschild) in 2011, Micon's QP is of the opinion that the work that has been performed at the Project has been properly executed and follows best practices guidelines as outlined by the CIM. Micon's QP also reviewed the exploration information in 2021 when conducting the updated mineral resource estimate and remains of the opinion that work that was performed at the Project was properly executed and followed the current best practices guidelines.

10 DRILLING

Most of the information for this section was extracted from the 2010 and 2011 Micon Technical Reports, as well as the 2011 Technical Report by Easdon and Diaz

10.1 2004 to 2009 Andina Chile drilling programs

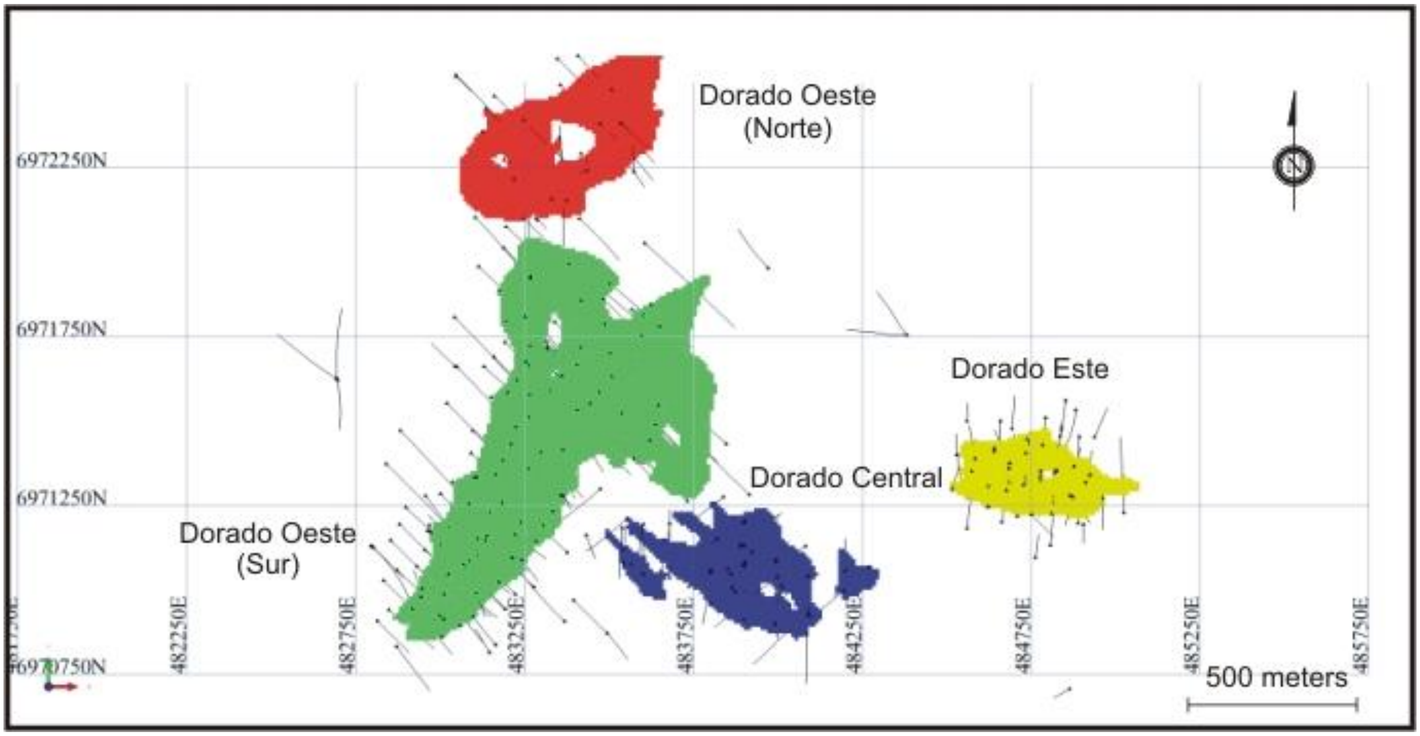
Hochschild acquired Andina in 2013. Andina Chile carried out seven phases of exploration at the Volcan property, starting with the 2004 to 2005 field season. The five exploration drilling programs up to the 2008 to 2009 campaign are summarized in Table 10-1. Figure 10-1 provides an overview of the drilling that has been completed on the Dorado sector from 1991 to 2010. The drilling program from 2009 to 2010 is discussed in detail later in this section.

Table 10-1: Volcan Project Drill Hole Summary 2004 to 2009 (Phases I through V)

Area Drilled	Data for Area Drilled	Andina Chile					
		2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	Total
Dorado Oeste	No. of holes	0.00	22	65	54	9	150
	RC holes (m)	0.00	1,796.00	11,490.00	5,602.00	2,200.00	21,088.00
	DD holes (m)	0.00	4,158.07	14,042.90	22,735.30	1,955.15	42,891.42
	Mixed (m)	0.00	0.00	1,204.30	0.00	0.00	1,204.30
	Total (m)	**0**	**5,954.07**	**26,737.20**	**28,337.30**	**4,155.15**	**65,183.72**
Dorado Este	No. of holes	1	16	8	2	2	29
	RC holes (m)	0.00	2,316.00	1,476.00	800.00	0.00	4,592.00
	DD holes (m)	359.60	1,647.70	0.00	0	534.30	2,541.60
	Mixed (m)	0.00	589.45	1,038.85	0.00	0.00	1,628.30
	Total (m)	**359.60**	**4,553.15**	**2,514.85**	**800.00**	**534.30**	**8,761.90**
Dorado Central	No. of holes	0	31	6	0	4	41
	RC holes (m)	0	7,118.00	1,492.00	0	0	8,610.00
	DD holes (m)	0	1,766.45	420.00	0	1,372.40	3,558.85
	Total (m)	**0**	**8,884.45**	**1,912.00**	**0**	**1,372.40**	**12,168.85**
ODAE	No. of holes			10	29	0	39
	RC holes (m)			1,754.00	6,262.00	0	8,016.00
	DD holes (m)			892.85	6,467.65	0	7,360.50
	Total (m)			**2,646.85**	**12,729.65**	**0**	**15,376.50**
Total Drilling	No. of holes	1	69	89	85	15	259
	RC holes (m)	0	11,230.00	15,432.00	12,664.00	2,200.00	42,306.00
	DD holes (m)	359.60	7,572.22	18,378.90	29,202.95	3,861.85	56,352.37
	Mixed	0.00	589.45	2,243.15	0.00	0.00	2,832.60
	Total (m)	**359.60**	**19,391.67**	**33,810.90**	**41,866.95**	**6,061.85**	**101,490.97**

Note: Table taken from the 2011 Micon Technical Report

Figure 10-1: Plan View of the Drill Hole Coverage and Gold Deposits of the Dorado Sector, Volcan Property



Note: Figure supplied by Andina Minerals Inc. for the January, 2011 Micon Technical Report.

10.1.1 2004 to 2005 Drilling Campaign

In its 2004 to 2005 season (Phase I), Andina Chile drilled one 359.60-m DD hole (DVA-001) in the Dorado Este sector. Easdon (2005) reported:

> *"The bulk of the gold intersected in this hole (1.26 g/t Au in 148 m) is contained within the hydrothermal breccias previously recognized by Cameco as being the core of the Dorado Este zone."*

The drilling was performed by Major Drilling of Santiago.

Easdon (2005) also reported that Andina Chile had contracted Geo Vectra Surveying of Copiapo to resurvey all prior Homestake and Cameco drill hole locations and to survey the locations of new holes. A Total Station digital survey unit was used. Metson of Copiapo was retained to conduct down-hole surveys of all new holes drilled.

10.1.2 2005 to 2006 Drilling Campaign

Drilling in the 2005 to 2006 season (Phase II) was completed by Terra Services Drilling of Santiago. Geomensura of Santiago carried out the surveying of drill collars. This survey program was considered accurate to 10 to 15 cm horizontally and 30 cm vertically and utilized Total Station digital surveying equipment. Metson of Copiapo and Comprobe of Santiago were retained to complete down-hole surveying of the drill hole deviation and they used either Maxibor Reflex or Giroscopion D29 equipment (Easdon 2008).

10.1.3 2006 to 2007 Drilling Campaign

The Phase III drilling program was largely directed at drill testing the strike and dip extensions of the mineralization in the three Dorado Zones and to increase the level of confidence in resource estimation.

10.1.4 2007 to 2008 Drilling Campaign

As summarized in Table 6-1, the majority of holes drilled in the Phase IV program were on the Dorado Oeste sector. Two of the holes that are attributed to the Dorado Oeste zone were drilled between the Dorado Oeste and the Dorado Este zones to test the potential for joining the two deposits.

Andina Chile contracted a surveyor from Copiapo to survey all drill hole collars, as well as carry out a detailed topographic survey for the entire Dorado Oeste zone. The surveying, which is considered to be accurate to 10 to 15 cm horizontally and 30 cm vertically, utilized Total Station digital surveying equipment. The surveying was integrated with the Quickbird and Google Earth satellite imagery.

Andina Chile contracted Comprobe, also from Copiapo, to complete down-hole surveying of all of the holes drilled by Andina Chile in the 2007 to 2008 season. Comprobe utilized a gyroscope survey tool, model Giroscopio DG 29. Readings were taken at intervals of 10 m over the length of the holes.

On the completion of each hole, PVC pipe was inserted into the collar, and cemented in place in such a way as to indicate the direction and inclination of the hole. A metal reinforcing rod was driven into the ground which had a metal plate, approximately 10 cm by 20 cm, welded to the top of it. The drill hole identification number was arc-weld inscribed so that the hole can be permanently identified in the field. All drill hole numbers were prefixed with a “D” indicating a diamond drill hole and an “R” for a reverse circulation drill hole. All holes were numbered in sequence beginning at number 690.

Diamond drill core and RC recovery was excellent with recovery averaging 98%, or better, for both the diamond drill and the RC drill holes. The core runs were routinely measured by tape and the recovery calculated. The 2 m RC sample runs were weighed and the sample recovery for each sample was calculated using the theoretical volume extracted multiplied by the specific gravity of the rock.

10.1.5 2008 to 2009 Drilling Campaign

The objective of the Phase V drilling campaign was to complete infill drilling on those sections where the existing information was believed to be incomplete. Some of the Phase V drill holes were completed as twin holes, the purpose of which was to validate the results of holes completed by previous operators for the Dorado Central and Dorado Este deposits.

A summary of the best intercepts from the Phase V drilling campaign are shown in Table 10-2.

10.2 2009 to 2010 (Phase VI) Drilling Campaign

10.2.1 Dorado Oeste

The objective of the Phase VI drilling campaign was to conduct further infill drilling in the Dorado Oeste zone to determine the continuity of, and to identify any trends in, the higher grade mineralization. The mineralization widths reported are core lengths and their relationship to true width of the mineralization is subject to interpretation.

Table 10-2: Summary of Significant Results, Phase V (2008-2009) Drilling Campaign

Drill Hole ID	Sector	Mineralized Intersection				Assay Results		
		Section	From (m)	To (m)	Length* (m)	Au (g/t)	Cu (ppm)	Best Intercept
DOA-775	DO	DO-1400	344	386	42	0.70	746	
DOA-776	DO	DO-1100	0	156	156	0.93	741	40 m @ 1.3 g/t Au, 0.10% Cu
			644	730	86	1.40	0.13%	50 m @ 1.9 g/t Au, 0.16% Cu
ROA-777	DO	DO-1450	234	270	36	0.60		
ROA-778	DO	DO-1050	174	206	32	0.58		
DOA-779	DO	DO-400	120	278	158	0.55		
	DO	DO-400	328	408	80	0.96	824	46 m @ 1.1 g/t Au
ROA-780	DO	DO-1700	146	172	26	0.82	605	
	DO	DO -1700	230	250	20	0.83	625	
ROA-781	DO	DO -1700	210	254	44	0.73		
ROA-782	DO	DO -1300	314	378	64	0.36		
ROA-783	DO	DO -550	236	392	156	0.53	218	
DCA-784	DC	NE-6	62	232	170	0.52	485	24 m @ 1.1 g/t Au, 0.08 %Cu
DCA-785	DC	NE-8	34	104	70	1.10	942	40 m @ 1.5 g/t Au
	DC	NE-8	178	200	22	1.22	848	
DCA-786	DC	NE-9	10	166	156	0.87	0.15%	48 m @ 1.2 g/t Au
DCA-787	DC	NE-7	0	232	232	0.39		4 m @ 2.5 g/t Au
DEA-788	DE	VC_8	0	158	158	1.37	636	124 m @ 1.6 g/t Au, high grade of 7.8 g/t Au
DEA-789	DE	VC_6	92	188	96	1.13	469	46 m @ 1.5 g/t Au

Note: Table supplied by Andina Minerals Inc. for the January, 2011 Micon Technical Report. All lengths are core lengths and the relationship to true width is not known.

The Phase VI drilling program was conducted between November 16, 2009 and May 4, 2010. During this period, a total of 8,719.40 m of DD was conducted in 21 holes and 8,998.00 m of RC drilling was conducted in 31 holes. Table 10-3 summarizes the metres drilled on the Volcan property in each of the Dorado gold deposits (Dorado Este, Central and Oeste zones), during the Phase VI program.

The locations of drill collars corresponding to Phase VI and earlier campaigns are depicted in Figure 10-2. Collars corresponding to Phase VI holes are shown with orange dots.

At the end of Andina Chile's Phase VI drilling campaign, a total of 82,901.12 m in 202 holes had been completed on the Dorado Oeste deposit since 2004. The DD totalled 51,610.82 m, RC drilling totalled 30,086 m and mixed drilling comprised 1,204.30 m.

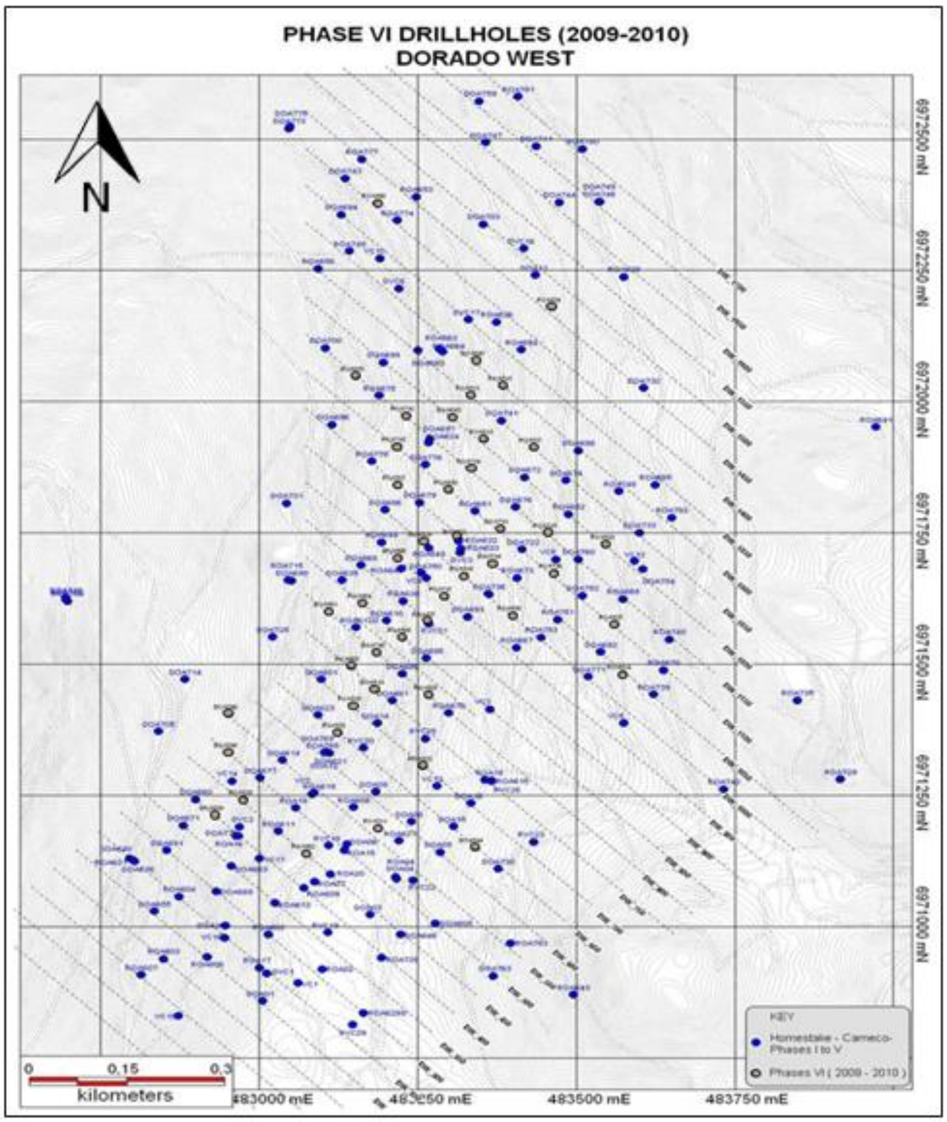
During the 2009 to 2010 season, drilling was completed by Major Drilling Chile S.A. while the down-hole surveying was conducted by Servicios Geofísicos Comprobe Limitada, located in Santiago. The survey was conducted nominally at intervals equating to every 10 m using a digital gyroscope. Collars may vary ±5 m from the proposed collar locations. Azimuth and dip measurements may vary up to ± 2°.

Table 10-3: Drill Hole Summary for the 2009 to 2010 Drilling Program (Phase VI)

Zone	Diamond Drilling		Reverse Circulation		Total	
	Number of Holes	Metres	Number of Holes	Metres	Number of Holes	Metres
Dorado Oeste	21	8,719.40	31	8,998.00	52	17,717.40
Dorado Este	0	0	0	0	0	0
Dorado Central	0	0	0	0	0	0
Dorado Total	**21**	**8,719.40**	**31**	**8,998.00**	**52**	**17,717.40**

Note: Table supplied by Andina Minerals Inc. for the January 2011 Micon Technical Report.

Figure 10-2: Plan Showing the Collar Locations for the 2009 to 2010 Drilling Campaign (In Orange)



Note: Figure supplied by Andina Minerals Inc for the January 2011 Micon Technical Report.

On the completion of each hole, PVC pipe was inserted into the collar, and cemented in place in such a way as to indicate the direction and inclination of the hole. A metal reinforcing rod was driven into the ground which had a metal plate, approximately 10 cm by 20 cm, welded to the top of it. The drill hole identification number was arc-weld inscribed so that the hole can be permanently identified in the field. All hole numbers were prefixed with a "D" indicating a diamond drill hole and an "R" for a reverse circulation drill hole. All holes were numbered in sequence beginning at number 790.

Diamond drill core and RC recovery was excellent, with recovery averaging 98%, or better, for both the diamond drill and the RC drill holes. The core runs were routinely measured by tape and the recovery calculated. The 2-m RC sample runs were weighed and the sample recovery for each sample was calculated using the theoretical volume extracted multiplied by the specific gravity of the rock.

10.2.2 Ojo de Agua Este

The ODAE Prospect is located 6.5 km northeast of the Dorado deposits and 3 km due east of Andrea and Florencia prospects. Together with the latter two, it is a significantly mineralized area on the Volcan property.

The area of principal interest in which all the drill holes and most of the trenches are located covers 1.5 km^2.

Major Drilling Chile S.A., located in La Serena, carried out 2,375 m of drilling in 10 holes (2,242 m of reverse circulation and 133.5 m of DD) (Table 10-4). Both methods were beset by problems with ground conditions, particularly faulting and high-water pressures, and, as a result, the planned depths of most holes were not attained. The early onset of winter finally curtailed the diamond drill program in May, 2010.

Table 10-4: Summary of the Drill Statistics for ODAE Area, 2009-2010

Drill Hole Number	UTM Coordinates		Collar Elevation (masl)	Drill Hole Length (m)		Azimuth (°)	Inclination (°)	Drill Hole Type
	Easting	Northing		Planned	Actual			
RODAE-806	489,822	6,974,727	4,782	400	162.00	340	-60	RC
RODAE-807	489,883	6,974,965	4,771	400	318.00	10	-59	RC
RODAE-812	489,882	6,974,962	4,771	400	336.00	331	-58	RC
RODAE-814	489,955	6,974,888	4,759	500	500.00	330	-60	RC
RODAE-816	489,886	6,975,127	4,776	400	414.00	359	-59	RC
RODAE-838	489,929	6,975,165	4,782	500	21.95	225	-60	DDH
RODAE-841	489,927	6,975,163	4,782	500	46.20	224	-59	DDH
RODAE-849	489,931	6,975,166	4,782	500	40.00	223	-60	RC
RODAE-850D	489,881	6,975,118	4,772	400	167.30	227	-64	RC/DDH
RODAE-851	489,768	6,974,869	4,772	400	370.00	44	-59	RC
Total				**3,400**	**2,375.45**			

Note: Table supplied by Andina Minerals Inc. for the 2011 Micon Technical Report.

The drill holes were situated on the basis of information obtained from the geological mapping and trench and drill sample geochemistry, as these became progressively more available.

All holes were surveyed down-the-hole by Servicios Geofísicos Comprobe Ltda from Santiago. The holes were nominally surveyed every 10 m.

The core cuttings and drill core were logged at the camp. Assay samples were taken every 2 m and sent to the company's facilities in Copiapo for the insertion of blanks and standards. In addition, the diamond core was cut using a saw, and sent for preparation and analysis to the laboratory of Geoanalítica. Geoanalítica is an ISO 9000:2001 certified laboratory.

The drill data were processed and modelled using GEMS 6.2 (Gemcom software).

10.3 Phase VI Drilling Campaign Results

10.3.1 Dorado Oeste

Drilling results for Phase VI are shown in Table 10-5. Main intercepts are shown in columns "First Intersection" and "Second/Third Intersection."

Table 10-5: Drill Hole Summary for the 2009 to 2010 Dorado Oeste Drilling Program (Phase VI)

Section*	Drill Hole Number	Drill Hole Length (m)	Mineralized intersections			
			From (m)	To (m)	Length** (m)	Gold Assay (g/t)
DO-400	DOA 839	500.20	274	320	46	0.744
			456	494	38	0.542
DO-450	ROA 802	210.00	0	192	192	0.923
	ROA 820	300.00	118	268	150	0.491
DO-500	DOA 846	548.40	326	420	94	1.18
			456	524	68	0.462
DO-550	ROA 811	300.00	102	238	136	0.512
	DOA 840	500.00	452	500	48	0.650
DO-650	ROA 832	200.00	6	268	172	0.578
	DOA 842	84.70			40	40 ppm Mo
	DOA 844	581.45	202	360	158	0.643
			426	520	96	0.674
DO-700	ROA 833	440.00	26	188	162	0.489
			298	440	142	0.524
	ROA 823	130.00	0	120	120	0.532
DO-750	ROA 803	394.00	332	392	60	0.470
	DOA 819	420.00	0	336	336	0.434
DO-800	DOA 790	450.00	0	450	450	0.853
	DOA 801	581.45	328	424	156	1.00
			526	564	38	1.20
	ROA 805	318.00	50	220	170	0.870
DO-850	ROA 804	396.00	268	374	86	1.20
	ROA 805	420.00	80	178	1.10	98
DO-900	ROA 837	400	28	170	142	0.418
			206	354	148	0.321
DO-950	ROA 797	420.00	60	420	360	0.840

Section*	Drill Hole Number	Drill Hole Length (m)	Mineralized intersections			
			From (m)	To (m)	Length** (m)	Gold Assay (g/t)
	DOA 808	500.00	214	464	250	1.05
DO-1000	DOA 810	488.40	8	184	176	0.510
			322	450	128	0.738
	DOA 828	455.35	264	338	74	0.843
	ROA 830	290.00	64	178	114	0.799
DO-1050	DOA 799	450.10	94	198	104	1.04
			264	420	154	1.19
	DOA 822	563.15	102	316	214	0.670
			434	476	42	1.20
	ROA 824	220.00	114	212	98	0.754
	ROA 827	200.00	0	28	28	0.655
			70	154	84	0.478
DO-1100	ROA 795	330.00	8	146	138	0.443
			182	230	48	0.841
	ROA 796	500.00	26	384	360	0.701
	DOA 791	496.55	120	150	30	0.440
			172	242	70	1.10
			334	494	162	1.18
	ROA 825	290.00	100	258	158	0.676
	ROA 836	140.00	2	110	108	0.411
DO-1150	ROA 792	320.00	0	182	182	0.800
	ROA 763	400	40	366	326	0.840
	ROA 794	400	0	400	400	0.663
	DOA 835	1,145.65	346	394	48	0.304
			772	776	4	3.32
	DOA 852	32.40	0	32	32	0.471
DO-1200	DOA 813	300.00	0	300	300	0.533
	ROA 829	276.00	96	190	94	0.617
	DOA 843	432.20	0	138	138	1.52
DO-1250	ROA 821	344.00	132	310	236	1.40
	ROA 817	320.00	0	156	156	0.433
			250	320	70	0.608
DO-1300	ROA 815	250.00	144	172	28	0.422
	DOA 845	430.25	346	430	84	0.416
DO-1400	ROA 800	200.00	10	166	156	0.776
DO-1450	ROA 834	230.00	122	140	18	0.407
Total	**47 Holes**	**17,598.25**				

Note: Table supplied by Andina Minerals Inc. for the January 2011 Micon Technical Report.
*Note: Sections noted in the Micon Technical Report were originally shown as DW when they should be shown as DO.
**Note: All lengths are core lengths and the relationship to true width is not known.

Five holes were aborted due to poor ground conditions and these are summarized in Table 10-6. The samples derived from the drill holes which were abandoned were not assayed.

Table 10-6: Summary of the Aborted Drill Holes for the Dorado Oeste Area

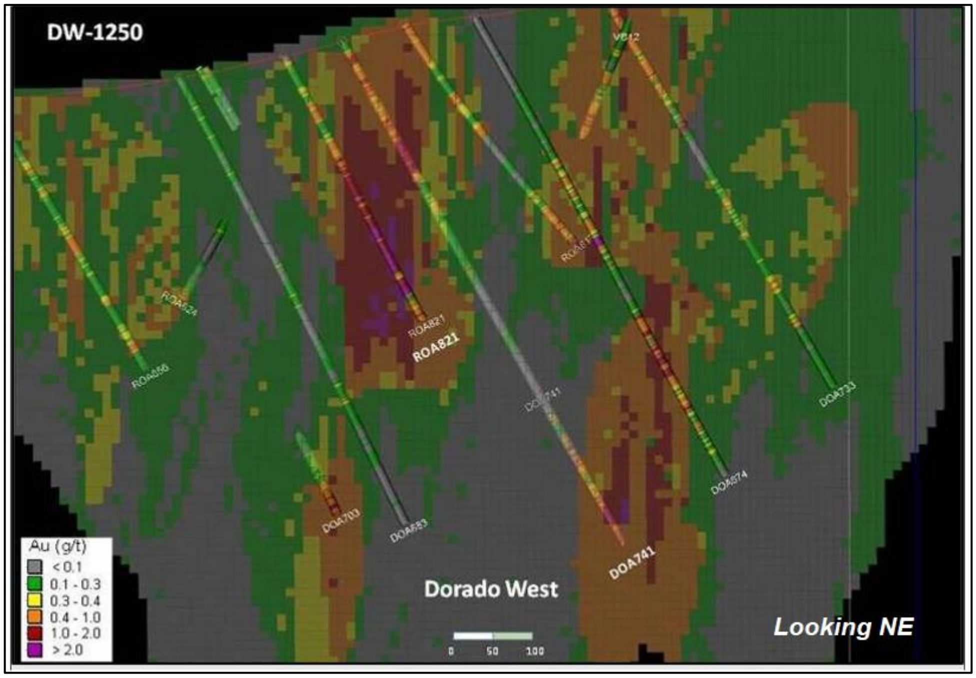
Drill Hole Number	Depth of Abandonment (m)	Type of Drill Hole
ROA 798	6.85	RC
ROA 809	30.00	RC
DOA 818	11.15	DD
ROA 831	30.00	RC
DOA 848	41.15	DD
Total	**119.15**	

Note: Table supplied by Andina Minerals Inc. for the January 2011 Micon Technical Report.

The deep exploration hole, DOA 835, which was proposed to explore the possibility of porphyry copper style mineralization at depth, was budgeted to be 1,400 m long. However, due to bad ground conditions, DOA 835 only reached a depth of 1,145.65 m. The results, from a mineralization point of view were poor, although the potassic alteration assemblage observed starting at a depth of 960 m is typical in porphyry copper-type alteration assemblages.

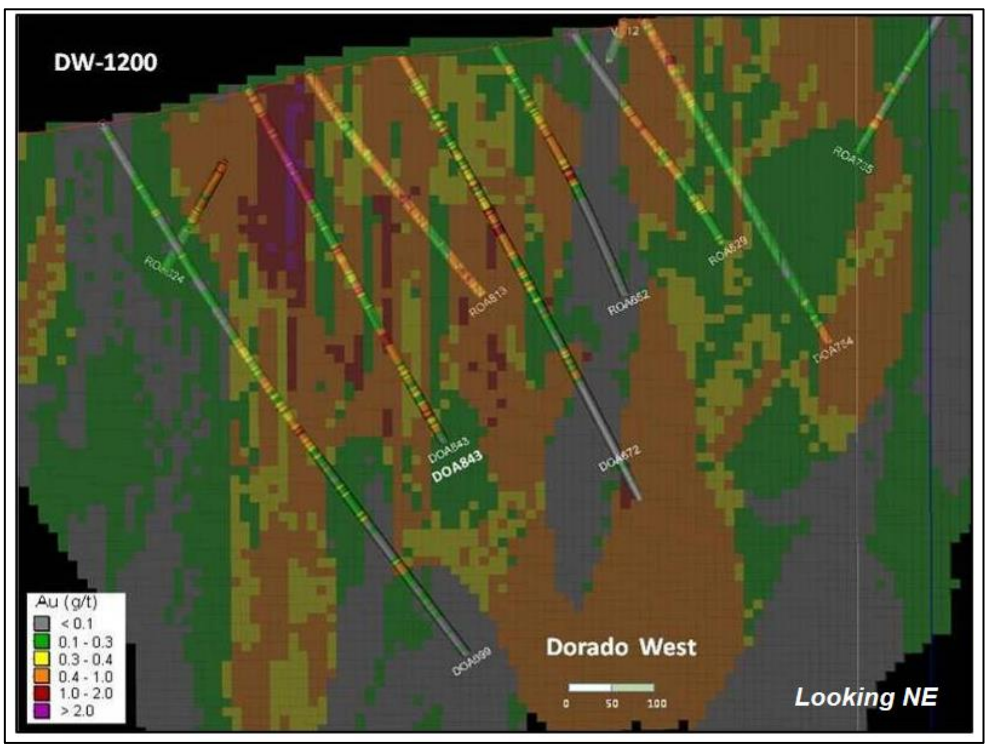
Drill hole ROA 821, drilled on Section 1250 (Figure 10-3), was proposed to examine the lateral extension of the mineralization previously identified in DOA 741 (Phase V). The results from this drilling were excellent, with an intersection averaging 1.40 g/t of gold over 236 m from 132 m to 310 m. Drilling was conducted on Sections 1200 (DOA 843) and 1300 (DOA 845) (Figure 10-4 and Figure 10-5), in a continuing effort to examine the lateral extent of the mineralization. The assay results obtained for drill hole DOA 843 were also considered to be excellent, with the first 138 m of the hole averaging 1.52 g/t gold. The assay results obtained for Section 1300 were not as positive, although the last 84 m contained the highest-grade interval, which averaged 0.416 g/t gold. Andina Chile's geologists suspect that higher grades may be located at depth.

Figure 10-3: Cross-Section through Section Line DO-1250 Illustrating the Drill Holes and Gold Grade (g/t)



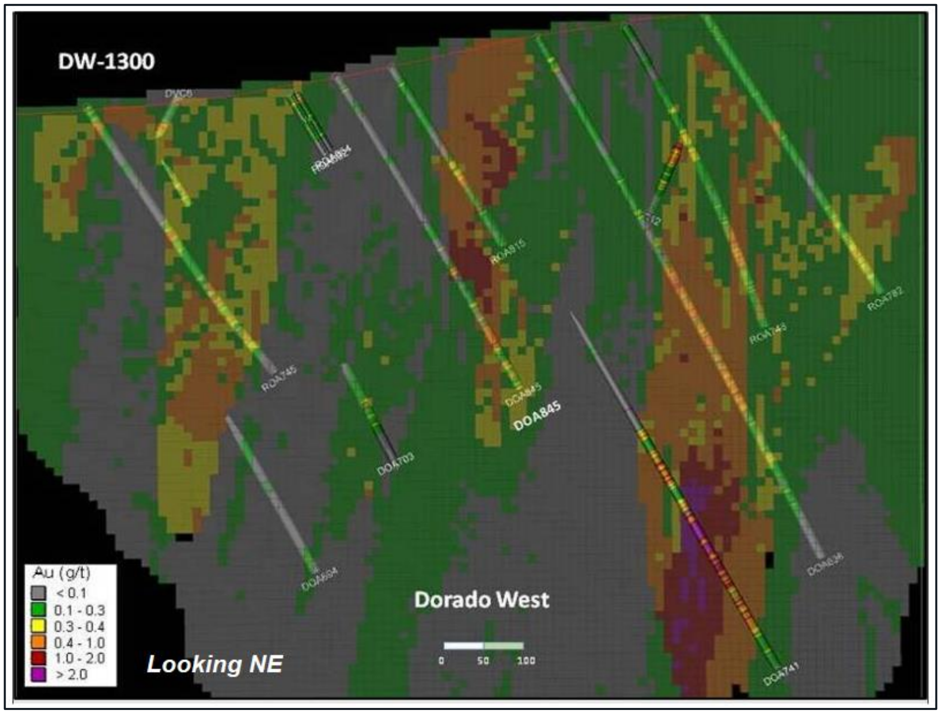
Note: Figure supplied by Andina Minerals Inc for the January 2011 Micon Technical Report.

Figure 10-4: Cross-Section through Section Line DO-1200 Illustrating the Drill Holes and Gold Grade (g/t)



Note: Figure supplied by Andina Minerals Inc for the January 2011 Micon Technical Report.

Figure 10-5: Cross-Section through Section Line DO-1300 Illustrating the Drill Holes and Gold Grade (g/t)



Note: Figure supplied by Andina Minerals Inc for the January 2011 Micon Technical Report.

10.3.2 Ojo de Agua Este

The 2009-2010 drill campaign established that the ODAE area contains a core of higher grade gold mineralization within an envelope of lower grade mineralization, covering an irregular oval area 800 m by 400 m.

The best intersections in holes RODAE 851, RODAE-850D and RODAE-812 (which terminated prematurely in higher grade mineralization) suggest the potential for a resource of higher grade than that obtained in the Dorado targets. Preliminary analysis of the geometry of the higher grade intersections (over 1.0 g/t gold), incorporating trench results, postulates a main north trending mineralized structure at least 350 m long, with a width of about 30 m. Mineralization extends to at least 300 m vertically. This model is currently based primarily on only two drill holes; therefore, it is speculative and alternative hypotheses exist. Testing these was the objective of the early drilling conducted in the summer campaign of 2010 to 2011 (Phase VII).

Table 10-7 summarizes the best intersections, slightly modified from those disclosed in Andina Minerals press releases. Figure 10-6 illustrates the locations of the holes in plan view.

Table 10-7: Drill Hole Summary for the 2009 to 2010 ODAE Drilling Program (Phase VI)

Drill Hole Number	Drill Hole Length	Mineralized Intersection				Including
		From (m)	To (m)	Length* (m)	Gold Assay (g/t)	
RODAE 806	162.00	126	128	2	3.99	
RODAE 807	318.00	4	64	60	0.50	
RODAE 812	336.00	0	84	84	0.56	
		176	246	70	1.20	18 m @1.71 g/t Au at end of hole
RODAE 814	500.00	0	18	18	0.25	
RODAE 816	414.00	128	160	32	0.27	
		370	414+	>44	0.25	
RODAE 838						Not analyzed
RODAE 841	21.95	18	30	12	0.39	2-24 averaging 552 ppm Mo
RODAE 849	46.20					Not analyzed
RODAE 850D	167.30	100	167+	>67	0.74	>18 m @1.71 g/t Au
RODAE 851	370.00	166	288	122	1.45	32 m @3.25 g/t Au
Total	**2,375.45**					

Note: Table supplied by Andina Minerals Inc. for the January 2010 Micon Technical Report.
* All lengths are core lengths and the relationship to true width is not known.

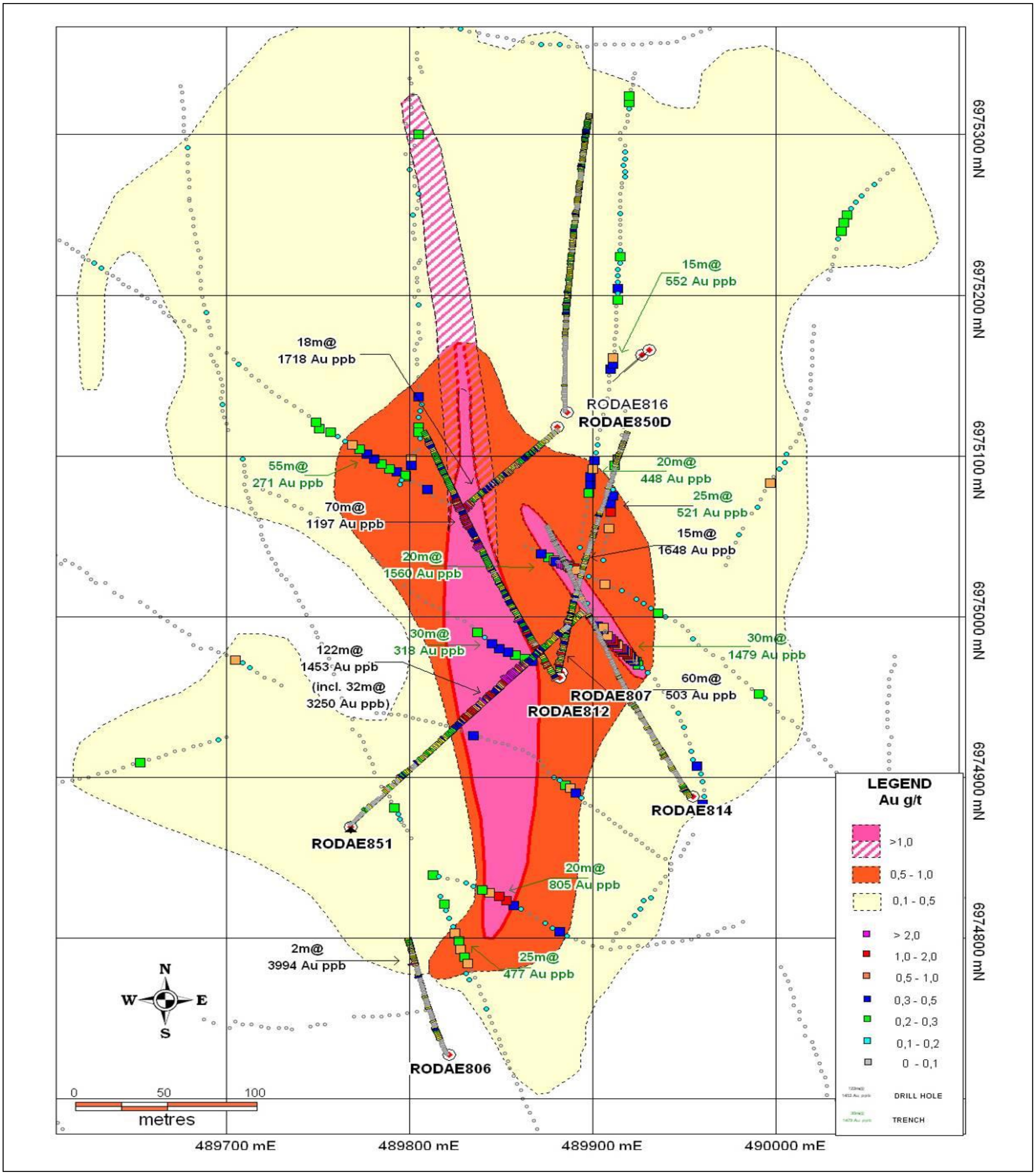
10.4 2010 to 2011 (Phase VII) Drilling Campaign

The 2010 to 2011 drilling campaign was focused on the ODAE Prospect to further infill and define the extent of the mineralization that had been discovered during the 2010 field season.

The drilling was performed by Geotec Boyles with the down-the-hole surveying performed by Data Well Services Ltda. of Copiapo.

Table 10-8 summarizes the drilling conducted at the ODAE Prospect in the 2010 to 2011 campaign.

Figure 10-6: ODAE Drill Hole and Trench Results and Inferred Limits of Mineralization in 2010



Note: Figure supplied by Andina Minerals Inc. for the October, 2010 Micon Technical Report.

Table 10-8: Summary of the 2010 to 2011 (Phase VII) Drilling Campaign at the ODAE Prospect

Work Program	Number	Metres	Samples Taken	Assays
Drill Holes (RC, DD and RC-DD)	33	10,831.7	5,211	Au, Cu, Mo

Note: Table taken from the September, 2011, ODAE Technical Report.

Thus, at the end of Andina Chile's drilling over the two field seasons 2009-2010 and 2010-2011 (Phases VI and VII), a total of 43 holes totalling 13,207.15 m were completed. Of the total drilled metres, 8,491.60 m are RC drill holes and 4,715.55 m are DD holes. Of the 43 holes drilled, 34 are RC holes 3 are DD holes and 6 holes are combined RC/DD. The area drilled has dimension of 700 m north-south x 350 m east-west. The holes numbered "RODAE" are RC holes; "DODAE" are DD holes; and the "RODAExxxD" are the combined RC/DD holes.

10.5 Micon QP Comments

In 2010, Micon's QP reviewed the drilling results for Volcan and believe that the drilling was conducted according to the best practices described by the CIM. Micon's QP reviewed the drilling again prior to updating the 2022 mineral resource estimate and continues to believe that the drilling was conducted according to current best practices.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

This section was extracted from the January, 2011 Technical Report and earlier reports and updated where necessary.

11.1 Description Iof Sampling Method and Approach

Part of this section has been taken in its entirety from the Technical Report by Pressacco et al. (2009) which has been reviewed and accepted by Micon's QP.

The sampling method and approach used by Andina Chile at Volcan have been described in prior technical reports by Easdon (2008, 2006a, 2006b, 2005), Gonzalez (2007), Easdon and Gonzalez (2007) and Bartlett (2004). The conclusions contained in these reports on the sampling method and approach are summarized as follows:

Bartlett (2004) reviewed summary reports prepared by Homestake and Cameco and examined drill core. Cameco's work was focused on the Dorado Este area. Pertinent observations were:

- RC cuttings were sampled at 2-m intervals and the samples sent to Geolab.
- Diamond drill core was split using a manual guillotine and sampled at 2-m intervals. Fifty percent of the core was sent to Geolab, with the remainder stored in core boxes for reference.
- Core was stored at the estate of the Cousiño family (Hacienda Castilla) north of Santiago. It was in good condition and labelled and maintained to industry standards.
- Easdon (2005) commented on the Andina Chile sampling method and approach as follows:
- Andina Chile had initiated a carefully controlled and designed QA/QC system.
- Drill core and cuttings were handled by SBX Consultores on behalf of Andina Chile from the moment they exited the drill.
- Andina Chile personnel were present at all times the drills were in operation.
- Core/cuttings were boxed/split and bagged under the supervision and control of Andina Chile personnel.
- Core was taken to the facilities at Hacienda Castilla where it was pre-logged and marked for splitting by a senior geologist. The 2-m intervals were split with a diamond saw. One half of the core was returned to the core box for final logging and storage on site; the other half was properly bagged and labelled and retained under lock and key for pick up by the laboratory.
- Cuttings were taken to the camp site and stored under cover until handed over to the laboratory on pick-up.
- Prior to October, 2005, samples were analyzed at the ALS Chemex laboratory in La Serena. From October, 2005, the Geoanalítica laboratory in La Serena was used.

Andina Chile had reopened and deepened a number of the trenches excavated by Cameco and re-sampled them at 5-m intervals. The work confirmed that Cameco had properly sampled and identified anomalous zones at Dorado Este and other zones.

Easdon (2005) also reported that Andina Chile was surveying in detail all prior and newly spotted drill hole collars. This work demonstrated that the Homestake and Cameco UTM data were off by an approximate and consistent 50 m in the northing and 20 m in the easting.

The following has been extracted from Easdon (2008):

“The sampling methods employed by Andina Chile were industry standard methods for handling drill core and cuttings. Intervals of 2 m were selected for both the diamond drill core and RC cuttings. However, at the discretion of the geologist logging the diamond drill core, the core sample interval could be reduced. It was Easdon’s opinion that the sampling intervals that have been selected for the drill core and cuttings were appropriate to test the style of mineralization being developed. Micon’s QPs observations during the site visit confirmed Easdon’s opinion.

“Effective November, 2007, all of the samples, core, rejects, etc., from prior operations were transferred to the new Andina Chile facility located in Copiapo, and the facility was utilized for the RC sample preparation, final core and cuttings logging, and storage. As reported in prior Technical Reports, the Volcan samples had been sent to the SBX facilities at Hacienda Castilla, one hour’s drive south of Copiapo. Geoanalítica, (Asesoria Minera Geoanalítica Ltda.) the assay laboratory used by Andina, Chile established a sample preparation facility at Paipote on the outskirts of Copiapo. Geoanalítica shipped the prepared samples to its principal laboratory in La Serena for assay.

“DD core and RC drill cuttings were regularly shipped by private contractor to the preparation facilities at Copiapo.”

The Micon QP believes Geolabs is a reference to ALS Geolabs or, later, ALS Chemex which had ISO 9001:2000 accreditation at the time. Geoanalítica is an ISO 9000:2001 certified laboratory. These laboratories are commercial analytical laboratories and were independent of Andina Chile and its parent companies.

11.1.1 Micon QP Comments from the January 2011 Technical Report

Micon’s QP conducted a data verification process during a site visit between March 10 and 13, 2009, when the field procedures for the drilling program were examined, examples of the host rock types, alteration and veining were observed in outcrop and representative sections of drill core were reviewed. During the 2009 visit, Micon’s QP found that the field procedures that were being used to set up the diamond drill, recover the core, transport the core to the logging facilities and the logging and sampling procedures were all being carried out to the best practices currently in use by the mining industry.

Micon’s QP conducted a second site visit to the Volcan Project, between April 17 and 19, 2010. During this site visit to both the Project and Andina Chile’s facilities in Copiapo, the procedures for conducting the drilling program were discussed, including drilling set-up, surveying of the drill collars and down-hole surveying, preliminary logging at the base camp, final logging, sampling and core storage procedures at the Copiapo facilities, submission of assay standard, blank and duplicate samples, as well as data gathering and recording procedures for the electronic database.

Micon’ QP found that the field procedures being used during the 2010 site visit were all in accordance with the best practices in use by the mining industry and that they are well documented. Micon’s QP concluded that the results produced by the procedures are reliable enough to form the basis for a mineral resource estimate.

Micon’s QP reviewed the data prior to undertaking the updated mineral resource estimate contained in Section 14 and is of the opinion that the results remain reliable enough to form the basis for a mineral resource estimate.

11.2 Description of Sample Preparation, Analysis and Security

Sample preparation and security at Volcan has been described in prior Technical Reports by Easdon (2008, 2006a, 2006b, 2005), Gonzalez (2007), Easdon and Gonzalez (2007) and Bartlett (2004). The conclusions contained in these reports on sample preparation and security, are summarized as follows:

Bartlett (2004) reported:

- Given the passage of time from 1997, it was not possible verify the appropriateness of the sample preparation protocol of the historical sampling completed by previous operators.
- fifty-g sample charges were assayed using the fire assay method.
- Internal quality control assay data held by Geolab were reviewed. Duplicate 50-g fire assays were undertaken at a rate of one in every five samples and showed excellent correlation between sample pairs.
- Data derived from re-assaying Geolab pulps at the SGS Chile Limitada (SGS) laboratory in Santiago were examined. Excellent correlation was demonstrated between sample pairs above 0.1 g/t Au, with the exception of two pairs. In both of those pairs, the Geolab assays appeared consistent with adjacent sample results.
- A precision plot of the SGS and Geolab data showed that approximately 95% of the sample pairs differed by less than 50%. It was concluded that the Geolab assay data were of high standard.
- The assays for the drill core reviewed were consistent with the mineralization observed in the core.
- Easdon (2005) reported the following for the February-April, 2005 program:
    - Lag, trench and drill core samples were transported by Andina Chile personnel to Copiapo for shipment/delivery to the ALS Chemex laboratory in Coquimbo.
    - Andina Chile provided 16 duplicate channel samples and 7 duplicate samples of diamond drill hole DVA-001 as a check against the ALS Chemex analyses.
    - Easdon considered that the results of both sets of duplicate sample assays were not consistently reproducible and recommended that the DVA-001 sample rejects be reanalyzed at the Geoanalítica laboratory.
    - The ALS Chemex laboratory used the following sample preparation sequence:
        - Samples were dried at 60o C for 6 hours.
        - Crushed in a jaw crusher with 95% passing 10 mesh.
        - Crushed material passed through a ring pulverizer with 95% passing 40 mesh.
        - Pulverized material passed through a Jones splitter with 500 g processed further and the balance retained for reference.
        - 250 g of the pulverized material ring pulverized to 85% passing 200 mesh.
        - Sample fire assayed using standard 50-g fire assay procedures.
        - ICP analysis performed on 1 g of ground material as required, e.g., for copper.
    - ALS Chemex had ISO 9001:2000 accreditation and checked 12% of results using a combination of standards, blanks and duplicates.
    - The Geoanalítica laboratory used similar sample preparation procedures:
        - Samples were dried as necessary.
        - Sample was crushed to +95% at -10 mesh.
        - Crushed material was homogenized and split to a 1,000-g portion.
        - The 1,000-g portion was pulverized to -150 mesh and rotary split into one 750-g sample to be plastic bagged and returned to the client and one 250-g sample to be paper bagged and submitted for analysis.

- 50 g of material analyzed by standard fire assay with atomic absorption finish (results over 3 g/t Au have gravimetric finish).
- Samples for ICP analysis were sent by Geoanalítica to ALS Chemex.
- Geoanalítica was in the process of obtaining ISO 9001:2000 certification and inserted controls equivalent to 17% of the sample batch using standards, blanks and duplicates.

Easdon (2006a) reported the following sample preparation and analytical procedures used for work carried out between October, 2005 and February, 2006. By that time, Andina Chile had implemented a well-defined QA/QC system in order to ensure the integrity of the sample preparation and shipping to the Geoanalítica laboratory in La Serena, which Andina Chile elected to use from October, 2005. Analyses for gold, total copper and molybdenum were carried out for all drill hole, trench and talus samples.

Easdon (2006a) reported the following additional details for analyses carried out by Geoanalítica:

- Samples for gold analysis were ground to 95% passing 150 mesh, and for copper analysis were ground to 90% passing 150 mesh.
- Batches of 48 samples included 7 internal control samples: 4 duplicates, 2 standards and 1 blank.
- 1 in 30 samples was checked to confirm that 95% of the sample was less than 10 mesh and 95% was 150 mesh for gold analysis.
- One blank quartz control per 40 samples was assayed for gold and then subject to multi-element ICP to check for contamination.
- Spectrographic atomic absorption was conducted on:
  - 50-g fire assay with atomic absorption finish for gold, sensitive to 5 ppb Au.
  - Acid digestion (nitric, hydrochloric, perchloric and hydrofluoric) with atomic absorption analysis for copper, sensitive to 3 ppm Cu.
  - Acid digestion (as for copper) with atomic absorption analysis for molybdenum, sensitive to 3 ppm Mo.

Easdon (2006b) reported no change in sample preparation and analytical procedures. He reported that statistical analyses undertaken by Andina Chile of the combination of standards, blanks and duplicates inserted into the drill sample stream for samples from Dorado Oeste demonstrated that the Geoanalítica laboratory was producing repeatable and reliable assay results. The company planned to send 196 drill hole sample pulps and 133 drill hole rejects to ALS Chemex in La Serena for check assays.

Easdon (2006b) also reported that Andina Chile planned to install a sample preparation facility at the Hacienda Castilla.

Gonzalez and Easdon (2007) reported on the sample preparation facility installed at Hacienda Castilla and operated by Geoanalítica. The equipment was housed in two 20-ft steel shipping containers and comprised jaw crushers, concentric Rock Lab pulverizer and mechanical splitter.

Andina Chile inserted approximately 15% additional samples into the sample stream, including standards, blanks and duplicates. All samples were analyzed for gold by fire assay and for total copper and molybdenum by atomic absorption. If additional elements were requested for analysis, the sample pulps were forwarded to Acme Analytical Laboratories (Acme) in Santiago for standard ICP analysis.

The following has been extracted from Easdon (2008):

"On July 26, 2008, the author reviewed the new sample preparation and storage facilities that Andina Chile had set up in Copiapo. At the same time the author reviewed the Geoanalítica facility which was set up in Paipote (located immediately outside of Copiapo and on the road to the Project) under a three-year exclusive contract with Andina Chile. This contract is effective during the active field season. The Andina Chile facility is equipped with an office, change quarters, and a kitchen. The core trays, duplicate cuttings, pulps and laboratory rejects are very well organized, are easily retrievable as needed, and are stored under a waterproof tarp covered installation. Typically there is a crew of people working at the facility during the day shift, and at night there is a watchman, such that a person is always present and the facility is secure 24 hours a day. Andina Chile has set up a core sawing facility next door to the Geoanalítica preparation laboratory and the sawed core is directly transferred to Geoanalítica for preparation in Paipote, while the remaining half is sent to the Andina Chile's storage facility.

"At the time of the author's visit to the facility in Copiapo, the sample preparation had terminated for the 2007-2008 field season and the author was unable to witness first-hand the procedures being used. However, per prior reports by the author and by Gonzalez, R. [(April and November, 2007) and Easdon, M. (November, 2005 and September, 2006) "Technical Reports on the Volcan Gold Project, Region III, Chile" all filed on SEDAR (www.sedar.com) under the heading "Technical Reports"], Andina Chile has consistently maintained a rigorous Quality Control and Quality Assurance ("QC/QA") program.

"At no time, or in any aspect, is an officer, director or associate of the issuer involved in the sample preparation.

"Geoanalítica has set up a sample preparation facility which is essentially identical to their facility in La Serena. The procedure for preparing the samples has not varied since the 2006-2007 field season (refer to Gonzalez, R. Nov. 2007 Technical Report). Andina Chile typically analyzed all of the samples for Au, Cu and Mo.

"It is Easdon's opinion that the sample preparation methods being employed are appropriate and to industry accepted standard practices. Sample security at the new facility in Copiapo is adequate and acceptable."

Acme stated on its website that its laboratories in Santiago achieved ISO 9001:2000 certification in 2005. Acme was acquired by Bureau Veritas in February, 2012.

Micon's QP reviewed the information regarding sample preparation and security at Volcan during the early exploration programs and notes that where there were potential deficiencies these were corrected once they were identified and that the sample preparation and security measures for the earlier programs were generally in line with best practices guidelines of the time and that the data generated from these programs is of a sufficient standard to be used as the basis of a mineral resource estimate. Micon's QP has reviewed Easdon's work and agrees with his opinions.

11.3 2009 to 2010 (Phase VI) Exploration Program

The following is reproduced in its entirety from Lewis et al. (2010) which was, in part, summarized from the June, 2010 review of the 2010 QA/QC report by Magri Consultores.

The Phase VI drilling program comprised a total of 52 drill holes (21 DD and 31 RC), for which Andina Chile continued to follow its established QA/QC protocols. A total of 270 duplicate samples were prepared from the 31 RC drill holes completed during this program and the results are presented in Figure 11-1. Sample preparation was undertaken as described above by Easdon (2008) and analysis was undertaken by Geoanalítica. The correlation coefficients are high (very close to 1), intercepts are low, and slopes close to 1.

A total of 230 duplicate samples were prepared from the coarse rejects of the 21 diamond drill holes completed during this program and the results are presented in Figure 11-2. A good correlation is present between the original and the duplicate sample results. It is concluded that the protocols for sample preparation and analysis produce very good results and that the sample processing was carefully performed.

A total of 500 sample pulps from the 52 drill holes completed during the Phase VI, 2009-2010 field season were submitted for duplicate assaying, and the results are presented in Figure 11-3.

As a control on accuracy, Andina Chile inserted standards at a rate of 5% of the total samples taken, for a total of 492 standard reference and 169 blank samples. The results for the standard samples are presented in Figure 11-4, Figure 11-5 and Figure 11-6.

Cumulative sum plots relative to the observed mean (i.e., the mean of the gold ppb values reported by the laboratory) (Figure 11-4) show that standard reference samples G301-1 and G303-8 had relatively small (less than 30%) fluctuations around a cumulative sum value of 0. Standard reference sample G303-6 shows the largest deviations from the mean laboratory value (-68.4%), with an initial period (from December 17, 2009 to March 9, 20103/9/2010) where the standard reference was underestimated, followed by a period (from March 9, 2010 to June 1, 2010) where the standard reference value was overestimated.

However, when the analysis is repeated relative to the known mean (nominal value) of the standards (Figure 11-5), only standards G303-6 and G303-8 are close to a cumulative sum of 0, whereas standard G301-1 shows large relative deviations from the nominal values, indicating that this standard was generally underestimated by the laboratory.

A scatter plot for all three standard reference samples is shown in Figure 11-6.

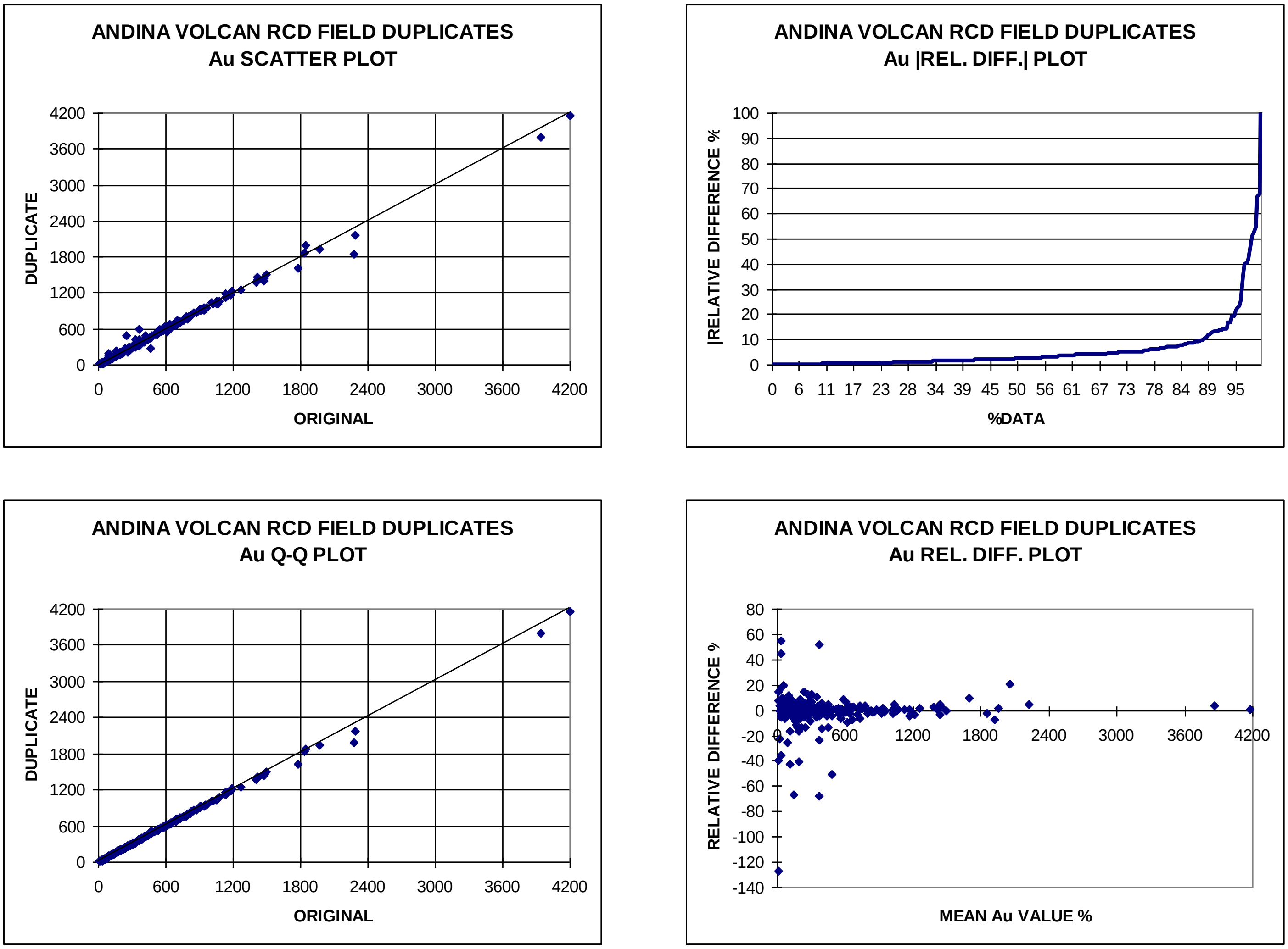
The regression line has a slope of 0.9895, which indicates that there is no significant overall bias in the analysis of these standard reference samples.

As previously mentioned, it is evident that standard reference sample G301-1 was generally underestimated by the laboratory. This was also noted by Magri Consultores in the 2009 QA/QC analyses for exploration Phases III, through V.

These results indicate that, in general, the standard reference sample analyses for the Phase VI exploration campaign were acceptable.

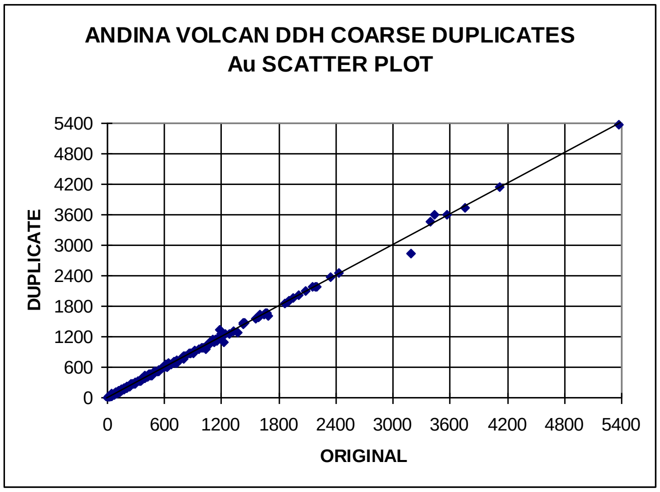
Analysis of the results for blank samples indicated that only 9 of the 169 blank samples (5.3%) returned values outside the 95% confidence intervals for each batch of blanks. However, analysis of blanks by means of confidence intervals based on the assays of the blanks, rather than on the nominal (certified) values for the batch of blanks, is of limited value as one would expect 5% of the data to fall outside the 95% confidence intervals. It would be better to evaluate laboratory contamination by analyzing blanks which followed high valued samples in the laboratory's processing order. For the Andina Chile Volcan Project, it would be better to obtain blanks which are truly blank, instead of using rejects from low valued samples, as these contain small but variable amounts of gold.

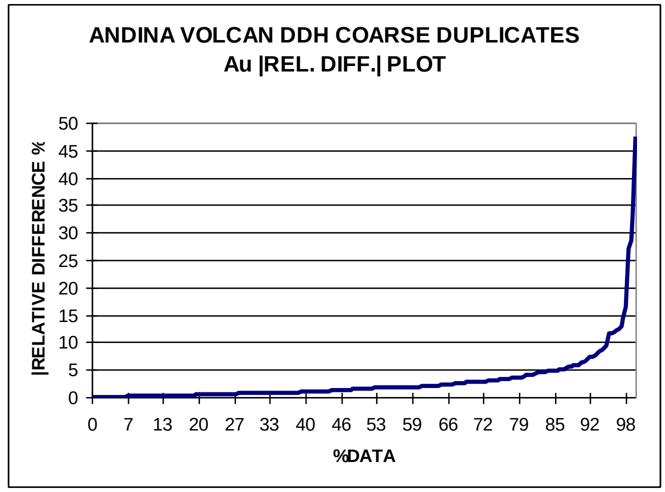
Figure 11-1: Results for the RC Field Duplicate Samples, Phase VI Exploration Program

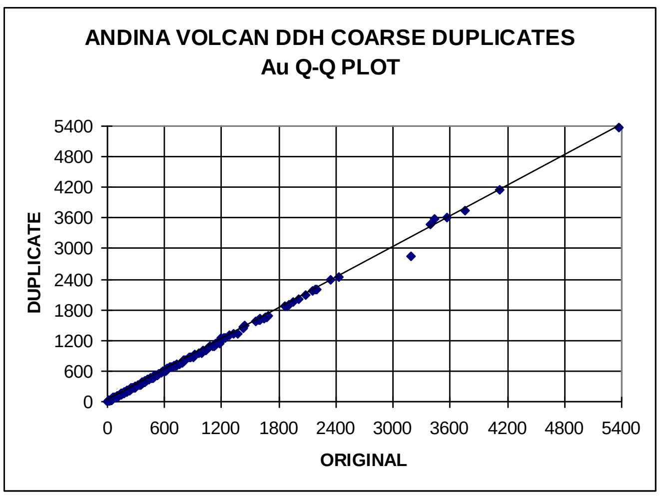


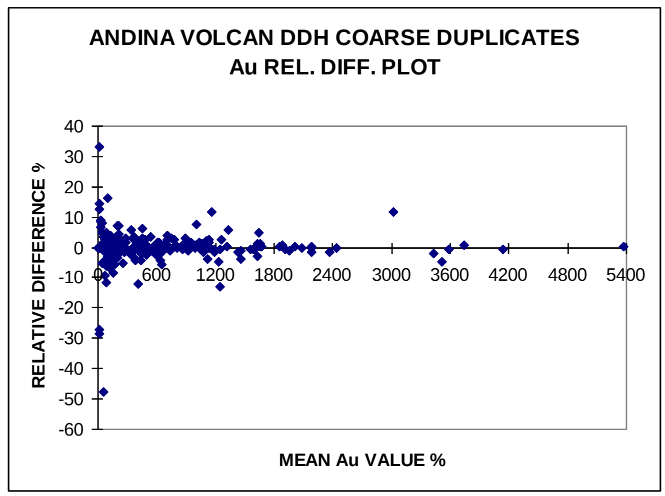
Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

Figure 11-2: Results for the Diamond Drill Field Duplicate Samples, Phase VI Exploration Program



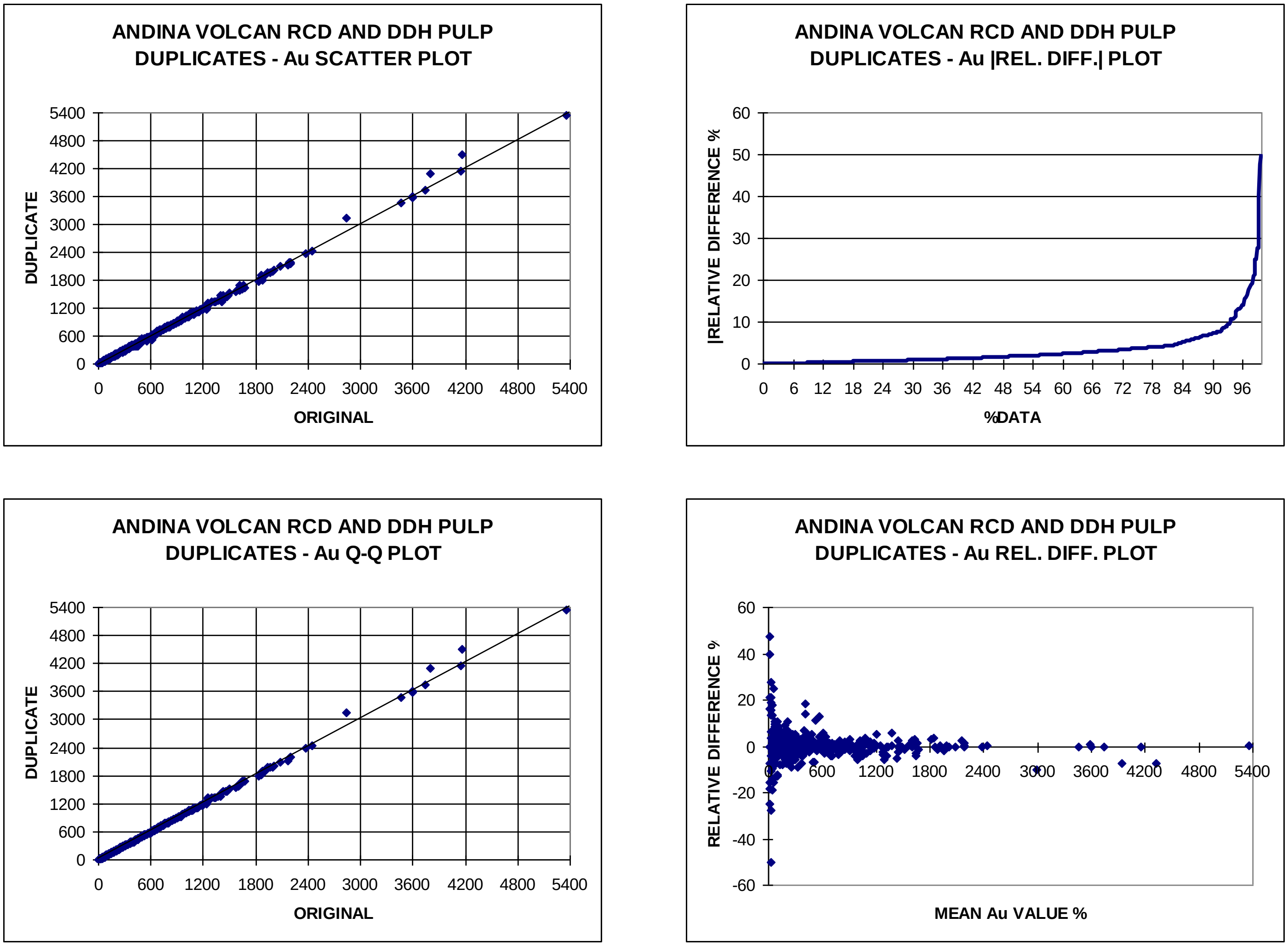






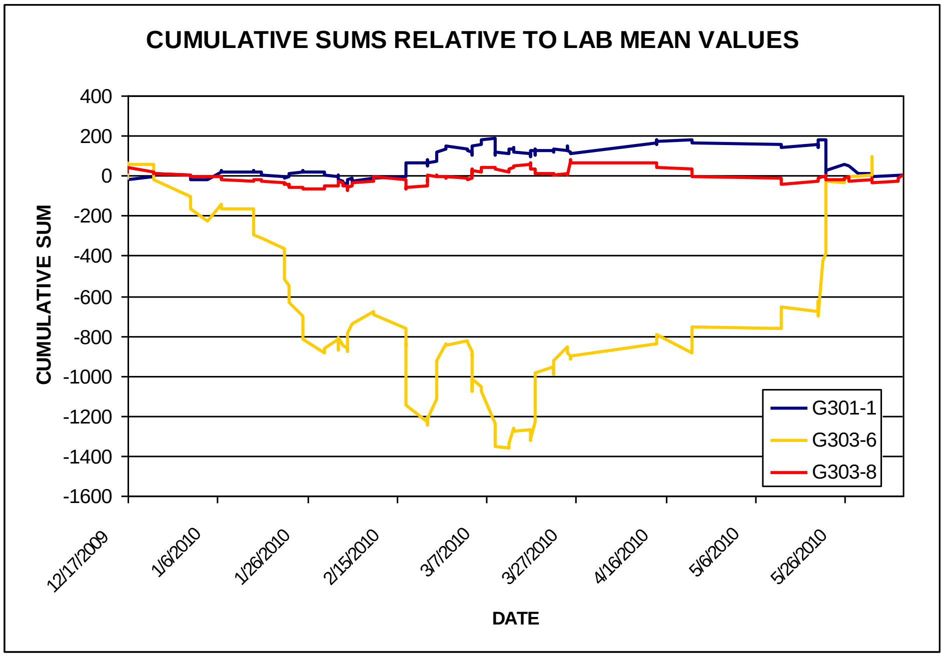
Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

Figure 11-3: Results for the Pulp Duplicate Samples, Phase VI Exploration Program



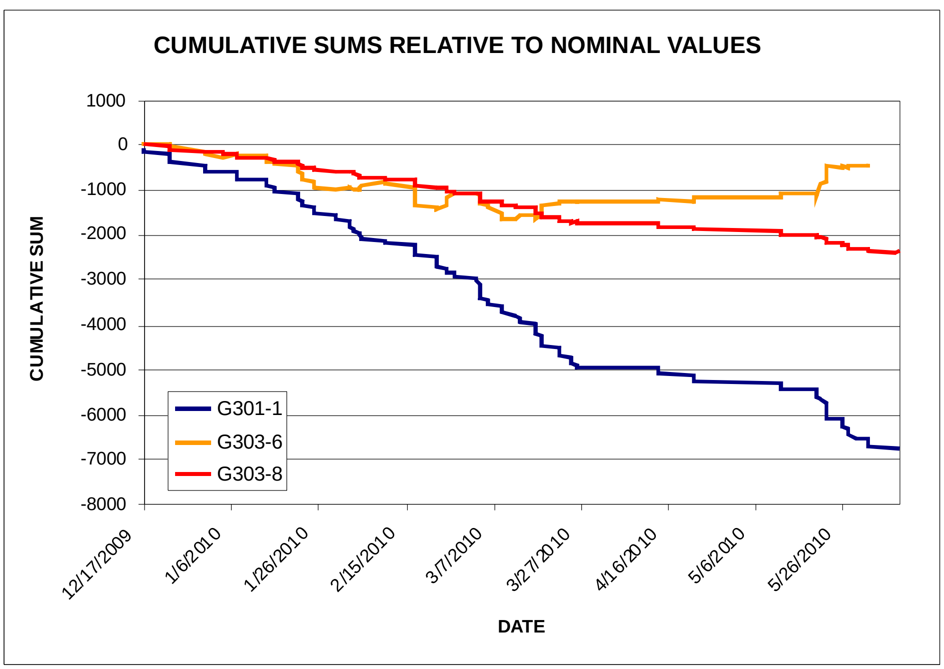
Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

Figure 11-4: Cumulative Sum Plot for the Standard Reference Samples (Relative to the Observed Means) Phase VI Exploration Program



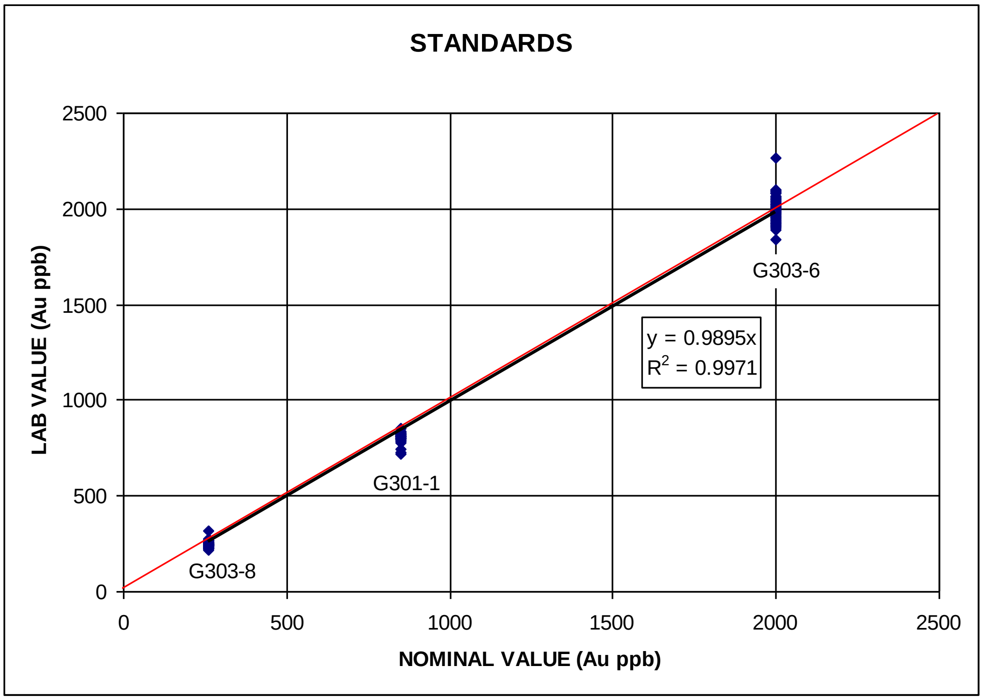
Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

Figure 11-5: Cumulative Sum Plot for the Standard Reference Samples (Relative to Nominal Values) Phase VI Exploration Program



Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

Figure 11-6: Scatter Plot of Laboratory and Nominal (Known) Values for the Standard Reference Samples Phase VI Exploration Program



Note: Figure taken from the June, 2010 report by Magri Consultores Ltda.

11.3.1 Micon QP Comments from the 2011 Technical Report

The following comments are reproduced from Lewis et al., (2010).

Micon's QP observed the sample preparation and security procedures followed by Andina Chile and its contractors and confirmed that at no time is an officer or director of Andina Chile involved in sample preparation.

Geoanalítica states on its website that it has achieved ISO 9001:2000 certification. SGS reports on its website that analytical work is performed in accordance with the standards of ASTM, ISO, JIS and other industry standards. Acme states on its website that its laboratories in Santiago achieved ISO 9001:2000 certification in 2005. The certification status of the laboratories has not been confirmed by Micon's QP.

As noted previously, Micon's QP conducted a site visit between April 17 and 19, 2010, and concluded that the field procedures that were being used to set up the diamond drill, recover the core, transport the core to the logging facilities and the logging and sampling procedures were all being carried out in accordance with the best practices currently in use by the mining industry. As no further exploration or drilling programs were conducted by Andina Chile, Hochschild or Tiernan after the site visit by Micon's QP the data remains sufficient upon which to conduct an updated mineral resource estimate.

11.4 2010 to 2011 (Phase VII) Drilling Campaign ODAE Prospect

The following information regarding the 2010 to 2011 sample preparation, analysis and security for the ODAE Prospect was extracted from the September, 2011, Technical Report by Easdon and Diaz.

The following summarizes the manner in which Andina Chile manages the drill hole samples:

- Andina Chile uses a carefully controlled and designed QA/QC program.
- Drill core and cuttings are handled by Andina Chile personnel and/or SBX sub-contracted personnel from the moment that the core/cuttings exit the drill.
- Andina Chile personnel are present at all times the drills were in operation.
- Once the core samples have been prepared for assaying the same QA/QC procedures are used as for the cutting samples.
- The cuttings are split are in a standard cutting splitter with ¼ of the sample being put into a pre-labeled plastic bag under the supervision and control of Andina Chile personnel at the drill site. The core and cuttings samples are transported daily to the Andina Chile Paipote core and cuttings storage facility. Final logging of core and cuttings are also performed at this facility. Field duplicate samples are inserted at a rate of approximately 1 per 20 samples. The sample stream is labeled (tagged) such that when the samples have been ground to 90% passing –10 mesh and then crushed to 95% passing -150 mesh the appropriate standards, blanks and duplicate pulps can be inserted (~ 7 - 8%). They are then taken to the campsite for storage until transported to Paipote.
- At Paipote the samples are sent to Geoanalítica for grinding and crushing and are then returned to Andina Chile for insertion of the standards, etc.
- The core is boxed at the drill site, where it has been properly taken from the core barrel. The recovery, RQD, and fracture frequency are measured by a geological technician. The core boxes are properly sealed such that there will be no movement or separation of the core and are transported to the campsite.
- The core is pre-logged at the campsite and is marked for splitting by a senior geologist after which it is taken to the Andina Chile facilities in Paipote where the core is split at 2 m intervals with a diamond saw. One half of the core is returned to the core box for final logging and storage in Paipote; the other half is properly bagged and labeled. The core sample is retained under lock and key until it is delivered to the laboratory by Andina Chile personnel for crushing and grinding. Once the core samples have been prepared for assaying the same QA/QC procedures are used as for the cutting samples.

The sampling methods employed by Andina Chile are industry standard methods for handling drill core and cuttings. Two metre sample intervals were selected for both the diamond drill core and RC cuttings. It was Easdon's opinion that the 2 m sampling interval that has been selected for the drill core and cuttings is appropriate to test the mineralization based on the fact that Andina Chile would use open pit mining methods if a mineable deposit was to be developed. Furthermore, it was Easdon's opinion that the field procedures that are being used to set up the diamond drill, recover the core, transport the core to the logging facilities and that the logging and sampling procedures were all being carried out to the best practices currently in use by the mining industry.

All the samples were delivered by Andina Chile personnel to Geoanalítica Limitada's sample preparation facility in Paipote, where they were crushed and then shipped by Geoanalítica to its assay facility in Coquimbo. Geoanalítica analyzed the drill samples for gold, copper and molybdenum. The gold assays were performed utilizing 50 g fire assay with an AAS or gravimetric finish; the Cu and Mo were assayed using standard wet analytical techniques. Sample pulp splits of trench and drill hole samples were subsequently sent by Geoanalítica to the ALS Chemex laboratory (also in Coquimbo) for multi-element (ICP) analysis on 48 elements. Andina Chile has no relationship with Geoanalítica. Geoanalítica is an ISO9000:2001 certified laboratory.

The following summarizes the sample preparation procedures used at the Geoanalítica Paipote sample preparation facility:

1. The samples are coarse crushed to 95% passing 10 mesh.

2. The material is then rotary split with 50% (~8 kg) of the sample being returned to Atacama for storage. The other 50% is rotary split to 2 – 1 kg samples and one 6 kg - samples. The 6 kg sample is retained as a coarse duplicate and stored.

3. One of the 1 kg samples is then dried and ground to 95% passing -150 mesh and an “original” 250 g pulp is taken.

4. The second 1 kg duplicate is likewise dried and ground (95% passing -150 mesh) and 3 splits are taken – 2 – 250 g splits (duplicate coarse and duplicate pulp) to be assayed.

5. The remaining 500 g split is stored.

Andina Chile collected the prepared pulps and inserted the field duplicates, standards and blanks as part of the entire hole batch, utilizing a different sequential numbering system. The re-numbered pulps were then re-delivered to the sample preparation facility in Paipote which then shipped the samples to the Geoanalítica laboratory in Coquimbo. At each stage of the process Andina Chile utilized shipping slips which were signed as appropriate by Geoanalítica and by Andina Chile.

In Coquimbo, Geoanalítica assays the received pulps as summarily described:

1. Fifty grams of material are subjected to a standard 50 g fire assay; typically, an AA finish is used, however if the resulting values are greater than 3 g/t Au then the reported result will be obtained using a gravimetric finish; the lower detection limit for Au is 5 ppb.

2. Copper and molybdenum are analyzed for utilizing a 4-acid digestion and an AA finish with a lower detection limit of 3 ppm.

3. Geoanalítica then sends the ICP samples to ALS Chemex.

4. Geoanalítica employs extensive QA/QC techniques to assure the quality of its assays. Fire assay analyses are run in batches of 48 samples; 41 samples are client samples, and 7 samples (15%) are laboratory (internal) inserted control which includes 4 duplicates, 2 standards and 1 blank.

Geoanalítica uses internationally accepted techniques and standards at all levels of the sample preparation and sample assay procedure to assure quality control. As indicated above, the laboratory inserts its own controls which comprise 17% of the sample batch using a combination of standards, blanks and duplicates to maintain quality control.

Geoanalítica then transfers ~ 150 g of the pulps to the ALS Chemex laboratory in Coquimbo for the IPC analyses, which are performed as follows:

- Geochemical Procedure: ME-ICP41; Trace Level Methods Using Conventional ICP¬AES Analysis.
- Sample Decomposition: Nitric Aqua Regia Digestion (GEO-AR01). Analytical Method: Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP - AES).
- A prepared sample is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted to 12.5 mL with deionized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. The analytical results are corrected for inter-element spectral interferences.

  NOTE: In most geological matrices, data reported from an aqua regia leach should be considered as representing only the leachable portion of the particular analyte.
- Batches of 48 samples include 7 internal control samples: 4 duplicates, 2 standards and 1 blank.
- 1 in 30 samples are checked to confirm that 95% of the sample was less than 10 mesh and 95% was 150 mesh for gold analysis.

- One blank quartz control per 40 samples was assayed for gold and then subject to multi-element ICP to check for contamination.

The QA/QC techniques that were used by Andina Chile have produced verifiable and generally reproducible results. This has been achieved by statistically evaluating the results coming out of the Geoanalítica based predominantly on the reproducibility of the purchased standards (260 ppm, 850 ppm, 1,960 and 2,000 ppm Au). The variation between the standards, blanks and duplicate samples has generally ranged within accepted parameters for normal laboratory and geologic variations. All of the blanks returned low values which indicated that there was no contamination being introduced by the preparation of the samples. In the event that an inserted standard did not return an assay which lies within 2 standard deviations of the mean standard value, Andina Chile instructed the laboratory to re-assay the entire (laboratory) batch. Where a duplicate sample did not replicate the original assay (within ~10% for values >1,000 ppb Au and within ~ 20% for values <1,000 ppb Au) the duplicate would be rerun; if the difference remained then a new sample would be prepared for assay.

It was Easdon's opinion that sample collection (RC and DD), preparation, security and analytical procedures are being properly done and that the results that are being returned are reproducible and may be used for resource estimations.

The duplicate samples, pulps, and split core are maintained in a secure (24-hour guarded) facility in Paipote.

Andina Chile is very conscientious about its sample preparation, security and storage procedures, and maintains a tight control on all sample collection, transportation, processing and storage.

At no time, or in any aspect, is an officer, director or associate of the issuer (Andina Chile) involved in any aspect related to the sample collection through to the sample preparation and shipping to the laboratory.

Micon's QP after having reviewed the Eason report regarding sample preparation, analysis and security for the ODAE Prospect and having observed Andina Chile's practices at Volcan believes that the data collected is of sufficient quality to be able to support further exploration programs as well as a mineral resource estimate for the ODAE Prospect.

11.5 Micon QP Comments

Micon's QP has reviewed the various sample preparation, analysis and security conducted by Andina Chile and believes that Andina Chile conducted its QA/QC program using best practicewhile it was undertaking its exploration and drilling programs. Micon's QP further believes that the information obtained is suitable to be used as the basis of a mineral resource estimate, even though several years have passed since the last program was completed prior to Hochschild acquiring Andina Chile in 2012.

12 DATA VERIFICATION

12.1 2010 Site Visit

The description of the 2010 site visit is taken from the 2011 Technical Report by Micon.

Micon's QP conducted a site visit to the Volcan Project, as well as to the core logging and Geoanalytical assay preparation facilities in Copiapo, between April 17 and 19, 2010. During this period, the field procedures for the drilling program were examined, examples of the host rock types, alteration and veining were observed in outcrop and representative sections of drill core were reviewed. In addition, the QA/QC program, incorporation of data into the electronic database and backup of the database were discussed.

The April, 2010, site visit was conducted by William J. Lewis, B.Sc., P.Geo., a Senior Geologist with Micon.

Figure 12-1 is an interior view of one of the core storage buildings at the facilities located in Copiapo. Figure 12-2 is a view of the interior of the Geoanalytical sample preparation facilities used by Andina Chile at that time.

Hochschild & Tiernan have informed Micon's QP that the cores stored in the lower trays of the core storage buildings were cleaned & transferred to cardboard storage boxes in 2022, following the ingress of mud & debris during a flood event that occurred in March 2015.

Figure 12-1: Interior View of One of the Andina Chile's Core Storage Buildings in Copiapo during the 2010 Site Visit

Photo courtesy of Micon, April 2010 Site Visit.

During the April, 2010 site visit, Micon did not take any check samples of the mineralization located on the Volcan Project as a number of samples were taken during the previous Micon QP site visit in March, 2009 which verified the mineralization. The results of the March, 2009 sampling were reported in the October, 2009 Technical Report (Pressacco et al., 2009).

Figure 12-2: Interior View of the 2010 Geoanalítica Sample Preparation Facilities in Copiapo

Photo courtesy of Micon April 2010 Site Visit

12.2 Micon QP Comments on Database Verification for the Updated Mineral Resources

The current resource estimate update used the original 2010 verified database described above in this section. Only the economic parameters were changed when conducting the 2022 updated mineral resource estimates.

Hochschild and Tiernan have been working on a new more detailed geo-metallurgical model for the Volcan Project. However, further work and reviews have to be completed on this model before it can form the basis of any future work at the Project.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Metallurgical testwork on Volcan has been extensively carried out by a number of groups over many years. From 2006 to 2010, Andina carried out multiple phases of metallurgical testwork to optimize the potential of Volcan. This early phase of work culminated in the last published NI 43-101 Technical Report entitled, "Technical Report on the Results of the Pre-Feasibility Study on the Dorado Deposits, Volcan Gold Project, Region III, Chile," dated January 31, 2011 (the "PFS") and published on SEDAR by Andina Minerals Inc. Following the PFS, Andina carried out a further phase of testwork in 2010, 2011 and 2012 to support a potential feasibility study for the Project.

Following its acquisition of Andina in 2012, Hochschild undertook further rounds of metallurgical testing in 2017, to develop a geometallurgical model; and in 2020, to evaluate ore sorting technology and copper flotation.

The following section summarizes the work done in these four main domains of metallurgical testwork and draws conclusions to support the metallurgical testwork assumptions required to estimate Mineral Resources.

13.2 Metallurgical Testwork

This sub-section outlines the testwork programs completed up to date for the Volcan Project. The metallurgical testwork campaigns are summarized in Table 13-1.

Table 13-1: Metallurgical Testwork Summary Table

Year	Laboratory	Testwork Performed
Phase 1 - Andina Testwork Programs 2010 and Earlier		
2006 to 2010	Kappes, Cassiday & Associates	Column and bottle roll leach tests Permeability tests Comminution tests (abrasion and bond work index) Flotation/carbon-leach (CIL) tests High-Pressure Grinding Roll (HPGR) tests Carbon-in-column tests
Phase 2 – Andina Testwork 2010, 2011 and 2012		
2010 to 2012	Kappes, Cassiday & Associates	Column leach tests (conventional crushing, HPRG and air sweeping of HPGR crushed material) Bottle roll tests Ore reactivity tests – Limestone dosage Permeability and percolation tests CIL optimization tests sulphidization, acidification, recycling, and thickening (SART) tests
Phase 3 – Hochschild Testwork		
2017	-	Geometallurgical testing for five different domains (gold recovery, cyanide, and lime consumption)
2020	AMTEL	Ore sorting tests Flotation and heavy media separation tests

13.2.1 Andina Testwork Programs 2010 and Earlier

Andina conducted a number of metallurgical testwork phases in order to optimize the potential recovery of gold from the Volcan Project. This section summarizes the program of Kappes, Cassidy and Associates ("KCA") metallurgical testing as described in the KCA laboratory test report, "Volcan Project, Report of Metallurgical Testwork, Column Leach Studies (Samples Y, Z, and AA), November 2010," and the KCA December 2010 pre-feasibility study report.

The testwork completed by KCA during 2010 used composite samples representing the range of gold grades expected during the life of the mine, based on mine planning undertaken to date. The composites used were designated Composites Y, Z and AA. The sample grades of these three composites were approximately 0.4, 0.8 and 1.2 g/t gold, respectively.

The 2010 KCA testwork program was designed to examine the envisaged process flowsheet which comprises of the following unit operations:

- primary and secondary crushing;
- high-pressure grinding roll (HPGR) tertiary crushing and fines removal;
- heap leaching of low to medium grade material;
- grinding and agitation leaching of high-grade material and HPGR fines; and
- paste thickened milled tailings disposal.

13.2.1.1 HPGR Testwork

Mineralized material preparation for heap leaching using HPGR equipment instead of conventional tertiary crushers was considered because the HPGR produces more fines and "micro-cracking", both of which expose more of the enclosed gold grains to leaching.

All HPGR testwork was carried out at the pilot plant facility of KHD Humboldt Wedag International AG (KHD) in Cologne, Germany. Conventional crushing for comparative leach testing was carried out at the same facility.

Due to heap permeability concerns, it was decided to HPGR crush the composites (Y, Z and AA) at lower pressures (3.2 and 2.1 N/mm^2) to minimize fines in the heap leach. This was before it was decided to remove 10% of the fines from the HPGR product for the heap leach feed, thus eliminating concerns about permeability.

In earlier tests at higher HPGR crushing pressures (approx. 5.0 N/mm^2), the benefits in gold extraction over conventional crushing to the same P_{80} sizes were quite apparent but benefit was not readily apparent with the low pressure HPGR crushed products. Future testing was recommended on high-pressure HPGR crushing with air separation to remove the fines.

13.2.1.2 Bottle Roll Leach Tests

A total of 45 bottle roll leach tests were completed on portions of Y, Z, and AA composite materials. Twenty-four tests were conducted on samples which were subsequently utilized by Pocock Industrial for solids-liquid separation testing. Twenty-one tests were completed with the tailing analyses for complete extraction results.

Bottle roll tests on the air swept fines (nominally -300 µm) from the HPGR crushed high-grade composite yielded 78% recovery; after grinding to P_{80} of 75 µm the recovery increased to 85%. NaCN consumption for the materials ground to P_{80} of 75 µm averaged 0.83 kg/t, while $Ca(OH)_2$ consumption averaged 1.10 kg/t.

13.2.1.3 Permeability Testwork

Modified compacted permeability tests were completed by KCA using Composites Y, Z and AA. Tests were conducted with portions of each composite agglomerated with 0, 4 or 7 kg of cement per tonne of feed. Results indicated all samples maintained acceptable permeability with a simulated load of 100-meters.

13.2.1.4 Column Leach Tests

A series of column leach tests was undertaken by KCA utilizing as-received material from the Y, Z and AA composite samples.

A series of 31 short columns were set using both conventionally crushed and HPGR crushed material, at 80% passing 9.5 mm and 12.5 mm. In some cases, the samples were screened to remove the-300 µm material to simulate fines removal from the crushed products. Gold extractions from the short columns ranged from 56% to 71% based on calculated gold head grades which ranged from 0.426 to 1.386 g/t. The NaCN consumptions ranged from 1.79 to 3.84 kg/t. The tests were operated with varying additions of $Ca(OH)_2$ plus cement. Copper extractions ranged from 13% to 27% based on calculated head grades which ranged from 602 to 1,314 g/t Cu.

A series of 12 standard column tests (25-40 kg) were completed by KCA using Composites Y, Z and AA. After 87 days of leaching gold extractions from the three composites was:

- 56% to 57% from Composite Y material based on calculated head grades ranging from 0.409 to 0.439 g/t gold. The NaCN consumptions ranged from 1.23 to 1.91 kg/t. Lime plus cement consumption ranged from 2.54 to 5.20 kg/t.
- 64% to 67% from Composite Z material based on calculated head grades ranging from 0.826 to 0.868 g/t gold. The NaCN consumptions ranged from 1.55 to 1.82 kg/t. Lime plus cement consumption ranged from 2.49 to 5.16 kg/t.
- 68% to 72% from Composite AA material based on calculated head grades ranging from 1.314 to 1.357 g/t. The NaCN consumptions ranged from 1.56 to 2.08 kg/t. Lime plus cement consumption ranged from 2.56 to 5.09 kg/t.

Column test cyanide consumptions are substantially higher than experienced during commercial production. It is expected that commercial cyanide consumption for the Volcan material will be lower than that experienced during the column tests.

13.2.1.5 Bond Work Indices

Samples of each composite were submitted by KCA to Phillips Enterprises for Bond Work Index grindability tests. The resulting ball mill work indices at 100 mesh (150 µm) are shown below:

- Composite Y: 17.2 kWh/t (metric)
- Composite Z: 16.4 kWh/t (metric)
- Composite AA: 16.9 kWh/t (metric)

A Bond Work Index of 17.4 kWh/t from the earlier testwork was used for the pre-feasibility study.

13.2.1.6 Solid-Liquid Separation

Samples of leach residues nominally ground to a P_{80} of 75 µm were submitted to Pocock Industrial, Inc. for solids-liquids separation testing.

Consolidation tests were performed on thickened leach residue to reflect the expected conditions for a tailing's facility. The ultimate densities achieved after 72 hours were 66.1 to 68.4% solids by weight. An ultimate density of 68% solids was used for the pre-feasibility study.

13.2.2 Andina Testwork 2010, 2011 and 2012

At the time of preparation of the December 2010 KCA PFS report, additional testwork was being undertaken to support a potential feasibility study. The testwork was based on six new composite samples that were prepared from approximately 10 tonnes of bulk sample. The composites represented low, medium, and high grade from the first 5 years of production (upper) and from years 5 to 10 years of production (lower) based on the PFS mine plan. The composites were prepared through conventional crushing, HPRG and air sweeping of HPGR crushed material.

Each of the three types of samples were prepared and utilized for bottle roll leach tests, percolations tests, permeability tests, column leach tests and agitated leach optimization testwork. Portions were combined to investigate the performance of the mixed materials on a heap leach. Solid-liquid separation tests and leach slurry detox tests were conducted on medium and high-grade samples.

The impact of sulphidization, acidification, recycling, and thickening (SART) was also evaluated.

The results are presented in KCA's report entitled "Volcan Project Report of Metallurgical Testwork November 2012," dated November 27, 2012. This section is predominantly an extraction from the summary of the findings in the KCA report.

13.2.2.1 Bottle Roll Leach Tests

Preliminary bottle roll leach testwork and optimization testing was conducted samples including the conventionally crushed material, the HPGR crushed material and the HPGR crushed material with air sweep segregation (coarse and fine material).

The conventionally crushed low and medium grade composites were only tested using bottle roll leaching. The conventionally crushed high-grade composites were utilized for agitated leach optimization testwork.

The bottle rolls leach tests were analyzed for gold, silver, and copper.

Preliminary bottle roll leach tests were conducted to determine reagent addition requirements and to develop a baseline for the expected gold, silver, and copper extractions. During the initial stages of this test program, several rounds of bottle roll tests were performed due to varied reagent consumption results and investigations regarding the efficacy of lime versus lime and cement for pH control.

Optimization testwork was conducted on portions of the conventionally crushed and the HPGR crushed material, and the HPGR crushed material with air swept segregation (coarse and fine material). Testing was conducted to optimize cyanide addition and grind size. The optimized leach testwork showed that leaching with a sodium cyanide (NaCN) concentration of 0.75 g/L over 24 hours, at a grind size of 80% passing 75 μm gave optimum leaching results.

Portions of the high-grade composites were used to carry out carbon-in-leach (CIL) bottle roll testwork using hydrated lime for pH control. The portions were milled to 80% passing 75 μm, leached with 0.75 g/L NaCN and 30 g/L of granular activated carbon for 48 hours, with results as follows:

- LL composite: Head grade 1.41 g/t gold, Recovery 79%, NaCN consumption 1.36 kg/t
- MM composite: Head grade 1.0 g/t gold, Recovery 68%, NaCN consumption 0.96 kg/t

Tailings material from the high-grade composite testwork was used to conduct acid base accounting (ABA) and meteoric water mobility tests (MWMT). ABA is a static test to determine the acid producing or acid neutralizing potential of a material. Based on the results of this testing, the tailings materials from the agitated leach tests have a net ability to generate acid. Some notable constituents of the final MWMT solution were As, Cu, Fe, Hg, Ni and Sb.

13.2.2.2 Carbon-in-Column Test

Carbon-in-column testwork was completed to investigate gold loading onto granular activated carbon as a function of copper and free cyanide concentration. The investigation was conducted to provide data for plant design and project economic analyses. In this study, two (2) concentrations of copper and three (3) concentrations of NaCN were tested.

The feed solution for all six (6) tests contained 0.30 mg/L gold. The two (2) target copper concentrations of the feed solution were 150 and 300 mg/L. The three (3) target NaCN concentrations were 150, 300 and 600 mg/L.

The results of this testwork showed that higher cyanide concentrations with fixed gold and cyanide values will reduce copper loading onto carbon. At 150 mg/L cyanide and 300 mg/L copper, copper adsorbs onto carbon to the point of inhibiting gold from loading. This work also showed a range of gold and copper loadings, summarized below.

The following was observed in the first set of three (3) tests which were conducted with 150 mg/L copper, 0.30 mg/L gold and varying concentrations of NaCN:

- The highest gold and copper loading occurred with the lowest NaCN solution concentration;
- The highest percentage of gold loaded onto the first stage of carbon at the lowest NaCN concentration;
- The gold loading was similar with the medium and high NaCN solution concentrations, both as percentages and assayed values;
- The copper loading was lower at higher NaCN solution concentrations;
- The percent of total copper loaded at each stage was similar for all three (3) tests.

The following was observed in the second set of three (3) tests which were conducted with 300 mg/L copper, 0.30 mg/L gold and varying concentrations of NaCN:

- The lowest gold and copper loading occurred with the lowest NaCN solution concentration;
- The lowest percent of total gold loaded in the first stage at the lowest NaCN solution concentration;
- Gold loading was similar with the medium and high NaCN solution concentrations, both as percentages and assayed values;
- Copper loading was higher at the low NaCN solution concentration than the medium NaCN solution concentration;

- The percent of total copper loaded at each stage was similar for all three (3) tests.

In both sets of tests, little difference was observed in the gold loading between the medium and high cyanide concentration tests. In the six (6) tests, 81% to 94% of the gold loaded was loaded in the first three (3) stages and 94% to 99% was loaded in the first four (4) stages.

13.2.2.3 Permeability Studies

Portions of each core composite were utilized for compacted permeability testwork. Tests were conducted on portions from each composite and crush type without agglomeration at an effective heap height of 150 meters.

No permeability issues were observed in the tests on the conventionally crushed material with an equivalent loading of 150 meters. The flow rates from these samples ranged from 375 to 1000 times the expected heap leach flow rates.

For the tests on the HPGR crushed material, several tests failed an equivalent loading of 150 meters and subsequent testing at an equivalent loading to 60 meters heap height. Based on the results of the compacted permeability testing and the percolation testing, agglomeration of the HPGR material was recommended to maintain permeability. The cement utilized in agglomeration will also aid in pH control during leaching. Consequently, material for column leach testing conducted later was agglomerated with cement and lime before leaching.

13.2.2.4 Mineralized Material Reactivity Studies

A reactivity study was conducted to measure the acid generating potential of two (2) composites by measuring the pH of a recycled effluent leach solution from miniature column tests. These tests were initiated due to the reactive nature of the conventional and HPGR crushed material during the column leach testwork. To investigate the worst-case scenario, composites were selected based on those with repeated pH control difficulties.

Testing was conducted on 2-kg portions of material blended with varying amounts of hydrated lime and/or cement. Two (2) rounds of tests were performed. The first round investigated the effect of hydrated lime versus hydrated lime and cement on long-term buffering capacity. The second round of testing further investigated the effect of varying cement and hydrated lime additions on the long-term buffering capacity but with increased reagent additions.

The first round of testwork showed that the reagent additions were insufficient to maintain the leach effluent above a pH of 10 for more than a few days. Based on the results of the first round of testwork, a second round of tests was performed using higher reagent additions.

The second round of testwork demonstrated that a total reagent addition of 24 kg/t would provide adequate buffering capability to maintain a pH above 9 for over 200 days, or 100 tonnes of solution per tonne of mineralized material.

The long-term test data suggests the pH of the effluent will continue to decrease beyond the values observed in testing. The strong acid generating potential of the material could affect gold leaching in the short term and pose closure issues in the long term.

The solution applications in tests with the best long-term pH control were three (3) to five (5) times the expected solution application on the heap leach during an expected life of 15 years. These conclusions are based on the results of a small sample under constant leaching with contact with the air. The pH of the solution was not adjusted between the cycles, and the application rate of the solution was double a typical heap application rate.

13.2.2.5 Column Leach and SART Testwork

Column leach tests were conducted utilizing conventionally crushed material, HPGR crushed material, HPGR crushed material that had been air swept and HPGR crushed material that had been air swept and blended. This blending was performed to create samples that would reflect what is expected in the Volcan heap leach pad for the first and second five years of mine life.

A total of thirty (30) column leach tests were conducted utilizing material from the composite samples. Twenty-four (24) of the tests utilized between 144 and 175 kg of material in 200 mm diameter columns. The remaining six (6) tests utilized 30 kg of material in 100 mm diameter columns.

The conventionally crushed, HPGR crushed and HPGR crushed, and air swept materials were all leached using a 1.0 g/L NaCN solution. The air swept and blended HPGR crushed materials were utilized for a NaCN optimization program using 0.15, 0.30, 0.60 and 1.00 g/L NaCN.

A bench-scale SART program was conducted on the effluent solutions from duplicate columns from NaCN optimization program. The SART program was conducted to remove copper from the leach solution and to investigate the effects on gold leaching, copper leaching and NaCN consumption over the life of the column.

Products from the column leach tests were submitted to AMTEL for gold deportment analyses and reported in AMTEL report entitled, "Gold Deportment in 2011 Volcan Composite Feeds (DD, EE, FF, GG, LL, MM)," dated December 15, 2011.

13.2.2.5.1 Column Leach Test Extractions

The gold extractions from the conventionally crushed material ranged from 55% to 64% after 142 days of leaching based on calculated head grades ranging from 0.387 to 0.820 g/t gold. The NaCN consumptions for the columns ranged from 0.90 to 1.68 kg/t.

The gold extractions from the HPGR crushed material ranged from 53% to 69% after 134 days of leaching based on calculated head grades ranging from 0.408 to 0.851 g/t gold. The NaCN consumptions for the columns ranged from 1.17 to 2.80 kg/t. Of the six (6) HPGR crushed columns, two (2) were run as duplicate columns. The four (4) main columns (KCA Test Numbers 49115, 49121, 49127 and 49130) were run in 200-mm diameter columns utilizing between 148 and 175 kg of material. The duplicate columns were run in 100 mm columns each loaded with 30 kg of material. The duplicate columns had the highest cyanide consumption, which is most likely due to the smaller column test size.

The use of HPGR shows a consistent 3-5% improvement in recovery compared to conventional crushed material for both lower and medium grade material and in the upper and lower portions of the deposit.

Gold extractions from the HPGR crushed and air swept material ranged from 57% to 67% after a leach period of 130 to 150 days based on calculated head grades ranging from 0.416 to 0.831 g/t gold. The NaCN consumptions for the columns ranged from 1.13 to 1.54 kg/t.

The column tests on the air swept and blended HPGR crushed material (JJ) from the upper section of the mineralized body (first five years of mine life) were leached for periods between 163 and 183 days. They had the following extractions and cyanide consumptions at varying solution free cyanide levels:

- 53% to 60% gold extraction from the columns that were not treated with SART based on calculated heads ranging from 0.601 to 0.613 g/t gold. NaCN consumptions ranged between 0.44 and 1.46 kg/t.

- 53% to 59% gold extraction from columns that were treated with SART based on calculated heads ranging from 0.606 to 0.621 g/t gold. NaCN consumptions ranged between 0.33 and 1.49 kg/t.
- The column tests on air swept and blended HPGR crushed material (KK) from the lower section of the mineralized body (second five years of mine life) were leached for periods between 107 and 167 days. They had the following extractions and chemical consumptions:
- 57% to 64% gold extraction from the columns that were not treated with SART for samples with calculated heads ranging from 0.593 to 0.639 g/t gold. NaCN consumptions ranged between 0.54 and 0.88 kg/t.
- 57% to 66% gold extraction from columns that were treated with SART for samples with calculated heads ranging from 0.587 to 0.653 g/t gold NaCN consumptions ranged between 0.62 and 1.68 kg/t.

Four of the KK column tests were ended at 107/108 days because leaching appeared complete based on solution extraction curves. This was consistent with the results of previous column tests using the constituent material for the KK composite (EE and GG), which both leached relatively quickly at a high cyanide concentration.

After leaching, select columns were utilized for additional testing. Rinsing of select columns was conducted to reduce the effluent concentration of cyanide. Also, portions of select column tailings were utilized for characterization testing.

Rinsing of select columns showed that the effluent concentration of weak acid dissociable (WAD) and total cyanide could be reduced to a level below 1.0 mg/L with a solution application between 0.38 and 0.47 tonnes of solution per tonne of mineralized material.

Tails analyses on select columns showed that the material is acid generating and has the potential to leach arsenic, lead, copper, and mercury based on the results from toxicity characteristic leaching procedure (TCLP) and synthetic precipitation leaching procedure (SPLP).

Column test extraction results contained in this report were based upon granular activated carbon assays vs. the calculated head (carbon assays + tail assays).

13.2.2.5.2 SART Results

The bench-scale SART testwork was performed to remove copper from the solution and recover cyanide bound to the copper for further use in gold leaching. The SART columns facilitated further copper extraction by removing copper from the solutions, which is reflected in the 5 to 19% copper extraction increase in the columns treated with SART versus ones not treated with SART.

The SART process was intended to reduce overall cyanide consumption in high copper NaCN leach environment. The results reported from the SART versus non-SART tests was not consistent in achieving lower overall NaCN consumption. Further testwork is recommended.

No gold leaching enrichment was found between the SART and non-SART columns.

The results of the gold and copper extractions are summarized in Table 13-2 and Table 13-3.

The SART laboratory test copper precipitate averaged 49.6% Cu content over 229 samples analyzed. Laboratory test typically result in lower copper content in precipitate when compared to commercial operations (typically 65% Cu precipitate for similar operations in the region). No further analyses of the copper precipitate were reported. Commercial operations in the region typically produce copper precipitate which does not include deleterious elements at levels which attract penalties.

Table 13-2: Cyanide Column Leach Testwork Summary of Gold (Au) Extraction onto Activated Carbon and Chemical Consumptions

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (g Au/t)	Carbon Calculated Head (g Au/t)	Extracted onto Carbon, (% Au)	Days Of Leach	Tails P_{80} Size (mm)	Consumption NaCN (kg/t)	Final Addition Hydrated Lime (kg/t)	Final Addition Cement (kg/t)
49001	49101	DD (Conv) Low Grade Upper	0.212	0.487	56%	142	9.34	1.68	8.00	7.00
49002	49104	FF(Conv), Low Grade Lower	0.173	0.387	55%	142	9.39	0.90	2.50	0.00
49003	49107	FF(Conv), Medium Grade Upper	0.316	0.756	58%	142	9.67	1.14	3.00	4.00
49004	49110	GG (Conv), Medium Grade Lower	0.296	0.820	64%	142	9.55	1.04	2.00	0.00
49017	49115	DD (HPGR) Low Grade Upper	0.213	0.516	59%	134	10.52	1.87	15.00	8.00
49017	49118	DD (HPGR) Low Grade Upper	0.217	0.522	58%	134	10.44	2.80	17.00	8.00
49018	49121	EE (HPGR) Low Grade Upper	0.164	0.408	60%	134	9.40	1.17	3.00	0.00
49019	49124	FF (HPGR) Medium Grade Upper	0.307	0.767	60%	134	8.78	1.61	6.00	6.00
49019	49127	FF (HPGR) Medium Grade Upper	0.397	0.851	53%	134	10.71	2.77	8.50	0.00
49020	49130	GG (HPGR) Medium Grade Lower	0.260	0.847	69%	134	8.32	1.72	3.00	0.00
49057	49139	DD (HPGR+ AS) Coarse Low Grade Upper	0.210	0.502	58%	150	10.94	1.54	8.00	16.00
49059	49133	EE (HPGR+ AS) Coarse Low Grade Lower	0.178	0.416	57%	136	8.59	1.28	3.00	2.00
49061	49142	FF (HPGR+ AS) Coarse Medium Grade Upper	0.294	0.735	60%	130	9.47	1.13	4.00	12.00

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (g Au/t)	Carbon Calculated Head (g Au/t)	Extracted onto Carbon, (% Au)	Days Of Leach	Tails P_{80} Size (mm)	Consumption NaCN (kg/t)	Final Addition Hydrated Lime (kg/t)	Final Addition Cement (kg/t)
49063	49136	GG (HPGR+ AS) Coarse Medium Grade Lower	0.274	0.831	67%	136	8.38	1.22	3.00	2.00
49067	49145	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.15 gpl NaCN)	0.284	0.609	53%	165	7.96	0.44	6.00	16.00
49067	49148	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.15 gpl NaCN w/ SART)	0.294	0.619	53%	183	10.06	0.33	6.00	16.00
49067	49151	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.30 gpl NaCN)	0.260	0.601	57%	165	9.94	0.65	6.00	16.00
49067	49154	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.30 gpl NaCN w/ SART)	0.263	0.612	57%	169	8.90	0.44	6.00	16.00
49067	49157	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.60 gpl NaCN)	0.244	0.610	60%	180	10.40	1.17	6.00	16.00
49067	49160	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.60 gpl NaCN w/ SART)	0.265	0.621	57%	167	9.35	0.80	6.00	16.00
49067	49163	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (1.00 gpl NaCN)	0.249	0.613	59%	163	9.36	1.46	6.00	16.00
49067	49166	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (1.00 gpl NaCN w/ SART)	0.246	0.606	59%	167	9.32	1.49	6.00	16.00
49068	49169	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.15 gpl NaCN)	0.268	0.623	57%	163	7.53	0.54	3.00	2.00
60722	49172	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.15 gpl NaCN w/ SART)	0.267	0.628	57%	167	8.03	0.62	3.00	2.00

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (g Au/t)	Carbon Calculated Head (g Au/t)	Extracted onto Carbon, (% Au)	Days Of Leach	Tails P_{80} Size (mm)	Consumption NaCN (kg/t)	Final Addition Hydrated Lime (kg/t)	Final Addition Cement (kg/t)
49068	49179	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.30 gpl NaCN)	0.251	0.639	61%	159	9.01	0.70	3.00	2.00
60722	49182	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.30 gpl NaCN w/ SART)	0.219	0.587	63%	163	7.03	0.81	3.00	2.00
49068	49185	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.60 gpl NaCN)	0.222	0.601	63%	107	9.88	0.70	3.00	2.00
60722	49188	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.60 gpl NaCN w/ SART)	0.223	0.653	66%	108	11.38	1.07	3.00	2.00
49068	60778	KK (HPGR+ AS) Coarse, Grade Blend, Lower (1.00 gpl NaCN)	0.213	0.593	64%	107	9.73	0.88	3.00	2.00
60722	60781	KK (HPGR+ AS) Coarse, Grade Blend, Lower (1.00 gpl NaCN w/ SART)	0.218	0.609	64%	108	9.41	1.68	3.00	2.00

Table 13-3: Cyanide Column Leach Testwork Summary of Copper (Cu) Extraction onto Activated Carbon and Chemical Consumptions

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (mg Cu/kg)	Carbon Calculated Head (mg Cu/kg)	Copper Extraction %	Days Of Leach	Tails P_{80} Size, (mm)	Consumption NaCN (kg/t)	Final addition Hydrated Lime (kg/t)	Final addition Cement, (kg/t)
49001	49101	DD (Conv) Low Grade Upper	387	467	17%	142	9.34	1.68	8.00	7.00
49002	49104	FF(Conv), Low Grade Lower	315	373	15%	142	9.39	0.90	2.50	0.00
49003	49107	FF(Conv), Medium Grade Upper	494	619	20%	142	9.67	1.14	3.00	4.00
49004	49110	GG (Conv), Medium Grade Lower	875	972	10%	142	9.55	1.04	2.00	0.00
49017	49115	DD (HPGR) Low Grade Upper	372	448	17%	134	10.52	1.87	15.00	8.00
49017	49118	DD (HPGR) Low Grade Upper	306	389	21%	134	10.44	2.80	17.00	8.00
49018	49121	EE (HPGR) Low Grade Upper	308	382	19%	134	9.40	1.17	3.00	0.00
49019	49124	FF (HPGR) Medium Grade Upper	394	494	20%	134	8.78	1.61	6.00	6.00
49019	49127	FF (HPGR) Medium Grade Upper	331	429	23%	134	10.71	2.77	8.50	0.00
49020	49130	GG (HPGR) Medium Grade Lower	805	925	13%	134	8.32	1.72	3.00	0.00
49057	49139	DD (HPGR+ AS) Coarse Low Grade Upper	385	476	19%	150	10.94	1.54	8.00	16.00
49059	49133	EE (HPGR+ AS) Coarse Low Grade Lower	308	365	16%	136	8.59	1.28	3.00	2.00
49061	49142	FF (HPGR+ AS) Coarse Medium Grade Upper	414	518	20%	130	9.47	1.13	4.00	12.00
49063	49136	GG (HPGR+ AS) Coarse Medium Grade Lower	868	1011	14%	136	8.38	1.22	3.00	2.00
49067	49145	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.15 gpl NaCN)	439	493	11%	165	7.96	0.44	6.00	16.00

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (mg Cu/kg)	Carbon Calculated Head (mg Cu/kg)	Copper Extraction %	Days Of Leach	Tails P_{80} Size, (mm)	Consumption NaCN (kg/t)	Final addition Hydrated Lime (kg/t)	Final addition Cement, (kg/t)
49067	49148	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.15 gpl NaCN w/ SART)	385	475	19%	183	10.06	0.33	6.00	16.00
49067	49151	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.30 gpl NaCN)	380	477	20%	165	9.94	0.65	6.00	16.00
49067	49154	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.30 gpl NaCN w/ SART)	359	488	26%	169	8.90	0.44	6.00	16.00
49067	49157	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.60 gpl NaCN)	336	409	18%	180	10.40	1.17	6.00	16.00
49067	49160	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (0.60 gpl NaCN w/ SART)	340	505	33%	167	9.35	0.80	6.00	16.00
49067	49163	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (1.00 gpl NaCN)	385	478	19%	163	9.36	1.46	6.00	16.00
49067	49166	JJ (HPGR+ AS) Coarse, Grade Blend, Upper (1.00 gpl NaCN w/ SART)	298	481	38%	167	9.32	1.49	6.00	16.00
49068	49169	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.15 gpl NaCN)	663	733	10%	163	7.53	0.54	3.00	2.00
60722	49172	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.15 gpl NaCN w/ SART)	595	701	15%	167	8.03	0.62	3.00	2.00
49068	49179	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.30 gpl NaCN)	638	727	12%	159	9.01	0.70	3.00	2.00
60722	49182	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.30 gpl NaCN w/ SART)	535	676	21%	163	7.03	0.81	3.00	2.00
49068	49185	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.60 gpl NaCN)	629	724	13%	107	9.88	0.70	3.00	2.00

KCA Sample No.	KCA Test No.	Description	Weighted Avg. Tail Screen (mg Cu/kg)	Carbon Calculated Head (mg Cu/kg)	Copper Extraction %	Days Of Leach	Tails P_{80} Size, (mm)	Consumption NaCN (kg/t)	Final addition Hydrated Lime (kg/t)	Final addition Cement, (kg/t)
60722	49188	KK (HPGR+ AS) Coarse, Grade Blend, Lower (0.60 gpl NaCN w/ SART)	617	795	22%	108	11.38	1.07	3.00	2.00
49068	60778	KK (HPGR+ AS) Coarse, Grade Blend, Lower (1.00 gpl NaCN)	592	699	15%	107	9.73	0.88	3.00	2.00
60722	60781	KK (HPGR+ AS) Coarse, Grade Blend, Lower (1.00 gpl NaCN w/ SART)	516	708	27%	108	9.41	1.68	3.00	2.00

13.2.2.6 Detoxification of Agitated Leach Tails

A series of detoxification tests were conducted on select samples. The detoxification testwork was separated into multiple stages. The first stage was an optimization of the SO_2/ Air process on high-grade material. The second stage used the optimized parameters from the first stage on the air swept fines from the medium and low grade composites. This was followed by examination of Caro's Acid and Combinox testing programs.

The detoxification testwork was performed using two approaches. The first approach was to detoxify small batches of the leached material with sodium metabisulfite ($Na_2S_2O_5$) and air, with copper sulfate ($CuSO_4$) catalyst added based on the initial copper and iron concentrations in solution before lowering the pH. This method did not account for the leaching of iron after dropping the pH, resulting in a lower copper to iron ratio than was expected. This was referred to as a "static" method because all reagents were added at once based on initial solution data.

The second method was a kinetic approach, measuring the copper and iron in solution throughout the test at regular intervals. This allowed the copper to iron ratio in solution to be monitored and maintained and resulted in lower final total cyanide concentrations. This was referred to as a 'kinetic' method because reagents were added based on solution data throughout the test.

The results from the detoxification work indicate that the SO_2/ Air or Combinox methods are the most effective at reducing the cyanide concentration. The Caro's Acid method consumed the most reagents. Overall, it appears the SO_2/ Air method of detoxification achieves the best results with the least amount of reagents.

The 'kinetic' tests reduced the weak acid dissociable (WAD) and total cyanide to levels below those observed in the 'static' tests; however, copper additions were notably higher.

13.2.3 Hochschild 2017 Metallurgical Testwork

Following an exercise in 2013 to relog diamond drill core and define a geological model for the Dorado Oeste deposit, Hochschild engaged Ausenco Chile to develop a geometallurgical model from additional metallurgical testwork and based on Ausenco's experience in similar projects.

Based on a review of the lithology and main alterations for Dorado Oeste, five geometallurgical domains were defined. From the existing HQ diamond drill core, 15 samples of 20 kg each were selected for geometallurgical testing. Laboratory tests were undertaken to define the gold recovery; and cyanide and lime consumptions for each of the five geometallurgical domains. Mineralogy and inductively coupled plasma (ICP) analyses were also undertaken on the samples.

The metallurgical testwork assumed a process flowsheet of crushing/agglomeration, heap leaching and ADR. HPGR was not considered or included in the testing.

The results of the testwork are summarized into Ausenco report 101802-02-LT-E-0008 "Geometallurgical Recovery Model Generation Project for Volcan Gold Project," dated February 15, 2017.

13.2.3.1 Geology

The main lithologies recognized in relogging of the diamond drill core and sampling were:

- dacitic, rhyodacitic and andesitic lavas; mainly observed as intercalations and/or clasts in the Project's hydrothermal breccias;
- andesitic lavas and dikes, mainly observed as intercalations and/or clasts in the Project's hydrothermal breccias;
- dacitic to microdioritic porphyries, mainly observed as continuous rock units and as intrusions and clasts in the Project's hydrothermal breccias, and
- hydrothermal and igneous breccias, supported clast and matrix, some of them with fluid textures in the matrix of hydrothermal and igneous composition (of the same appearance and composition as the porphyries).

The main alteration recognized in relogging of the diamond drill core and sampling were:

- “acid leaching,” represented by silica, alunite, gypsum, sulfides (mainly pyrite) and limonites (in the most superficial samples observed);
- intermediate and advanced argilization, represented by associations of quartz-alunite-illite clays and chlorite;
- variable moderate to strong silicification, with formation of microcrystalline silica with clays and some alunite;
- biotitization, chloritization and argillation feldspars, with variable intensity between moderate to weak, and
- potassium alteration, mainly represented by secondary biotite and potassium feldspar in the form of halos in quartz veinlets and secondary biotite in the form of small fine clusters in matrix zones of hydrothermal breccias and selectively replacing some phenocrysts of mafic prismatic minerals (probably hornblendes).

13.2.3.2 Definition of Geometallurgical Units

To define Geometallurgical Units (GU), it is necessary to consider geological variables such as lithology, alteration, or their combinations, in groupings of rock volumes that are representative of the necessary deposit to model.

In the case of the Volcan Project, and according to the background information provided, this definition was limited only to the Dorado Oeste sector as it is the only area with information on lithology and alteration; it also corresponds to approximately 90% of the in-pit volume considered for the study. In the future, it may be possible to generate an extrapolation of the results to Dorado Central and Este, considering the geological model.

The definition of five GU’s was made using the following criteria for a representative analysis:

- Geological and volumetric representativeness (%);
- Spatial arrangement of lithological domains;
- Chemical profile of each lithological domain, and
- Alterations associated with each lithological domain.

Table 13-4: Geometallurgical Units of Dorado Oeste

GU	Description
1	Early Porphyry
2	Late Porphyry
3	Andesitic Lava Flow (ALF)
4	Magmatic and Hydrothermal Breccia
5	Igneous Breccia

13.2.3.3 Metallurgical Testwork on Samples from Geometallurgical Units

Based on the defined GU's, samples for metallurgical testwork were taken from existing HQ diamond drill core to represent the GU's lithology, alteration, alteration intensity and theoretical gold grade. In total, 15 samples were taken, three from each GU. Each sample was approximately 20 kg.

Samples were prepared for testing by crushing to 150 µm ahead of 2 kg bottle roll tests to estimate gold recovery; and cyanide and lime consumptions. In addition, each sample was characterized using an ICP analysis, to test for deleterious elements, and a mineralogical examination.

Based on the results, the geometallurgical model was built from the block model and by assigning each block a GU, the weighted gold recovery for the GU, and the weighted cyanide and lime consumption. A summary of the results is shown in Table 13-5.

Table 13-5: Geometallurgical Units in the Dorado Oeste Deposit

GU	% of Tonnage	Gold Grade (g/t)	Gold Recovery (%)
1	0.9	0.64	59
2	1.9	0.46	66
3	4.1	0.49	56
4	41.8	0.89	70
5	51.3	0.53	53
Total	**100**	**0.68**	**61**

The ICP analysis indicated that there are no deleterious elements in sufficient quantity that would affect the quality of the gold product or gold sales.

13.2.4 Hochschild 2020 Metallurgical Testwork

In 2020, AMTEL was engaged by the Hochschild's business improvement group to carry out some evaluations on Volcan samples, as follows:

- AMTEL report 20/22 - June 22, 2020 - mineralogical evaluation and ore sorting testwork on 70 core samples. Included evaluation of color, magnetic susceptibility, and liberation

- AMTEL report 20/47 - Dec 7, 2020 - general mineralogy, gold deportment, flotation testing and heavy media separation on three composite samples.

In general, the testwork concluded that gold was disseminated across various color, magnetic susceptibility, and density zones such that conventional ore sorting technology has limited potential to reject a component of non-economic or lower grade material from the mineralized material.

From the flotation and heavy media separation tests, it was concluded that a commercially viable flotation concentrate could not be produced from Volcan mineralized material.

13.2.5 Summary of Metallurgical Results

Below are a few points that summarize the metallurgical characteristics gleaned from the metallurgical studies completed to date on samples of Volcan mineralization:

- In all phases of testwork, it is evident that there is increasing recovery with increasing gold grade.
- In all phases of the testwork, it is apparent that there is increased recovery as the particle size is reduced.
- Cyanide soluble copper is present in sufficient quantities to affect cyanide consumption and potentially to require some specific process steps to minimize the cyanide consumption. SART testwork showed effective copper removal from solution resulting in cyanide reduction in column cell composite testwork.
- The use of HPGR shows an improvement in recovery. The HPGR result in more fines generation that will require agglomeration prior to heap leaching to ensure there are no permeability issues in the heaps.
- Preliminary work on establishing a geometallurgical model has shown that >90% of the Dorado Oeste deposit is contained in two main breccia units.
  - The magmatic and hydrothermal breccia appears to have a higher vein density and higher gold grades. Recoveries averaged 70% from 0.89 g/t head grade.
  - The igneous breccia unit appears to have a lower vein density and lower gold grades. The igneous breccia has correspondingly lower gold recovery associated with it, in line with previous conventional crushing testwork results. Recoveries averaged 53% from 0.53 g/t head grade.
  - It is not conclusive if the recovery differences are related to lithology or to head grade.
- There is limited potential to reject lower grade material from the Dorado Oeste deposit using ore sorting techniques or flotation.

13.3 Recovery Estimates

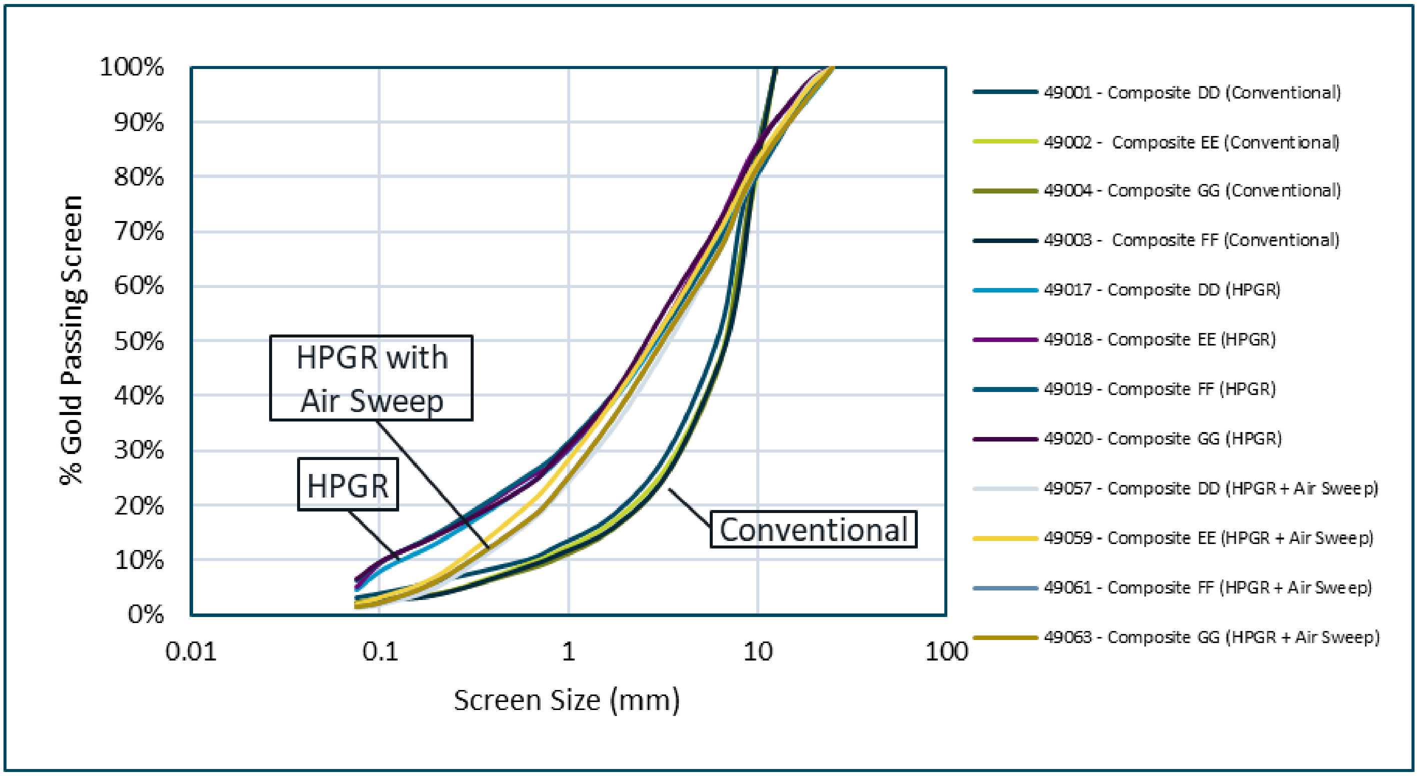
13.3.1 Impact of Pre-treatment on Gold Distribution

Much of the testwork has focused on determining the impact of three potential pre-treatments on metallurgical performance. To understand the following discussion on recovery it is important to put these into context. Figure 13-1 shows how the choice of crusher technology, and the removal of fines from the HPGR product, affect the gold distribution by size fraction in the heap leach feed for material with the same measure P_{80} size distribution.

- Conventional tertiary crushing produces a narrow size distribution with limited fines, about 12% minus 1 mm.

- The HPGR generates a product with a much flatter size distribution of which about 30% is below 1 mm. These fines need to be agglomerated to prevent permeability issues when stacked onto the heap.
- The air sweep removes the finer fraction for leaching in a tank leach circuit and thus eliminates the need for agglomeration.

Figure 13-1: Gold Distribution by Size and Pre-treatment.



Note: Figure supplied by Ausenco 2022

The expectation is that gold recovery on the heap will be improved by having a finer particle distribution to the heap. Removing the fines, and easily leached gold, would be expected to reduce heap recovery, but not overall recovery as gold in fines would be leached in a tank leach.

The data for four composites (DD, EE, FF, and GG) which were column leached with and without fines removal, showed on average a 3% reduction in head grade when the fines were removed. This suggests the grade in the feed to the tank leach would be slightly higher than feed to the heap leach in the case where fines were removed.

However, the economic benefit of a separate fines leaching circuit is not sufficient compared to the cost, so as noted in Section 17, the flowsheet being considered for Volcan includes HPGR crushing followed by agglomeration and heap leaching with the fines retained.

13.3.2 Testwork Composites

A total of nine composite samples have been tested during the KCA development work, with one additional sample used during the earlier work at McClelland. These samples were expected to be representative of the proposed mine plan for the Dorado Oeste deposit. Each composite was prepared to represent:

- Composite Y – low-grade material
- Composite Z – medium grade material
- Composite AA – high-grade material
- Composite DD – lower grade, upper portion of the deposit
- Composite EE – lower grade, lower portion of the deposit
- Composite FF – medium grade, upper portion of the deposit
- Composite GG – medium grade lower portion of the deposit
- Composite JJ – blended from Composites DD and FF, upper portion of deposit
- Composite KK – blended from Composites EE and GG, lower portion of deposit

13.3.3 Gold Recovery in Column Tests

To develop an understanding of gold recovery, the results from 93 column leach tests, from three test programs, have been analyzed.

- KCA report, "Volcan Project Report of Metallurgical Testwork" from November 2012;
- KCA report, "Volcan Project Report of Metallurgical Testwork" from January 2011; and
- McClelland report, "Heap Leach Cyanidation Testing - Volcan HPGR Product Samples" from April 2009.

Pivot tables have been used to analyse the data to find trends related to the variables studied during the development testwork.

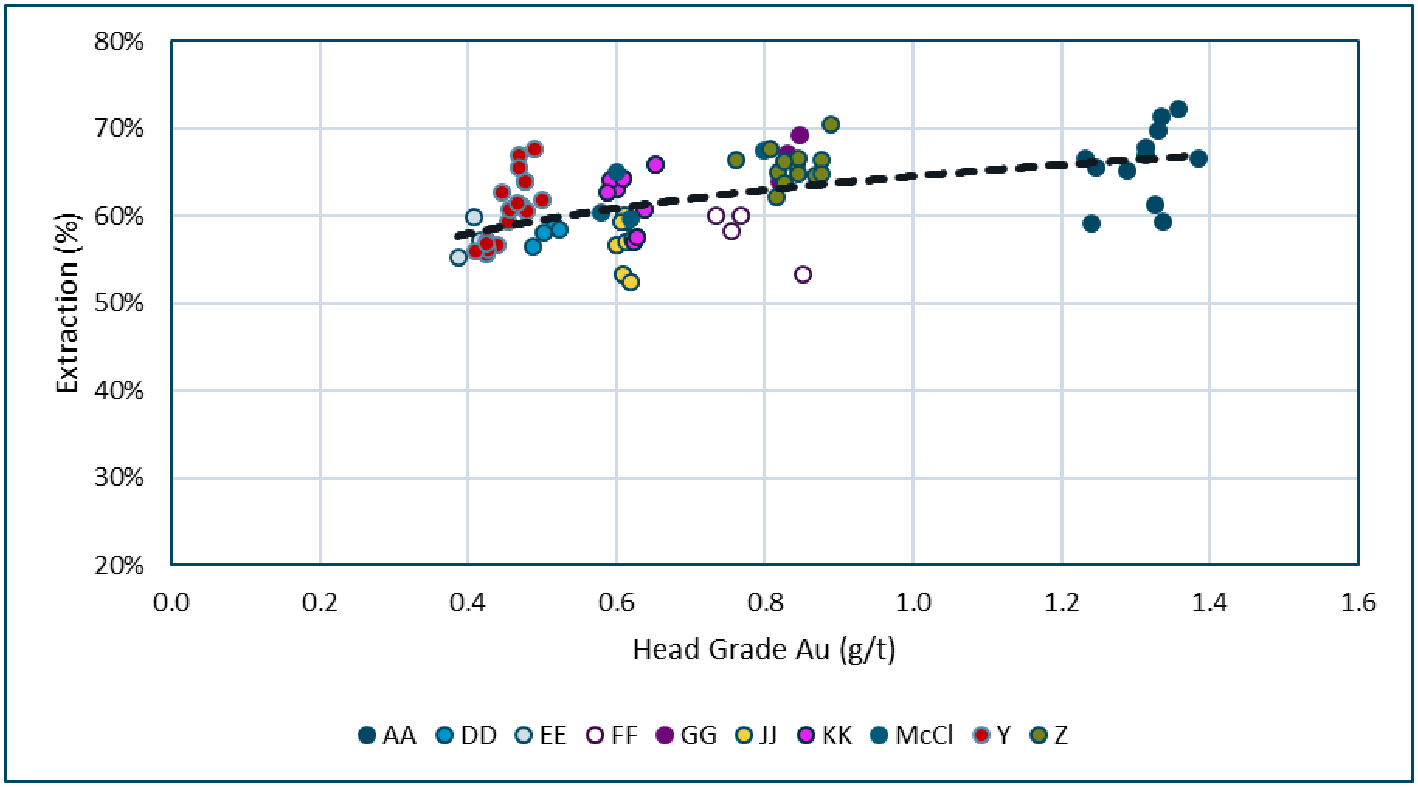
- Conventional vs HPGR crush, with and without fines removal
- Different HPGR crush pressures
- Crush size
- Impact of SART

Results from all column tests by composite are summarized in Table 13-6 and Figure 13-2 and show a dependence of recovery on head grade.

Table 13-6: Recovery Summary by Composite

Composite	Number of Column Tests	Average Composite Au Head (g/t)	Average Composite Au Leached (%)
AA	12	1.309	66.0%
DD	4	0.507	57.9%
EE	3	0.404	57.4%
FF	4	0.777	57.9%
GG	3	0.833	66.7%
JJ	16	0.611	57.0%
KK	16	0.617	61.9%
Y	18	0.456	60.8%
Z	13	0.839	65.7%
McClelland	4	0.650	63.1%
Total	**93**	**0.709**	**62.5%**

Figure 13-2: Gold Extraction vs Head Grade for All Tests



Note: Figure supplied by Ausenco 2022

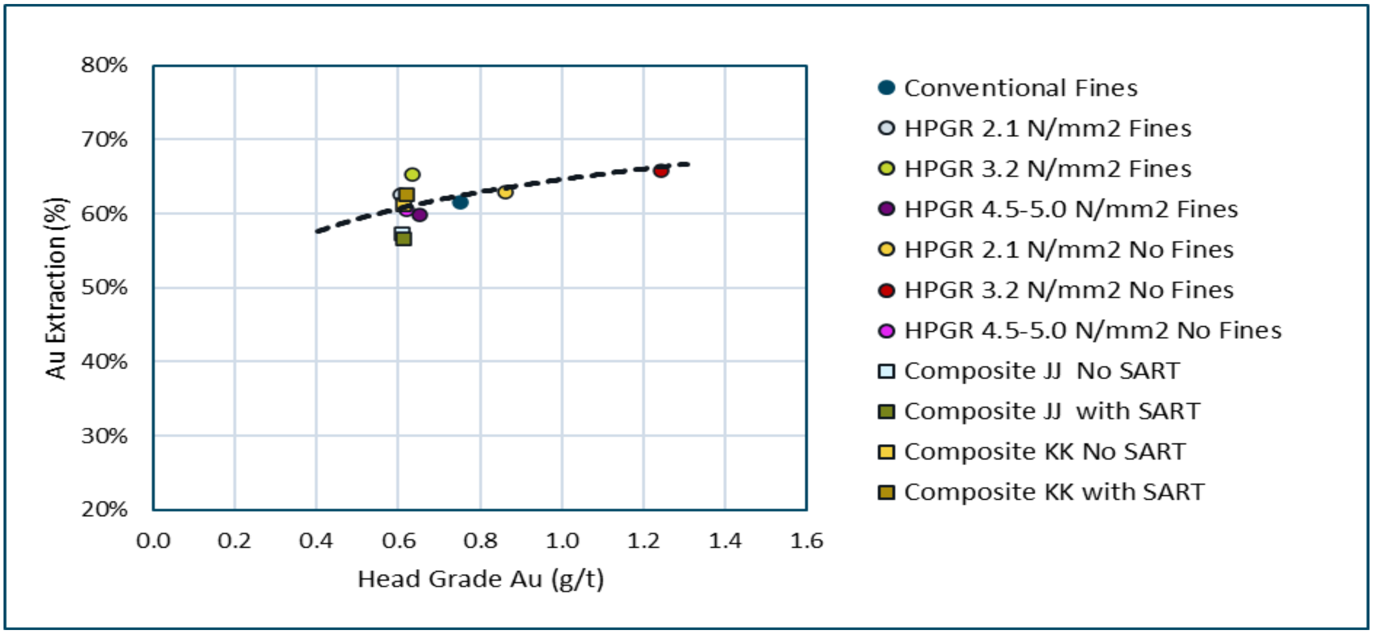
The same data was re-sorted to determine the impact of the process variables on recovery. This is summarized in Table 13-7 and Figure 13-3 with averages from each group of tests plotted against head grade.

- The tests using conventional crushing, HPGR at 2.1 N/mm^2 and 3.2 N/mm^2 crush pressures with the fines removed, all fall on the recovery line from Figure 13-3.
- Two composites (JJ and KK) where evaluated with and without SART. Very little impact on gold recovery was noted between the two data sets. Recovery from Composite JJ was typically below average; this has been attributed to performance of the FF component of the composite.
    - Composite FF showed lower recoveries than expected for both conventional and HPGR crushing. Based on gold deportment studies carried out by AMTEL in their report entitled “Gold Deportment in 2011 Volcan Composite Feeds” dated December 2011, the FF composite was determined to have an unusually high-level of refractory gold compared to the other composites observed from Volcan. Sample FF was designed to represent the medium grade mineralized material in the upper portion of the Dorado Oeste deposit.
- The nine column tests performed on material crushed with an HPGR at 3.2 N/mm^2 pressure, with the fines retained, outperformed the others with recovery about 4% above that predicted at the average head grade for the tests. Higher crusher pressure did not show the same benefit.

Table 13-7: Impact of Process Variables on Recovery

Composite	Number of Column Tests	Average Composite Au Head (g/t)	Average Composite Au Leached (%)
Conventional Crush	19	0.75	62%
HPGR 2.1 N/mm^2, with fines	8	0.61	63%
HPGR 3.2 N/mm^2, with fines	9	0.64	65%
HPGR 4.5-5.0 N/mm^2, with fines	6	0.65	60%
HPGR 2.1 N/mm^2, with no fines	5	0.86	63%
HPGR 3.2 N/mm^2, with no fines	7	1.24	66%
HPGR 4.5-5.0 N/mm^2, with no fines	4	0.62	61%
Composite JJ, no SART	8	0.61	57%
Composite JJ, with SART	8	0.61	57%
Composite KK, no SART	8	0.61	61%
Composite KK, with SART	8	0.62	63%

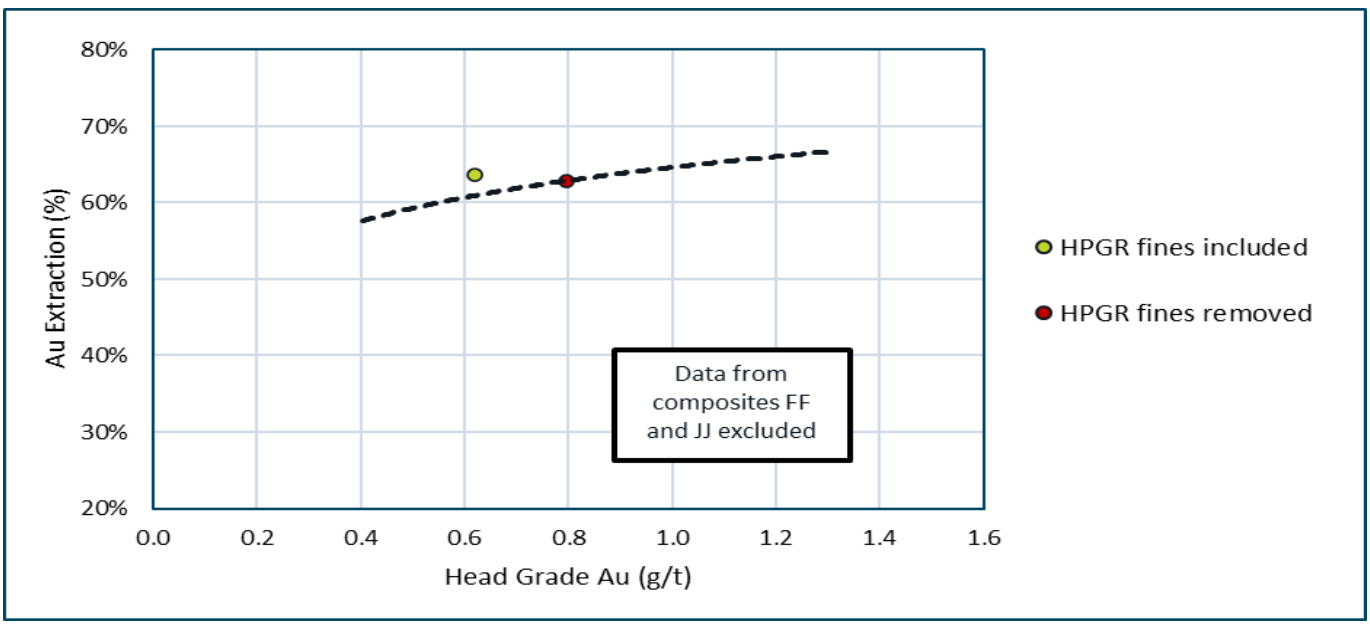
Figure 13-3: Impact of Process Variables on Recovery



Note: Figure supplied by Ausenco 2022

When only the results from HPGR tests with and without fines in the heap are analyzed, the tests with fines outperform those without fines, as shown in Figure 13-4.

Figure 13-4: Impact of Fines Removal



Note: Figure prepared by Ausenco 2022

13.3.4 Recovery Models

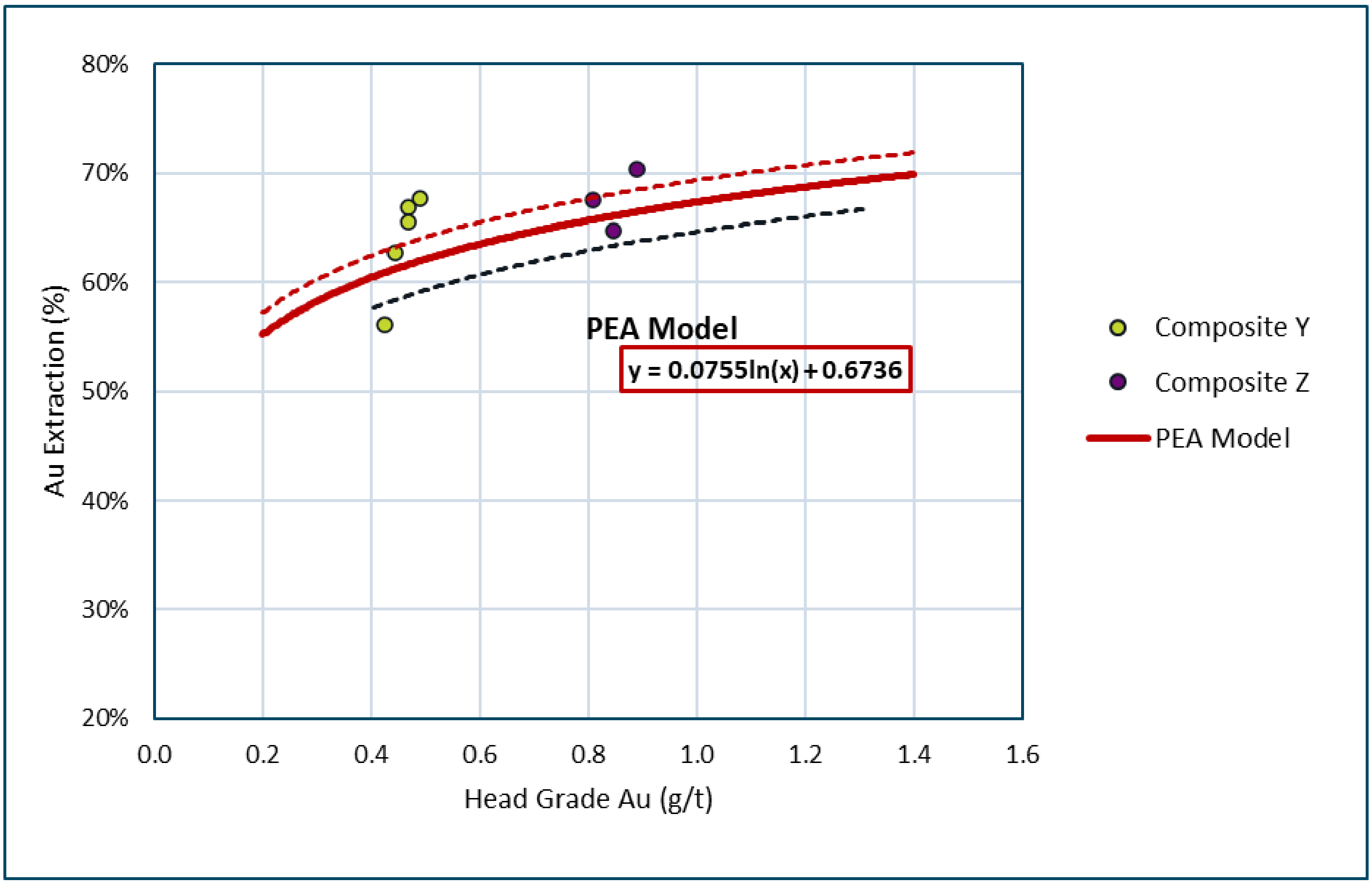
Based on the improved performance, a metallurgical recovery model has been developed using the data from the HPGR tests, crushed using 3.2 N/mm^2 of pressure with fines retained. To date, only 8 tests, on two composites (five tests with composite Y and three with composite Z) meet these criteria. The model developed from this data is shown in Figure 13-5 (red dotted line), along with the model used for this study (red solid line) which includes a 2% recovery deduction to allow for expected losses from full scale operation.

The modeled gold recovery is:

$$Gold\ recovery\ (\%) = 0.0755\ x\ ln\ (gold\ head\ grade\ (g/t) + 0.6736$$

Also shown on Figure 13-5, is the average recovery from all tests, black dotted line. The PEA recovery model with the HPGR at 3.2 N/mm^2 shows about a 2% improvement from the average.

Figure 13-5: PEA Recovery Model – HPGR, 3.2 N/mm^2 pressure, fines retained



Note: Figure prepared by Ausenco 2022

The reagent consumptions from all tests and from the eight selected to develop the recovery model are summarized in Table 13-8. For the recovery model tests, cyanide consumption is above average, but lime and cement addition are below average. The impact of SART on cyanide demand was not evaluated under the preferred pre-treatment conditions.

Table 13-8: Reagent Consumption

Composite	Number of Column Tests	NaCN Consumption (kg/t)	Lime Addition (kg/t)	Cement Addition (kg/t)
All tests	93	1.9	2.87	6.68
HPGR 3.2 N/mm^2, with fines	8	3.1	0.25	6.25

13.4 Deleterious Elements

Copper is present in the mineralized material in moderate to high levels and is considered a deleterious element due to the potential impact on the gold recovery process and reagent consumption. Copper is managed accordingly:

- Copper is a high cyanide consumer. The SART process removes the copper from the leach solution and produces a copper sulphide precipitate which is sold for copper credits.
- Most of the cyanide associated with the soluble copper is recovered in SART and recycled to the leaching stage.

Copper dissolution averaged 18% over the 70 column test results reported. No attempt was made to develop a recovery model at this stage. LOM Cu grade is estimated to be 0.05%.

SART is included in the flowsheet to remove and recover copper. The SART circuit requires acidification then addition of sodium hydrosulfide (NaHS) to precipitate copper from the solution stream, followed by removal of Cu_2S precipitates by filtration.

Mercury is present in the Volcan mineralized material at low levels, generally below detection level of 0.05 mg/L in leached solutions. The majority of mercury dissolved in the heap leach will report to the SART copper precipitate but is not expected to reach penalty levels. Minor mercury content could report to the CIC carbon and the ADR gold precipitate where it will be removed in a mercury retort. Salable volumes of mercury are not expected to be produced in the retort stage.

13.5 Comments on Mineral Processing and Metallurgical Testing

13.5.1 Future Testwork

Although there has been a significant amount of metallurgical testwork carried out on Dorado Oeste samples and composite samples, there is limited testwork that accurately reflects the proposed metallurgical flowsheet. The above recovery estimates for the proposed flowsheet are suitable for use in a Preliminary Economic Assessment, but more testwork is required for further engineering studies, such as a pre-feasibility study.

Future testwork should continue to evaluate and confirm:

- Recovery from a range of samples that cover the expected spatial distribution and grade range of the deposit. No high-grade samples have been leached after a HPGR grind at 3.2 N/mm^2.

- Testing and optimization of different HPGR crush pressures should continue. An understanding of the particle size distribution generated at different pressures and the impact this has on agglomeration reagent demand and cyanide consumption is needed to understand the costs and benefits of each scenario. An increase in fines content in agglomerates onto the heap could also impact ultimate lift heights and other aspects of the design.
- A trade-off study of an alternative process flow sheet which includes fines removal from the HPGR product for separate treatment via CIL, and coarse product heap leaching without agglomeration recommended to proceed with the current configuration of HPGR without fines removal followed by agglomeration. It is recommended that testing be done where the column leach and the fines tank leach are linked to ensure any economic benefits of the fines leach (with and without additional regrind) are well understood to confirm current trade-off study result.
- Testing of leach recovery from low grade material at coarser crush sizes (e.g. primary crushed) is recommended to determine if value would be added to the Project by leaching the low grade material at coarse crush, concurrent with mining, instead of the PEA basis which is to stockpile low grade material during the mine life then rehandle in the final Project years via the same processing route (I.e. fine crushing) as the higher grade material.
- The use of SART to reduce cyanide demand needs to be tested on samples being leached after different pre-treatments. Early work did not show any benefit to gold recovery, but copper recovery in the heap was increased when SART was included in the flowsheet. It was not clear form this work if any tangible reduction in cyanide demand was achieved with SART.
- Gold losses in SART need to be assessed.
- SART copper precipitate analyses should include a full suite concentrate assay to confirm that no deleterious elements are expected to be encountered at penalty levels.
- A copper recovery model should be developed to establish copper dissolution rates versus copper grade and/or other process variables.
- Bottle roll testing on all samples using a consistent procedure needs to be done and a recovery relationship established between these simple tests and the column tests. This proxy test will allow more data from smaller geometallurgical samples to be incorporated effectively into the block model. Well controlled sample preparation will be critical for this testing in order to establish a consistent particle sized distribution.

14 MINERAL RESOURCE ESTIMATES

14.1 General Information

The following description of the updated mineral resource estimate for the Dorado deposits, on which the Volcan Project is based, has been taken in large part from Lewis et al. (2011).

The updated mineral resource estimate for the Dorado deposits (Dorado Oeste (DO), Dorado Central (DC) and Dorado Este (DE)) of the Volcan Project were prepared as a collaborative effort involving representatives of Hochschild and Micon's QPs. The current mineral resource is based on the 2010 block model which was a prepared as a collaborative effort involving representatives of Hochschild, SRK Consulting Chile S.A. (SRK), Magri Consultores Ltda. (consultant retained by Andina Chile), Vector S.A. (Vector) and Micon. As a result of the 2010 collaborative effort, the description of the procedures followed in the preparation of the updated estimate will retain references to the various organizations in this section where applicable.

William J. Lewis, B.Sc., P.Geo., Senior Geologist of Micon has reviewed and supervised the updated resource estimate conducted by Mr. Alan J. San Martin, AusIMM(CP). on the mineral resource estimate completed for the Volcan deposit. Mr. Lewis is the QP for the resource estimate in this section of the Technical Report.

14.2 CIM Mineral Resource Definitions and Classification

All resources presented in a Technical Report must follow the current definitions and standards for mineral resources and reserves established by The Canadian Institute of Mining, Metallurgy and Petroleum (CIM). The latest edition of the CIM definitions and standards was adopted by the CIM council on May 10, 2014, and includes the resource definitions reproduced below:

> *"Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource."*
>
> *"A Mineral Resource is a concentration or occurrence of solid 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 eventual economic extraction."*
>
> *"The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."*
>
> *"Material of economic interest refers to diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals."*
>
> *"The term Mineral Resource covers mineralization and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of Modifying Factors."*

"Inferred Mineral Resource"

"An 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. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity."

"An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration."

"An Inferred Mineral Resource is based on limited information and sampling gathered through appropriate sampling techniques from locations such as outcrops, trenches, pits, workings and drill holes. Inferred Mineral Resources must not be included in the economic analysis, production schedules, or estimated mine life in publicly disclosed Pre-Feasibility or Feasibility Studies, or in the Life of mine plans and cash flow models of developed mines. Inferred Mineral Resources can only be used in economic studies as provided under NI 43-101."

"Indicated Mineral Resource"

"An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit."

"Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation."

"An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve."

"Mineralization may be classified as an Indicated Mineral Resource by the qualified person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralization. The qualified person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the Project. An Indicated Mineral Resource estimate is of sufficient quality to support a Pre-Feasibility Study which can serve as the basis for major development decisions."

"Measured Mineral Resource"

"A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit."

"Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation."

A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve."

"Mineralization or other natural material of economic interest may be classified as a Measured Mineral Resource by the qualified person when the nature, quality, quantity and distribution of data are such that the tonnage and grade or quality of the mineralization can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability of the deposit. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit."

14.3 CIM Estimation of Mineral Resources Best Practices Guidelines

Micon's QPs have used the CIM Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines which were adopted by the CIM Council on November 29, 2019, in estimating the Mineral Resources contained within of the Candelones Project. The November, 2019 guidelines supersede the 2003 CIM Best Practices Guidelines which were followed by Micon and its QPs when completing the previous 2010 and 2011 resource estimations and audits for the Project.

14.4 Resource Database

14.4.1 Description of the 2010 Database which was used for the Updated Resource Estimate

In 2010, after finalizing an exhaustive validation of the database in Chile, a MS-Access database file was provided to Micon by Andina Chile, wherein such drill hole information as collar location, down-hole surveys, and assays with veinlet intensity was stored. The cut-off date for the drill hole database was the end of the Phase VI drilling program (May, 2010) and it included all drill hole information up to and including hole ROA837, received up to June 17, 2010. This drill hole information was exported to CSV so as to be compatible with the format requirements for importation to Gemcom-Surpac v6.3.1 mine planning software. This procedure was employed by Micon's QPs for the purpose of having a parallel resource estimation to compare with the SRK's for the original auditing process at the time. SRK has worked using Vulcan Software. A description of the revised database is provided in Table 14-1.

Table 14-1: Summary of the Volcan Drill Hole Database (as of July, 2010)

Table Name	Data Type	Table Type	Records
assay_raw	interval	time-independent	65,345
collar			382
density	interval	time-independent	1,092
survey			12,723

14.4.2 2010 Geological Domain Interpretations

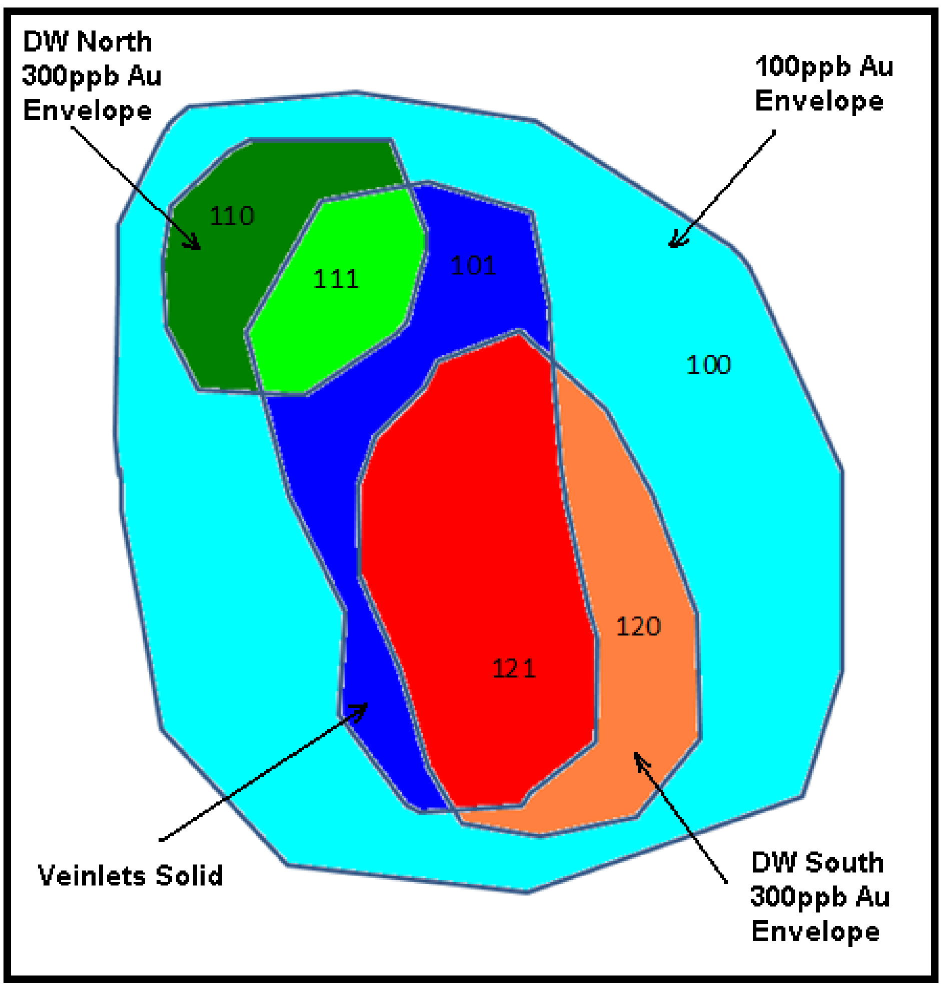
The gold mineralization at the Volcan Project is an example of a Maricunga-style deposit, a brief description of which was provided in Section 8. This style of deposit is typified by the presence of a system of quartz veinlets and stockworks that are typically formed at relatively shallow levels in a porphyry-style environment. The veinlets are associated with a number of different styles of porphyry-associated alteration, including argillic, potassic and propylitic, and can also be associated with minor amounts of disseminated, patchy and stringer sulphide minerals (Figure 14-1 and Figure 14-2). Field observations at Volcan have shown that the gold contents do not have a consistent relationship with either the primary rock type or alteration style.

Figure 14-1: Example of Maricunga-style Veining and Stockworks, Volcan Project (Interval from 318.0-320.0 m grades 1.08 g/t Au, 0.10% Cu)

Figure 14-2: Example of Disseminated and Stringer Sulphide Mineralization, Volcan Project (Interval from 310.0-312.0 m grades 1.32 g/t Au, 0.15% Cu)

However, analysis of the data gathered from the various exploration programs has shown that, while gold grades do not show any consistent relationships with many of the different types of veinlet compositions (i.e. pyrite, magnetite, alunite, gypsum and the like), a distinct association can be seen between the intensity of veinlets/stockworks of Black Banded Veins (BBV), Grey Banded Veins (GBV) and Quartz-Rich Veins (QV). Due to the complexity of these individual gold/veinlets intensity associations, the BBV, GBV and QV were combined into one and were expressed as 0, Tr (trace), 1, 2, and 3 intensity levels related to every sample of the assay table in the database. Then, an assay investigation was conducted on the entire assay table to determine whether or not this association could be demonstrated statistically. Encouraging results were obtained indicating that gold, in the majority of the cases, is directly associated with the combined veinlet intensity throughout the Dorado Oeste deposit. This finding led the team to create a new model in three-dimensions, in which if veinlet intensity was equal to 1, 2, or 3, it was labelled "Mineralization with Veins." The resulting solid or domain was later constrained with the 100 ppb Au grade envelope and the 300 ppb Au envelope, in DE, DC and DO. If veinlet intensity was equal to 0 or Tr, those intervals were labelled "Mineralization No Veins," representing mineralized material outside of the veinlet zone solid. Figure 14-3 shows a schematic representation of the different established domains. Table 14-2 identifies the mineralized zones for which these domains were created.

Figure 14-3: Dorado Oeste Deposit Domains - Graphical Schematic Representation (Not to Scale)



Note: Figure supplied by SRK Consulting.

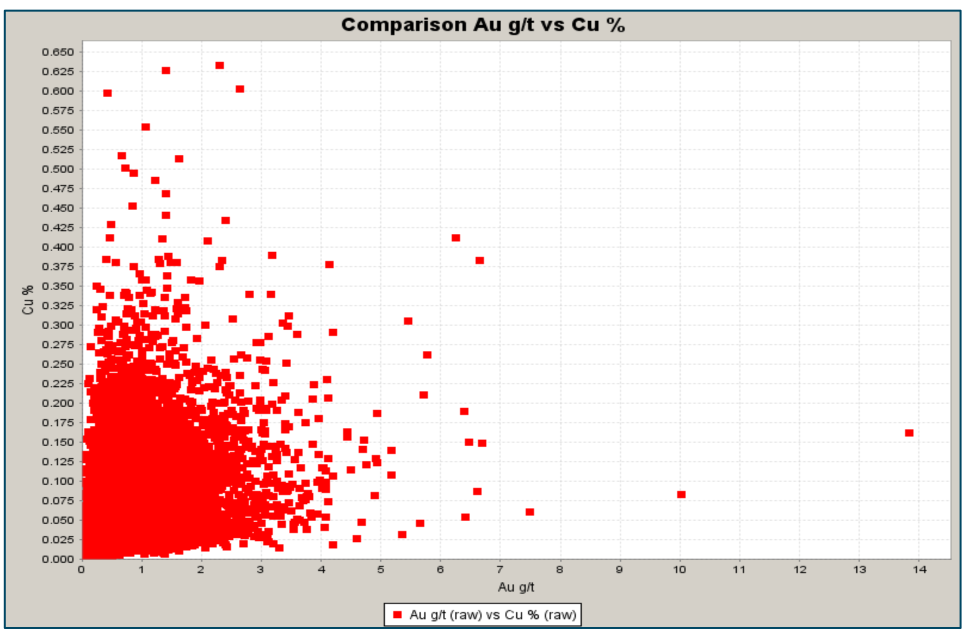
Table 14-2: Description of the Dorado Deposit Domains

Domain Description	Domain Code	100 ppb Au DO	300 ppb Au DO Norte	300 ppb Au DO-Sur	Veinlets Solid	300 ppb Au DC	300 ppb Au DE
DO 100ppb Envelope – No Veins	100	X					
DO 100ppb Envelope – With Veins	101	X			X		
DON 300ppb Envelope – No Veins	110		X				
DON 300ppb Envelope – With Veins	111		X		X		
DOS 300ppb Envelope – No Veins	120			X			
DOS 300ppb Envelope – With Veins	121			X	X		
DC 300ppb Envelope – No Veins	2000	X					
DC 300ppb Envelope – With Veins	2002					X	
DE 300ppb Envelope – No Veins	3000	X					
DE 300ppb Envelope – With Veins	3003						X

Table supplied by SRK Consulting.

Field work at Volcan has also shown that copper and, to a lesser extent, molybdenum values are present. Elevated molybdenum values are most often noted in the DC deposit. For the most part, molybdenum in the remainder of the deposits is present in trace amounts. While elevated copper values are at times directly associated with elevated gold values, no direct statistical correlation can be demonstrated between gold and copper values for the DO deposit (Figure 14-4). Also, while elevated gold and copper values co-exist on occasion in space, no consistent spatial correlation can be observed between gold and copper values for the DO deposit.

Figure 14-4: Statistical Comparison Between Gold and Copper Values, Dorado Oeste Deposit

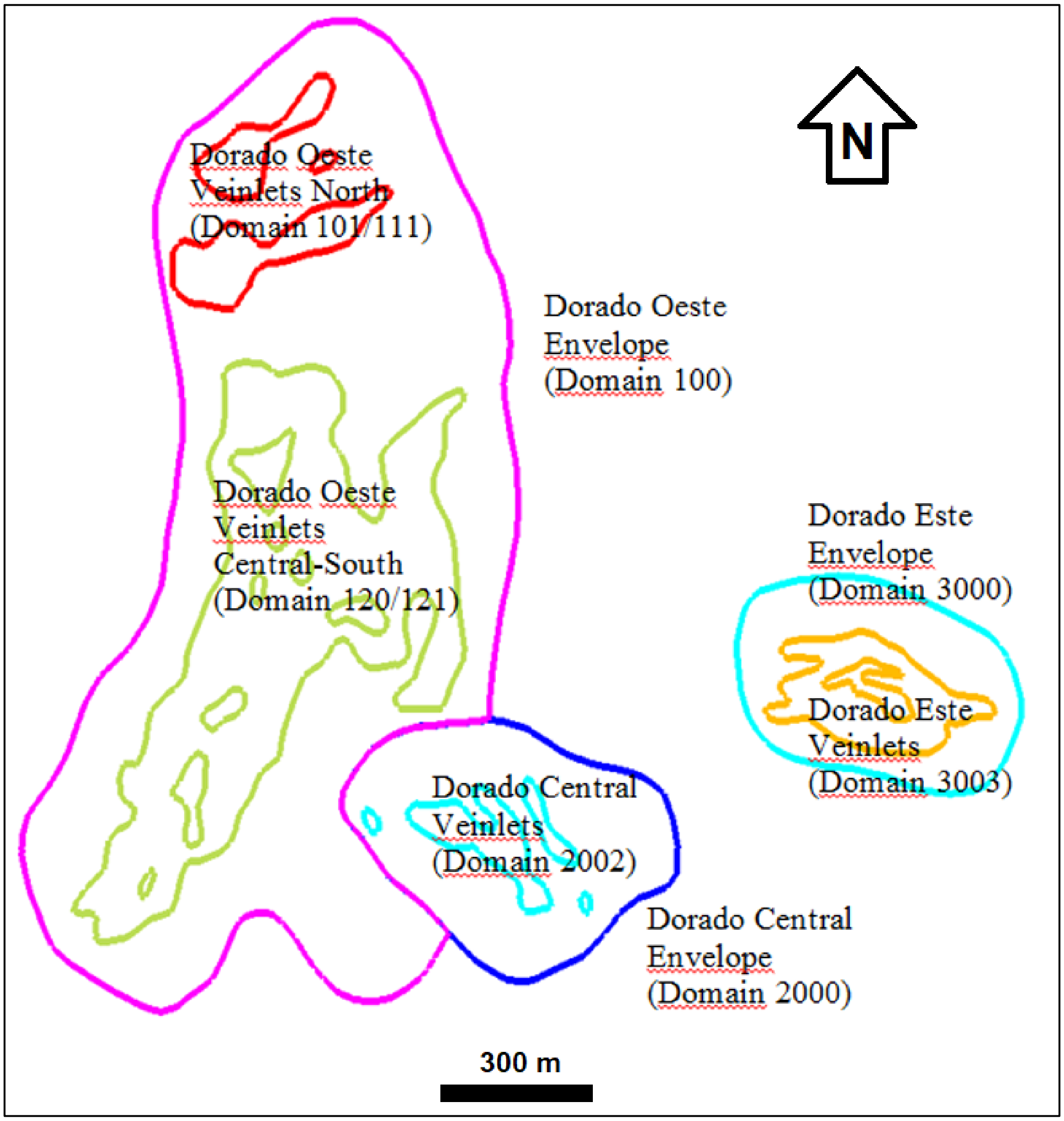


Note: Figure supplied by SRK Consulting.

A number of essentially barren porphyry bodies are found throughout the Dorado deposit, some of which are seen to cross-cut the gold mineralization.

Figure 14-5 is a plan view of the domain outlines in the Dorado deposits, at the 4705 bench elevation.

Figure 14-5: Plan View of the 4705 Bench Showing the Various Domain Outlines, Volcan Project



Note: Figure supplied by SRK Consulting.

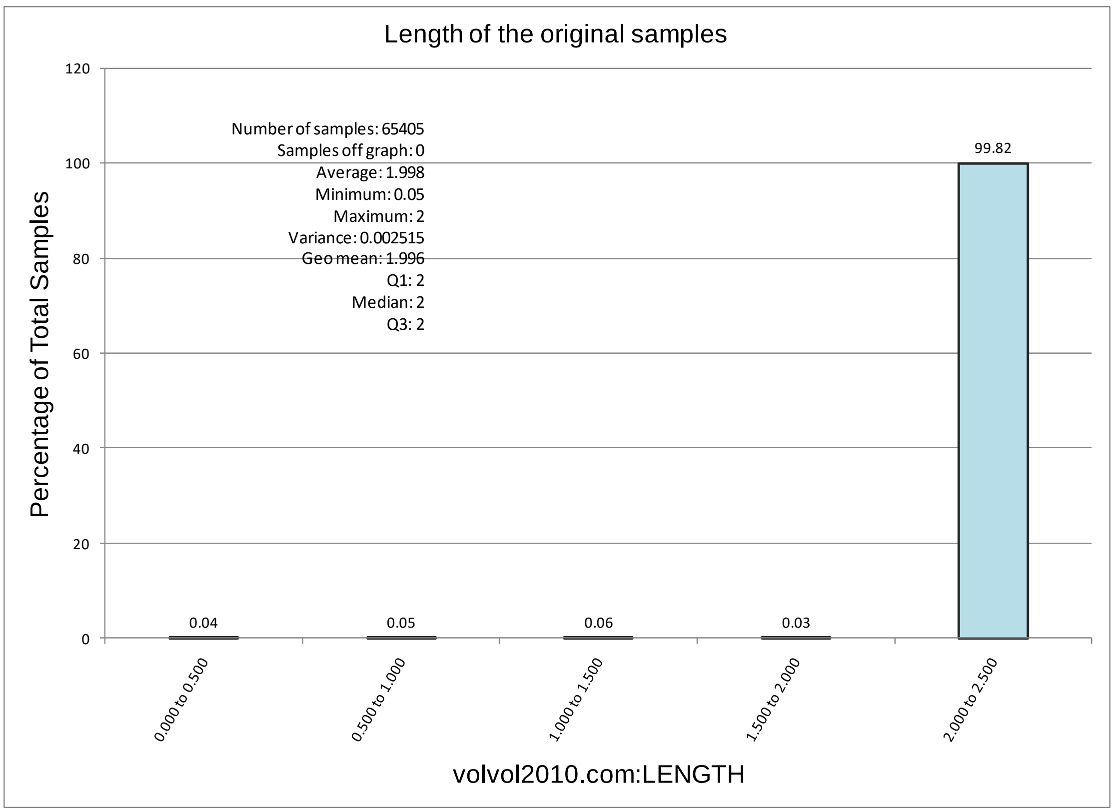
14.4.3 Compositing Methods

An analysis of the lengths for all samples contained within the drill hole database was conducted. This analysis revealed that the majority of the samples were 2 m in length (Figure 14-6). No compositing was required on this data set, and the raw samples were used for the preparation of the mineral resource estimate.

Statistical analyses were prepared for the gold assays for each of the different domain models. The results are presented as box-and-whisker plots without the ungrouped weights (Figure 14-7) and with the ungrouped weights (Figure 14-8).

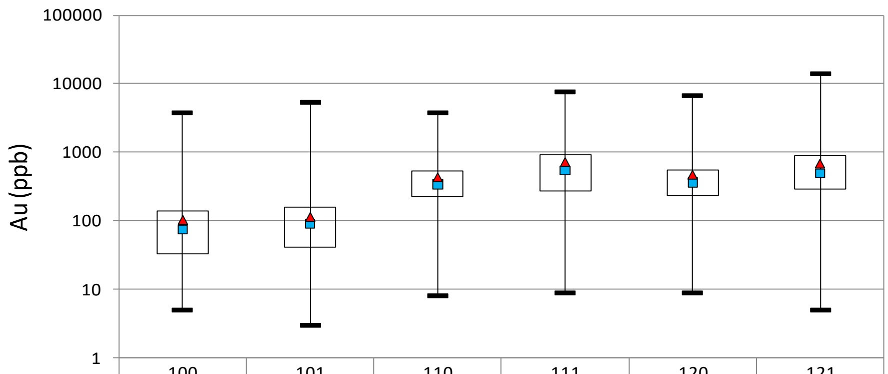
Ungrouped weights refer to the length of the samples (composite) which varies from a minimum sample length up to 2 m, SRK decided to use samples ≥ 1m length and they group samples by this criteria. Thus, ungrouped means the statistics are based on all the existing samples and grouped weights means the statistics are based on samples ≥ 1m length only. However, the differences between ungrouped and grouped are minimal.

Figure 14-6: Histogram of Raw Sample Lengths, Volcan Project



Note: Figure supplied by SRK Consulting.

Figure 14-7: Box-and-Whisker Plot of Gold Assays Contained Within the Geological Domains (Columns), Excluding Ungrouped Weights

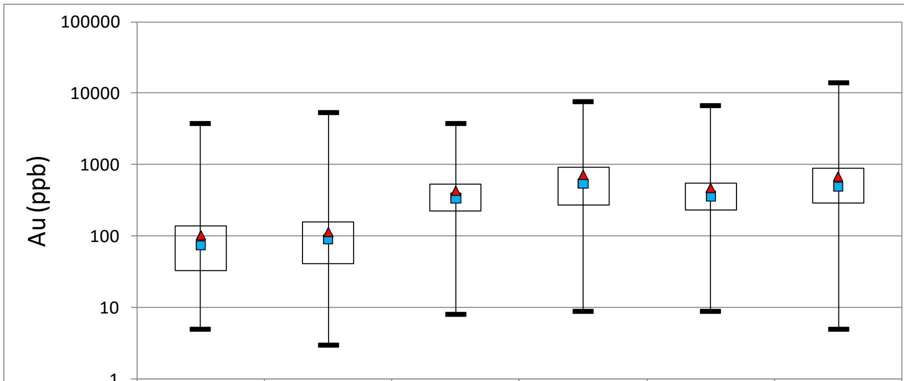


	100	101	110	111	120	121
Q1	33	41	223	276	236	288
Min	5	3	8	9	9	5
Median	75	90	342	544	364	496
Mean	102.2	113.1	435.0	730.5	474.2	691.3
Max	3791	5368	3804	7708	6615	13832
Q3	140	159	540	921	560	881
NSamples	15,474	4,807	1,390	502	6,344	13,464

UG_Au

Note: Figure supplied by SRK Consulting.

Figure 14-8: Box-and-Whisker Plot of Gold Assays Contained Within the Geological Domains (Columns), Including Ungrouped Weights (Samples ≥ 1m)



	100	101	110	111	120	121
Q1	33	41	223	276	236	289
Min	5	3	8	9	9	5
Median	75	90	342	544	364	496
Mean	102.2	113.2	435.2	730.5	474.4	691.5
Max	3791	5368	3804	7708	6615	13832
Q3	140	159	540	921	560	881
NSamples	15,454	4,804	1,389	502	6,339	13,458

UG_Au

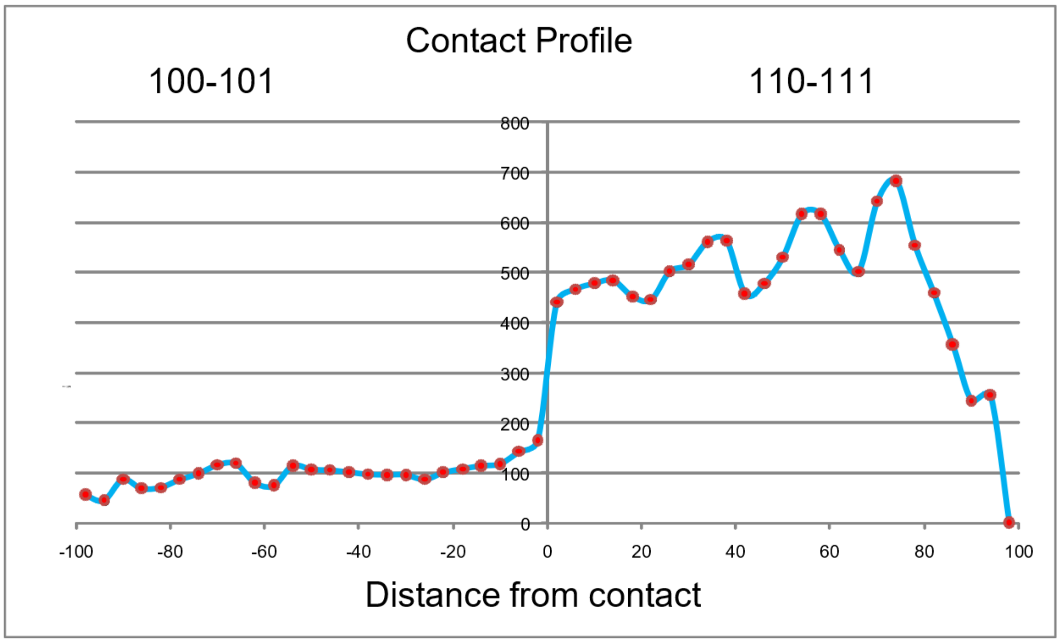
Figure supplied by SRK Consulting.

14.4.4 Contact Analysis

To study the changes in gold grade at the limits of the geological domains, contact profiles or average grade plots were prepared at incremental distances from the geological domain boundary. For these plots, if the grade averages remain relatively constant within the same range near the limit and then diverge when the distance from the contact increases, it is likely that the limit does not represent a natural constraint for the grades. If a limit is established and grades gradually change, there could be an overestimate on one side of the limit and an underestimate on the opposite side. If there is a clear difference in the grade average on both sides of the limit, then this is a sign that the limit could be important in constraining the grade estimates.

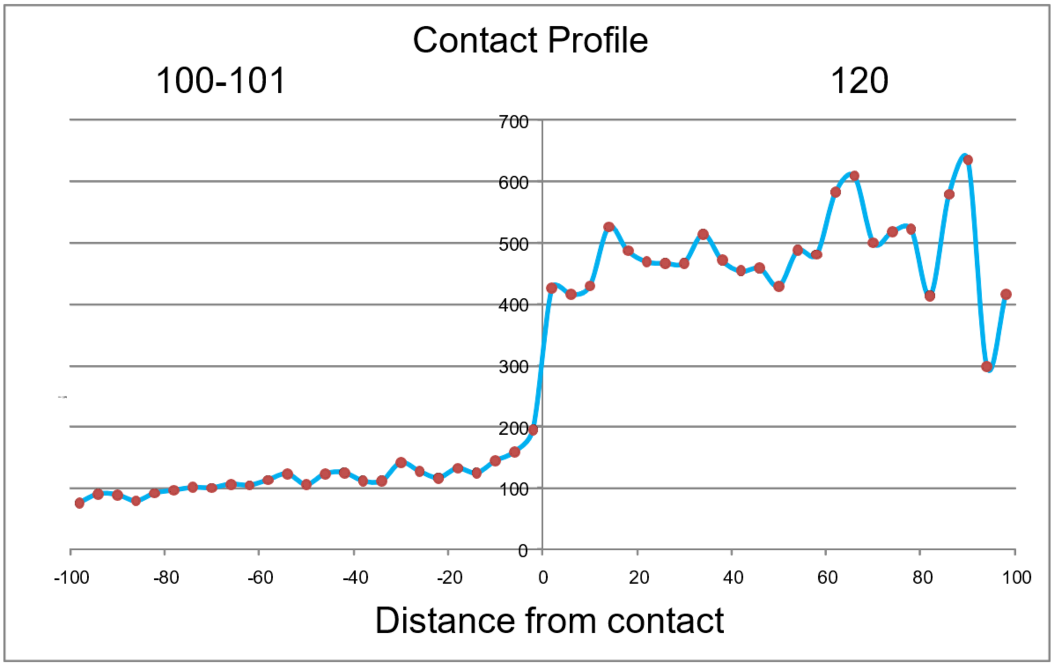
The contact profiles for the various geological domains are shown in Figure 14-9 through Figure 14-12.

Figure 14-9: Contact Analysis, Dorado Oeste (Norte) Deposit, Domain 100/101 – 110/111



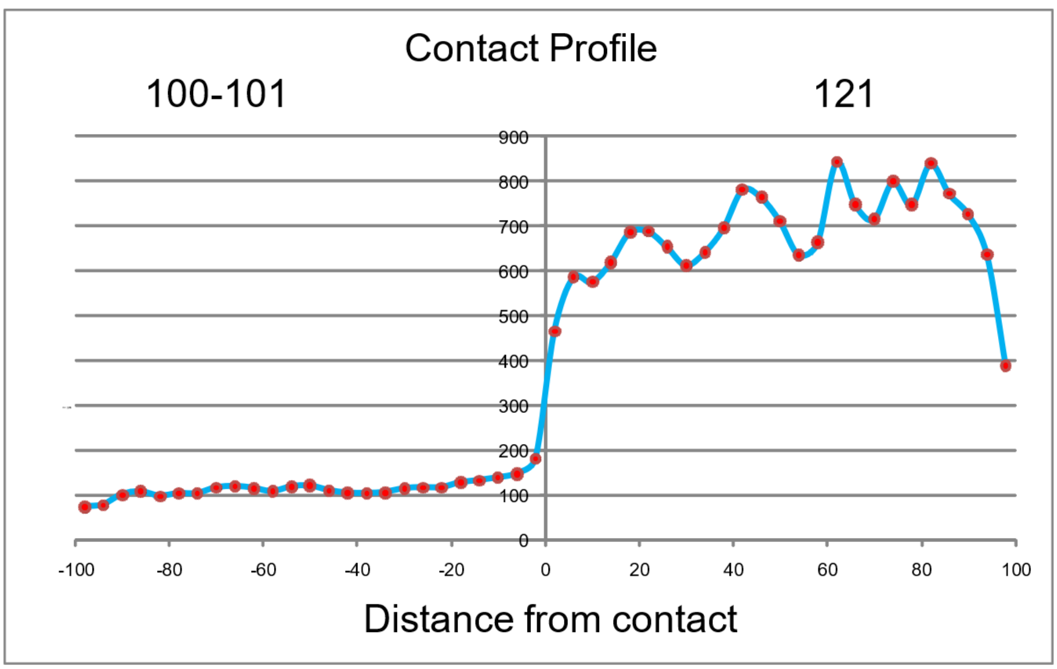
Note: Figure supplied by SRK Consulting.

Figure 14-10: Contact Analysis, Dorado Oeste (Sur) Deposit, Domain 100/101 – 120



Note: Figure supplied by SRK Consulting.

Figure 14-11: Contact Analysis, Dorado Oeste (Sur) Deposit, Domain 100/101 – 121



Note: Figure supplied by SRK Consulting.

Figure 14-12: Contact Analysis, Dorado Oeste (Sur) Deposit, Domain 120 – 121

Note: Figure supplied by SRK Consulting.

The contact graphs suggest the following:

- At DO, a small influence is observed between the data gathered outside and toward the veins, i.e., there is a slight interaction between the veins inside and outside the limit. To model this transition in values, an 8-m soft boundary was applied in the block model estimate in order to avoid an overestimate of the gold grades in the vein and an underestimate of the gold grades in the envelope at the vein limit.
- At DC, limits are better demarcated and no soft boundaries were used in preparation of the block model estimate for this domain.
- At DE, the border is clearly rigid; a strong change occurs the between the units exactly at the limit. No soft boundaries were used in preparation of the block model estimate for this domain.
- The behaviour of the gold grades along the contact between DO and DC envelopes (Domain codes 120 and 2000) is similar. A 50-m soft boundary was applied to prevent a barrier from developing between these envelopes.

Table 14-3 summarizes the boundary definition criteria applied to the block model.

Table 14-3: Boundary Definition between Geological Units (H = hard, S = soft)

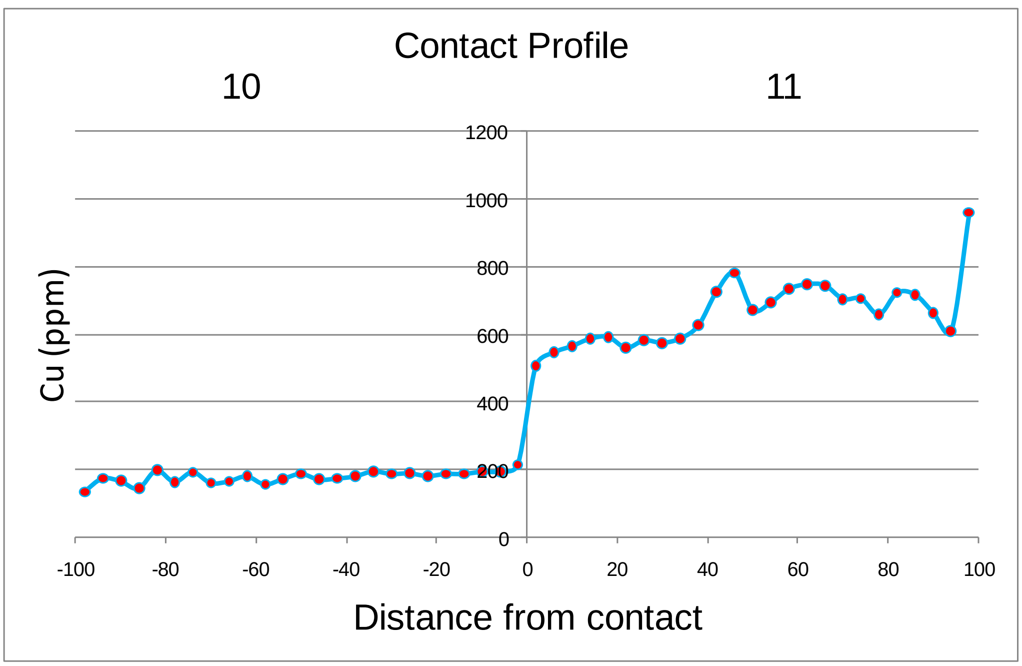
GU - Au	100-101	110-111	120	121
100-101		H	H	H
110-111	H		H	H
120	H	H		S (10 m)
121	H	H	S (10 m)	

Note: Table supplied by SRK Consulting.

A reciprocal, 10-m soft boundary was set between geological units 120 – 121.

Contact analysis between DO copper domains 10 and 11 indicates that a hard boundary should be set between both units (Figure 14-13).

Figure 14-13: Contact Analysis, Dorado Oeste (South) Deposit, Domain 10 – 11



Note: Figure supplied by SRK Consulting.

14.4.5 Grade Capping and Restriction

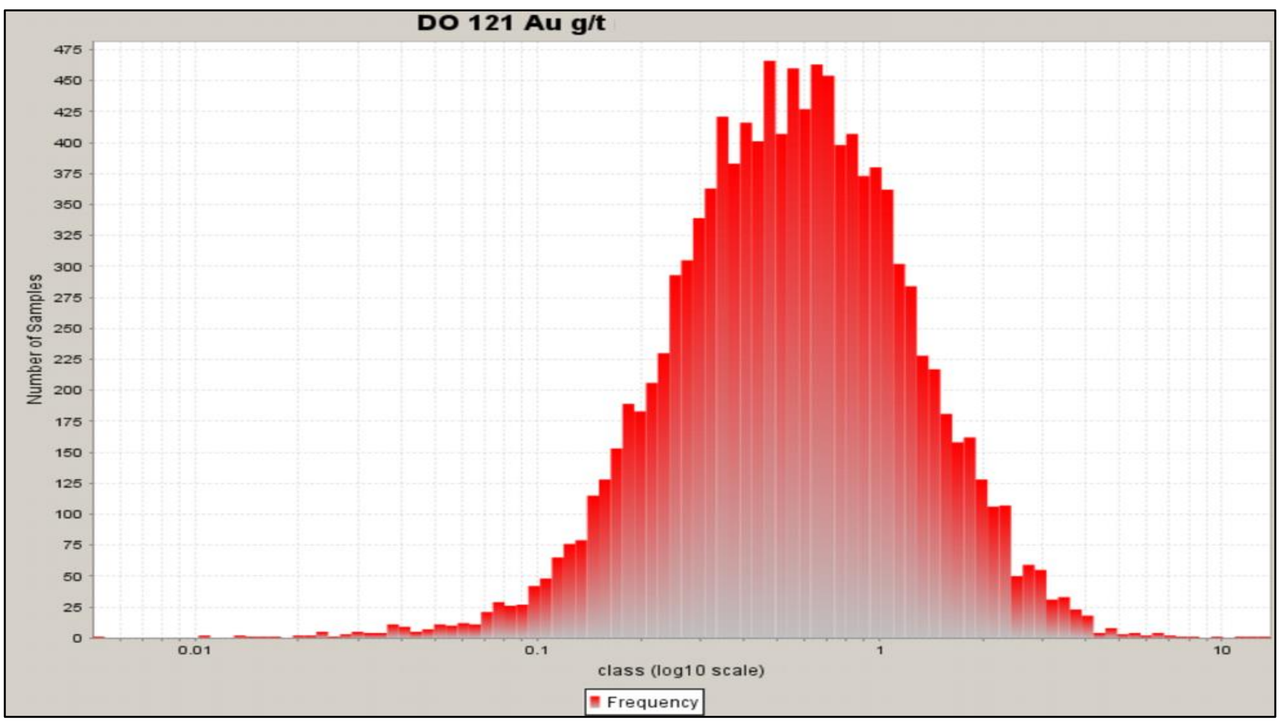
Grade capping (or top cutting) was investigated for the gold and copper assay values contained within the DO domain model in order to ensure that the possible influence of erratic high values does not unduly bias the grade estimate.

In the current resource estimation, grade capping was applied for copper and a threshold restriction was applied for the gold interpolation routine. In both cases (grade capping and threshold restriction) the limit values were established through statistical analysis. All samples contained within the three-dimensional domain model of the DO (South) deposit were coded in the database and extracted for analysis. A probability plot was created for each of the domains for both gold and copper, in order to determine the threshold and capping values to be applied.

Log-normal histograms were generated from the sample data, gold assays for each domain within DO (South) were extracted and the descriptive statistics of the data sets were generated, the most representative plot corresponds to Domain 121 (Figure 14-14). The grade cap values were selected by examining the probability plots for the grade at which outlier assays begin to occur, these are generally identified by breaks in the slope line. A capping value varies for each domain for gold and copper. It can be seen in the percentiles that the threshold limit and grade capping have a minimal impact in the overall data populations of the domains for the DO deposit.

Variable grade capping values were applied to the DC and DE deposits, and the copper grades in all domains, as shown in Table 14-4.

Figure 14-14: Frequency Log-normal Histogram of the Gold Values Contained Within the DO (South) Domain 121



Note: Figure supplied by SRK Consulting.

Table 14-4: Cu Grade Capping and Gold Threshold Limits Applied in DO (South) Deposit

Element	Domain	Au (ppb) – Cu (ppm)	Percentile
Au	100-101	1,200	99.90
	110-111	3,000	99.44
	120	4,200	99.90
	121	6,000	99.90
Cu	10	2,900	99.98
	11	6,350	99.97
	20	4,350	99.94
	30	3,200	99.95

Note: Table supplied by SRK Consulting.

14.4.6 Bulk Density Determination

Intervals of drill core for specific gravity determinations were selected by the project geologist at a sample frequency of every 50 m along the length of the core. Samples were chosen from ½-HQ and predominantly whole HQ core samples measuring at least 4 cm long which were sufficiently robust so as not to break up or crumble during the measurement process. The bulk density measurements were performed in the Geomechanical and Geotechnical Laboratories in the Department of Mines at the University of Chile using either the method described in the American Society of Testing Materials (ASTM) procedure 1998, the Asociación Española de Normalización (AENOR) 1999 or the International Society of Rock Mechanics (ISRM) 1986.

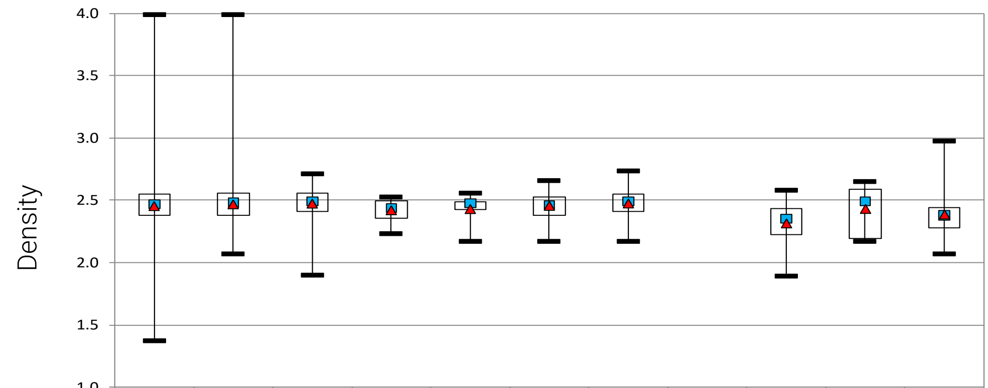
A total of 1,092 samples were used to estimate the density of the three Dorado deposits.

For each selected core sample, the dry weight was measured, and the core was dipped into liquid paraffin to give a thin coating. The sample was then weighed again. The sample was then submerged in water and its weight when fully submerged was recorded. The relevant lithology, mineralization type and oxidized state were noted for each core piece. The specific gravity of each core sample was defined using the following equation:

Specific gravity = weight dry (unwaxed)/(weight dry (unwaxed)−weight submerged)

Density statistics for each modelled domain (GU) are shown in Figure 14-15.

Figure 14-15: Density Statistics – All Data



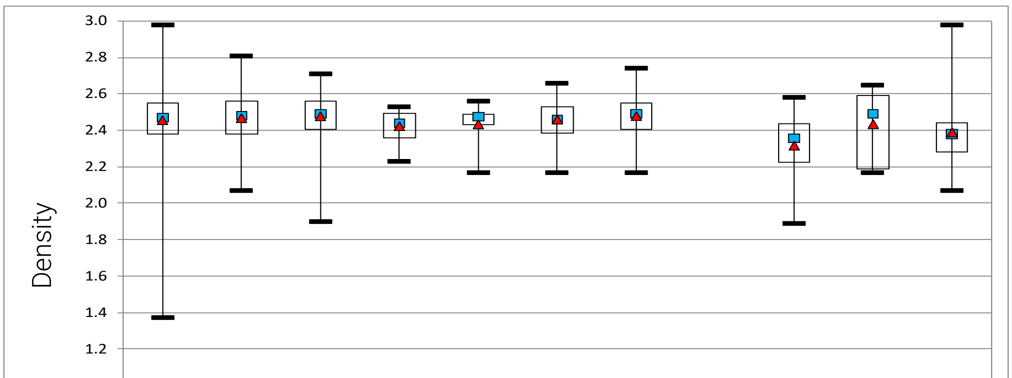
	Total	100	101	110	111	120	121	2000	2002	3000	3003
Q1	2.38	2.38	2.41	2.36	2.43	2.38	2.41		2.23	2.19	2.28
Min	1.37	2.07	1.90	2.23	2.17	2.17	2.17		1.89	2.17	2.07
Median	2.47	2.48	2.49	2.44	2.48	2.46	2.49		2.35	2.49	2.38
Mean	2.46	2.47	2.48	2.42	2.43	2.46	2.48		2.32	2.43	2.39
Max	3.99	3.99	2.71	2.53	2.56	2.66	2.74		2.58	2.65	2.98
Q3	2.55	2.56	2.56	2.50	2.49	2.53	2.55		2.44	2.59	2.44
NSamples	1,092	336	125	16	10	127	273	0	16	10	35

UG_Au

Note: Figure supplied by SRK Consulting.

As can be seen, there is an anomalous value in GU 100 (3.99 g/cm^3). This value was removed from the final database and the final statistics are shown in Figure 14-16.

Figure 14-16: Final Density Statistics



	Total	100	101	110	111	120	121	2000	2002	3000	3003
Q1	2.38	2.38	2.41	2.36	2.43	2.38	2.41		2.23	2.19	2.28
Min	1.37	2.07	1.90	2.23	2.17	2.17	2.17		1.89	2.17	2.07
Median	2.47	2.48	2.49	2.44	2.48	2.46	2.49		2.36	2.49	2.38
Mean	2.45	2.47	2.48	2.42	2.43	2.46	2.48		2.32	2.43	2.39
Max	2.98	2.81	2.71	2.53	2.56	2.66	2.74		2.58	2.65	2.98
Q3	2.55	2.56	2.56	2.50	2.49	2.53	2.55		2.44	2.59	2.44
NSamples	1,091	335	125	16	10	127	273	0	16	10	35

UG_Au

Note: Figure supplied by SRK Consulting.

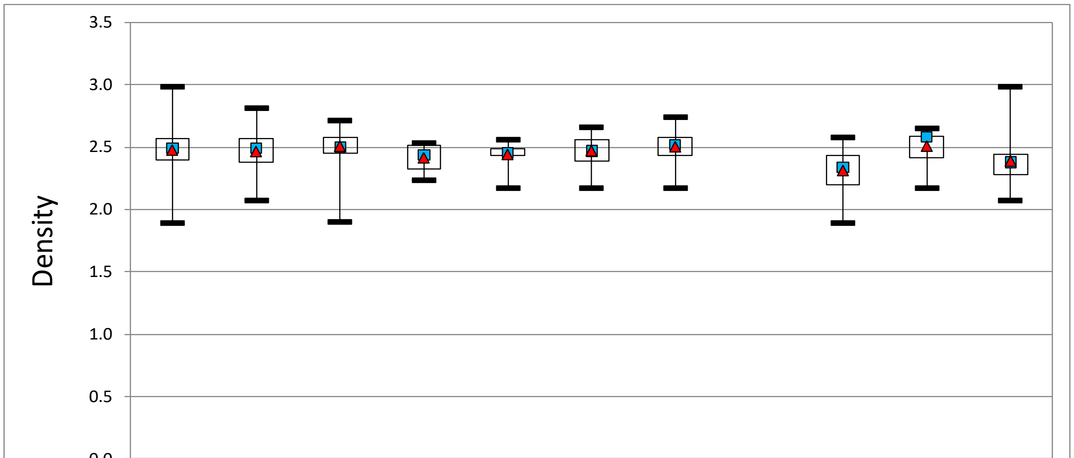
Based on statistics shown in Figure 14-16 it was decided that DO Norte (110 – 111) and DO South-Central (120 – 121) would be estimated separately, with average densities at 2.42 g/cm^3 and 2.47 g/cm^3, respectively.

A total of 947 samples were used in the density estimation. The remaining samples (145) fell outside the Au-100 ppb contour.

Samples representative of GU 2000 of DC were not available; therefore, densities at DC were estimated using SG data from the veinlet model (GU 2002).

Also, it should be noted that the samples selected for specific gravity determinations are not distributed in a regular pattern. This was dealt with by assigning a specific weighting to each sample by inverse distance squared interpolation. Results are shown in Figure 14-17.

Figure 14-17: Statistics – Declustered Density Samples



	Total	100	101	110	111	120	121	2000	2002	3000	3003
Q1	2.40	2.38	2.45	2.33	2.43	2.39	2.43		2.19	2.41	2.28
Min	1.89	2.07	1.90	2.23	2.17	2.17	2.17		1.89	2.17	2.07
Median	2.49	2.49	2.50	2.44	2.46	2.47	2.52		2.34	2.58	2.38
Mean	2.47	2.46	2.50	2.41	2.44	2.47	2.50		2.31	2.51	2.39
Max	2.98	2.81	2.71	2.53	2.56	2.66	2.74		2.58	2.65	2.98
Q3	2.57	2.57	2.58	2.51	2.49	2.56	2.58		2.43	2.59	2.44
NSamples	947	335	125	16	10	127	273	0	16	10	35

UG Au

Note: Figure supplied by SRK Consulting.

14.4.7 Density Estimation in Block Model

Density was estimated by inverse distance squared interpolation in all domains. The interpolation criteria are shown in Figure 14-5.

Table 14-5: Density Estimation Plan

UG	Pass	Type of Estimation	Block Variable	Search Angles			Search Radii		Discretization				Samples		Power	Database	Samples Variable	UG Database
				Bearing	Plunge	Dip	Major	Semi	Minor				Min	Max				
100-101	1	INVERSE DISTANCE	DENSITY	0	0	0	200	200	100	4	4	3	1	12	2	volden.cof.isis	DENSI	100-101
	2	INVERSE DISTANCE	DENSITY	0	0	0	1000	1000	1000	4	4	3	1	8	2	volden.cof.isis	DENSI	100-101
110-111	1	INVERSE DISTANCE	DENSITY	0	0	0	200	200	100	4	4	3	1	12	2	volden.cof.isis	DENSI	110-111
	2	INVERSE DISTANCE	DENSITY	0	0	0	1000	1000	1000	4	4	3	1	8	2	volden.cof.isis	DENSI	110-111
120-121	1	INVERSE DISTANCE	DENSITY	0	0	0	200	200	100	4	4	3	1	12	2	volden.cof.isis	DENSI	120-121
	2	INVERSE DISTANCE	DENSITY	0	0	0	1000	1000	1000	4	4	3	1	8	2	volden.cof.isis	DENSI	120-121
2000-2002	1	INVERSE DISTANCE	DENSITY	0	0	0	200	200	100	4	4	3	1	12	2	volden.cof.isis	DENSI	2000-2002
	2	INVERSE DISTANCE	DENSITY	0	0	0	1000	1000	1000	4	4	3	1	8	2	volden.cof.isis	DENSI	2000-2002
3000-3003	1	INVERSE DISTANCE	DENSITY	0	0	0	200	200	100	4	4	3	1	12	2	volden.cof.isis	DENSI	3000-3003
	2	INVERSE DISTANCE	DENSITY	0	0	0	1000	1000	1000	4	4	3	1	8	2	volden.cof.isis	DENSI	3000-3003

Note: Table supplied by SRK Consulting.

14.4.8 Results

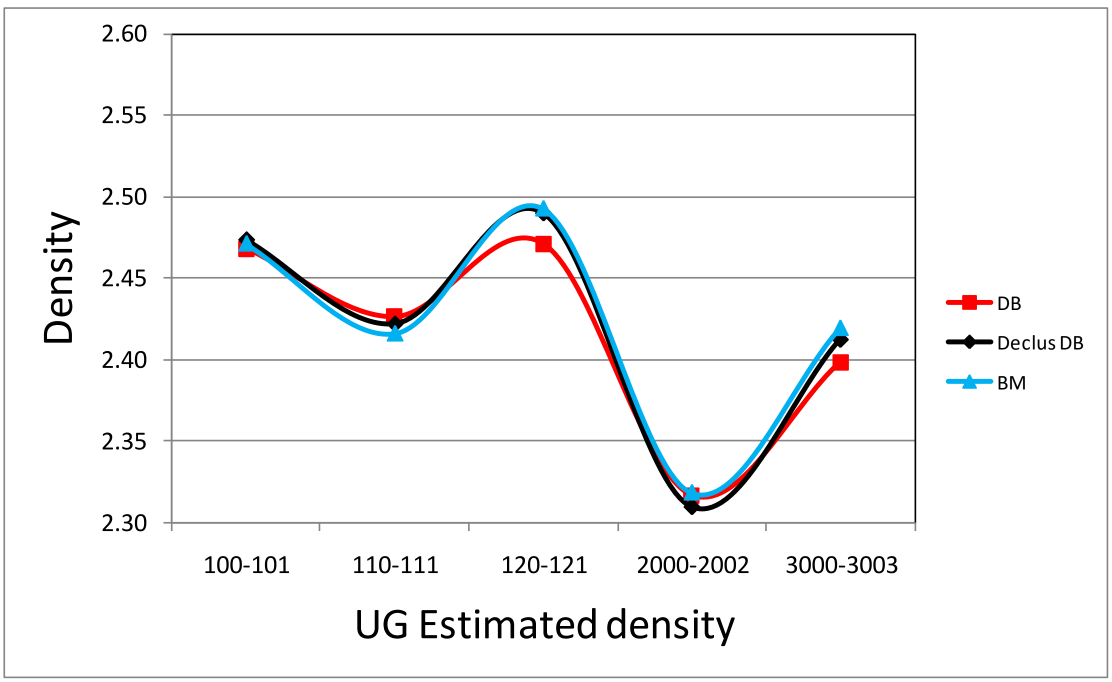
Final estimated densities are compared to declusterized sample densities in Table 14-6 and Figure 14-18. The results compare well.

Table 14-6: Density Comparison – Estimated Block vs Declustered Samples

UG_AU	Density			Number	
	DB	Declus DB	BM	Samples	Blocks
100-101	2.47	2.47	2.47	460	858,441
110-111	2.43	2.42	2.42	26	38,896
120-121	2.47	2.49	2.49	400	251,520
2000-2002	2.32	2.31	2.32	16	139,535
3000-3003	2.40	2.41	2.42	45	99,080

Note: Table supplied by SRK Consulting.

Figure 14-18: Graphical Comparison of Density – Block Model Estimates and Samples



Note: Figure supplied by SRK Consulting.

14.4.9 Variography

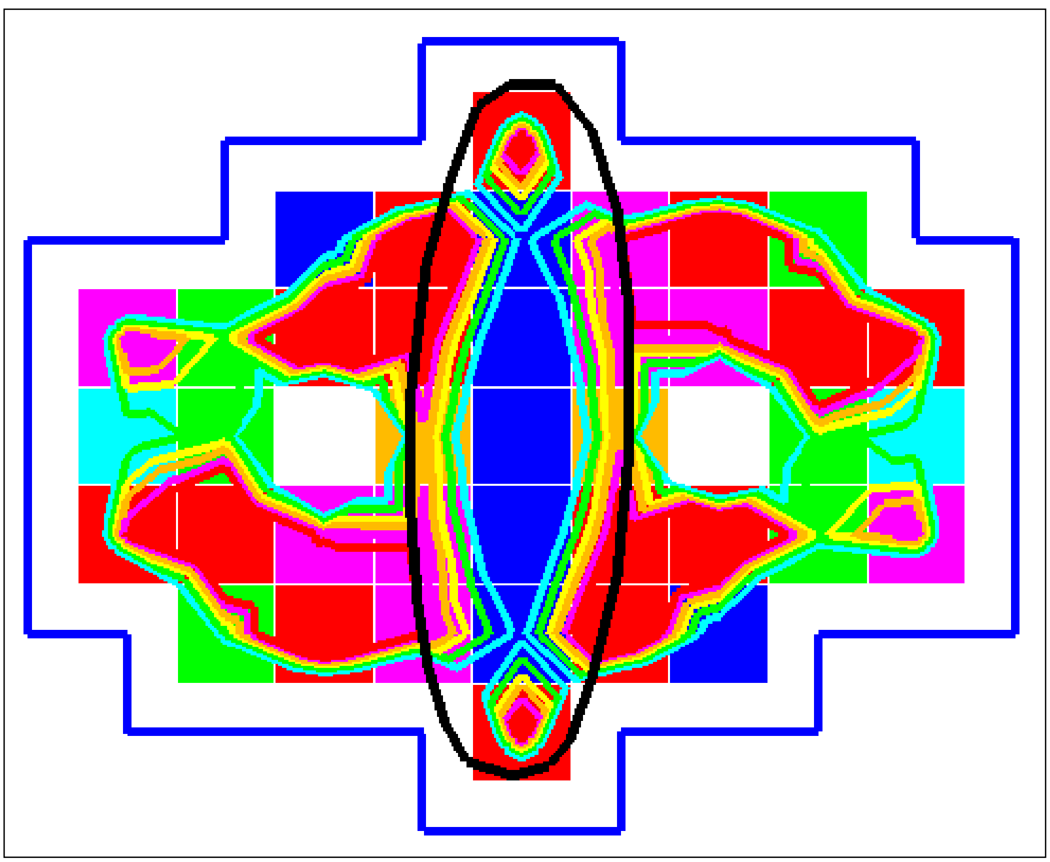
The variographic work described in this section was completed by SRK under the supervision of Dr. Magri. Micon's QP has reviewed this material and finds that it is still relevant to use in the current update since no further exploration or drilling programs have been completed since the 2011 Technical Report was published.

Correlograms were used for modelling and describing the spatial variability of the gold mineralization found at each of the deposits in the Dorado area of the Volcan property. These correlograms were prepared based on the 2-m raw sample data.

For the preparation of the gold correlogram models it was first necessary to identify the preferential directions of the gold distribution in each of the defined domains.

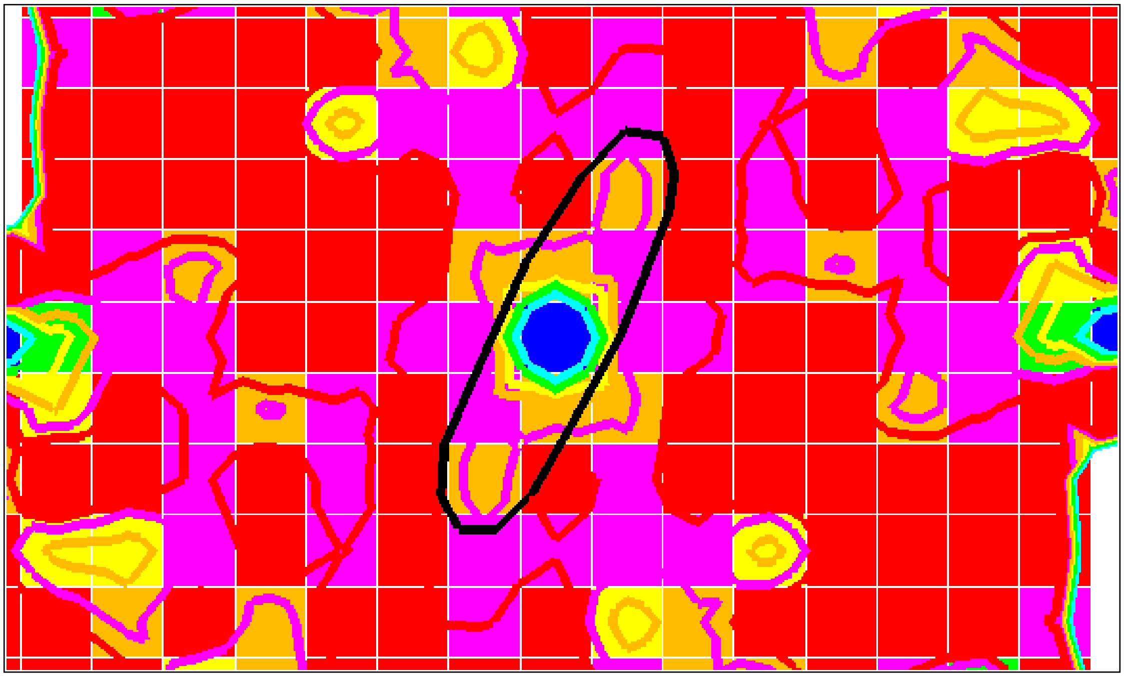
Variographic maps were then created to identify any structure that could differ from the trends observed in the deposit and that would require further analysis. The variographic maps for the DO deposit clearly show strong orientation in the vertical and along strike direction (Figure 14-19 and Figure 14-20). However, for the DC area, these trends are not observed, possibly due to a smaller amount of data and to the bigger separation between the composite samples (Figure 14-9). The variogram maps for the DE deposit are presented in Figure 14-22.

Figure 14-19: Variographic Map for the Veinlet Domain (Code 110-111), DO (Norte) Deposit



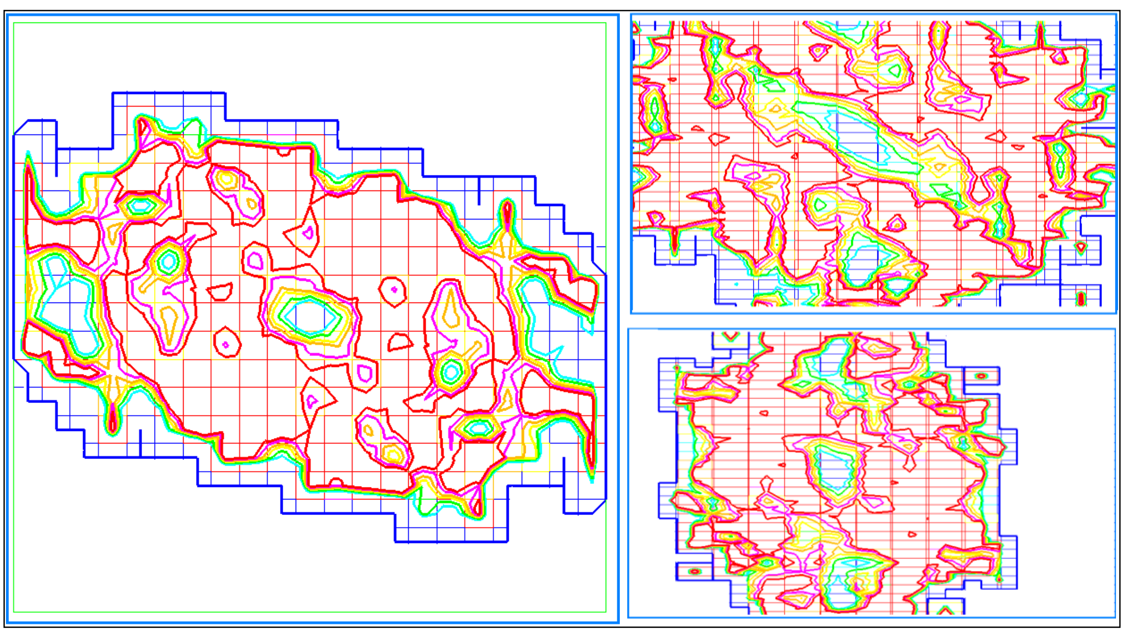
Note: Figure supplied by SRK Consulting.

Figure 14-20: Variographic Map for the Veinlet Domain (Code 120-121), DO (South) Deposit



Note: Figure supplied by SRK Consulting.

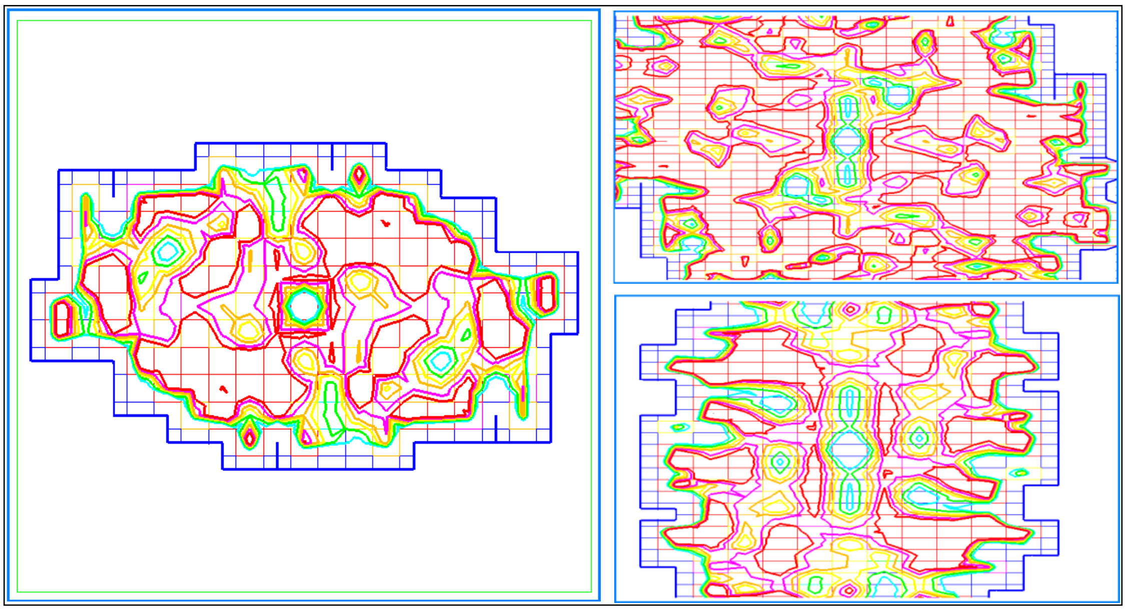
Figure 14-21: Variographic Map for the Veinlet Domain (Code 2002), DC Deposit



Note: Figure supplied by SRK Consulting.

The plan view is shown in the left image, the plunge view (in the plane of the structure) is shown in the upper right image and the dip view (the cross-sectional view) is shown in the lower right image.
Figure supplied by SRK Consulting.

Figure 14-22: Variographic Map for the Veinlet Domain (Code 3003), DE Deposit



Note: Figure supplied by SRK Consulting.

The plan view is shown in the left image, the plunge view (in the plane of the structure) is shown in the upper right image and the dip view (the cross-sectional view) is shown in the lower right image.
Figure supplied by SRK Consulting.

The approach applied for this study consisted of calculating experimental correlograms that validated the observed trends in the three orthogonal directions. Using the sample correlograms, the theoretical models were interpreted in each of the three principal directions for each of the domain models. These correlogram models consisted of a nugget effect (C0) and either two or three nested structures that contribute to the total variance. The model type is spherical for all the domains and for all of the three principal directions.

The nugget (C0) for each of the domains was determined by constructing down-hole variograms (correlograms) using a 2 m lag spacing. The variograms are presented in Appendix II [of Lewis et al. (2010)].

Based on the information obtained from the variographic maps and the determination of the nuggets for the different domains, experimental directional correlograms were prepared. These correlograms were interpreted in order to obtain the models of the theoretical correlograms which, in turn, provide three-dimensional correlograms to calculate the weights used in the Ordinary Kriging methodology of grade estimation. The preferential directions were re-aligned to correspond with veinlet geological attitudes. A summary of the interpreted correlogram parameters is presented in Table 14-7.

The anisotropy models shown by the correlograms are consistent with the mineralization trends observed within the GU of the domains, exhibiting the strongest correlation in the vertical direction (i.e. down dip). The next best correlation is from the along strike direction. The nugget effect, or the random variation component of the spatial variation, is seen to be approximately 10 to 15% of the total variation.

14.4.10 Block Model Construction

A simple, upright, whole-block model was created in the Vulcan software package using the parameters presented below:

- Origin: Xo=481,700 / Yo=697,130 / Zo=3,500
- Bearing: X' axis, Azimuth 145° (Vulcan® nomenclature)
- Block Size: 10 m x 10 m x 10 m
- Model Distance: X=2,700 m / Y=3,200 m / Z=2,000 m
- Type: Extended and indexed
- Spreadsheet Variables:
  - au_ppb: Au grade in ppb
  - cu_ppm: Cu grade in ppm
  - ug_au: Indicates the GU to which the estimated Au value is assigned
  - ug_cu: Indicates the GU to which the estimated Cu value is assigned
  - env: Indicates if the block is within the Au 100 ppb envelope
  - vein: Indicates if the block is in or out of the Cu 300 ppm envelope
  - inten: Indicates whether the block is in or out of the Au-veinlet envelope
  - env_cu: Indicates whether the block is in or out of the Cu 300 ppm envelope
  - flag_au: N° of ellipsoid estimation passes (as calculated) – Au
  - flag_cu: N° of ellipsoid estimation passes (as calculated) – Cu
  - ns_au: Number of samples used in the estimate – Au-ppb
  - ns_cu: Number of samples used in the estimate – Cu-ppm
  - varkri_au: Kriging variance - Au
  - varkri_cu: Kriging variance - Cu
  - nh_au: Number of drill holes used in the estimation – Au
  - nh_cu: Number of drill holes used in the estimation – Cu
  - dist_au: Average distance of the samples to the estimated block -Au
  - dist_cu: Average distance of the samples to the estimated block -Cu
  - au_nn: Au grade-ppb of nearest neighbour
  - cu_nn: Cu grade-ppm of nearest neighbour
  - categ: Resource categorization before smoothing
  - categ_suave: Resource categorization after smoothing
  - densidad: Rock density within mineralized envelope

- topo: Indicates whether the block is above or below the surface
- ug_rec: "Au Recovery Unit" (RU).

In general, the grade estimation plan is divided into four ellipsoids or passes to estimate each block. The first three passes are defined according to the distribution of the variogram function (correlogram) for each preferential bearing. In the fourth pass, all blocks were estimated. In some of the passes, it was necessary to restrict high grades in order to limit their spatial influence. The block discrimination used for DO was 3 m x 3 m x 5 m; for other sectors it was 4 m x 4 m x 3 m. All grade estimates were made using the Ordinary Kriging method. The estimation criteria for gold and copper grades are shown in Table 14-8 and Table 14-9, respectively.

Table 14-7: Summary of the Variographic Parameters, Volcan Project

Element	Domain	Nugget (C0)	Bearing	Plunge	Dip	First Structure				Second Structure				Third Structure			
						Sill	Major	Semi	Minor	Sill	Major	Semi	Minor	Sill	Major	Semi	Minor
Au	100/101	0.06	30	0	0	0.50	20	30	14	0.12	45	70	190	0.32	200	80	190
Au	110/111	0.06	0	0	0	0.54	45	40	16	0.4	60	50	75				
Au	120	0.07	25	0		0.53	35	50	20	0.4	65	60	75				
Au	121	0.1	25	0	0	0.43	15	13	35	0.3	25	30	90	0.17	110	45	150
Cu	10	0.09	90	0	0	0.49	50	50	16	0.42	68	55	210				
Cu	11	0.06	60	0	0	0.62	30	40	30	0.25	80	63	140	0.07	600	310	500
Cu	20	0.07	30	0	0	0.25	25	25	20	0.52	48	60	78	0.16	80	225	300
Cu	30	0.04	0	0	0	0.50	52	30	12	0.27	75	75	55	0.19	150	120	250

Note: Table supplied by SRK Consulting.

Table 14-8: Summary of the Estimation Plan Used in the Estimation of Gold Grades, Volcan Project

UG	Pass	Type	Angle			Ratio			Discret			Min. Samples	Max. Samples	Grade DB	UG DB	Soft Boun.	HighYield Limits				Max Sample x Drillhole
100-101	1	OK	30	0	0	25	6	120	3	3	3	8	16	AU_PPB	100-101		1200	6	6	6	6
	2	OK	30	0	0	55	40	80	3	3	3	8	16	AU_PPB	100-101		1200	6	6	6	6
	3	OK	30	0	0	130	70	200	3	3	3	8	16	AU_PPB	100-101		1200	6	6	6	6
	4	OK	30	0	0	310	100	400	3	3	3	16	20	AU_PPB	100-101		1200	6	6	6	
110-111	1	OK	0	0	0	25	6	120	3	3	3	8	16	AU_PPB	110-111		3000	6	6	6	
	2	OK	0	0	0	55	45	80	3	3	3	8	16	AU_PPB	110-111		3000	6	6	6	6
	3	OK	0	0	0	90	72	120	3	3	3	8	16	AU_PPB	110-111		3000	6	6	6	6
	4	OK	0	0	0	200	100	300	3	3	3	16	20	AU_PPB	110-111		3000	6	6	6	
120	1	OK	25	0	0	25	6	120	3	3	3	8	16	AU_PPB	120	121 (10m)	4200	6	6	6	
	2	OK	25	0	0	55	45	80	3	3	3	8	16	AU_PPB	120	121 (10m)	4200	6	6	6	6
	3	OK	25	0	0	90	72	120	3	3	3	8	16	AU_PPB	120	121 (10m)	4200	6	6	6	6
	4	OK	25	0	0	200	100	300	3	3	3	16	20	AU_PPB	120	121 (10m)	4200	6	6	6	
121	1	OK	25	0	0	25	6	120	3	3	3	8	16	AU_PPB	121	120 (10m)	6000	6	6	6	
	2	OK	25	0	0	55	40	80	3	3	3	8	16	AU_PPB	121	120 (10m)	6000	6	6	6	6
	3	OK	25	0	0	90	60	120	3	3	3	8	16	AU_PPB	121	120 (10m)	6000	6	6	6	6
	4	OK	25	0	0	180	75	240	3	3	3	16	20	AU_PPB	121	120 (10m)	6000	6	6	6	

Note: Table supplied by SRK Consulting.

Table 14-9: Summary of the Estimation Plan Used in the Estimation of Copper Grades, Volcan Project

UG	Pass	Type	Angles			Ratios			Discret.			Min. Samples	Max. Samples	Grade DB	UG DB	Soft Boun	Capping	Max Sample x Drillhole
10	1	OK	90	0	0	35	35	75	3	3	3	8	16	CU PPM	10	-	2900	-
	2	OK	90	0	0	50	50	120	3	3	3	8	16	CU PPM	10	-	2900	-
	3	OK	90	0	0	75	65	200	3	3	3	4	16	CU PPM	10	-	2900	-
	4	OK	90	0	0	140	120	400	3	3	3	2	8	CU PPM	10	-	2900	-
11	1	OK	60	0	0	30	30	50	3	3	3	8	16	CU PPM	11	-	6350	-
	2	OK	60	0	0	50	50	90	3	3	3	8	16	CU PPM	11	-	6350	-
	3	OK	60	0	0	80	70	140	3	3	3	4	16	CU PPM	11	-	6350	-
	4	OK	60	0	0	160	140	280	3	3	3	2	8	CU PPM	11	-	6350	-
20	1	OK	30	0	0	30	40	50	3	3	3	8	16	CU PPM	20	-	4350	-
	2	OK	30	0	0	45	55	70	3	3	3	8	16	CU PPM	20	-	4350	-
	3	OK	30	0	0	70	100	120	3	3	3	4	16	CU PPM	20	-	4350	-
	4	OK	30	0	0	140	200	240	3	3	3	2	8	CU PPM	20	-	4350	-
30	1	OK	0	0	0	30	30	50	3	3	3	8	16	CU PPM	30	-	3200	-
	2	OK	0	0	0	60	60	80	3	3	3	8	16	CU PPM	30	-	3200	-
	3	OK	0	0	0	100	100	120	3	3	3	4	16	CU PPM	30	-	3200	-
	4	OK	0	0	0	200	200	240	3	3	3	2	8	CU PPM	30	-	3200	-

Table supplied by SRK Consulting.

14.4.11 Block Model Validation

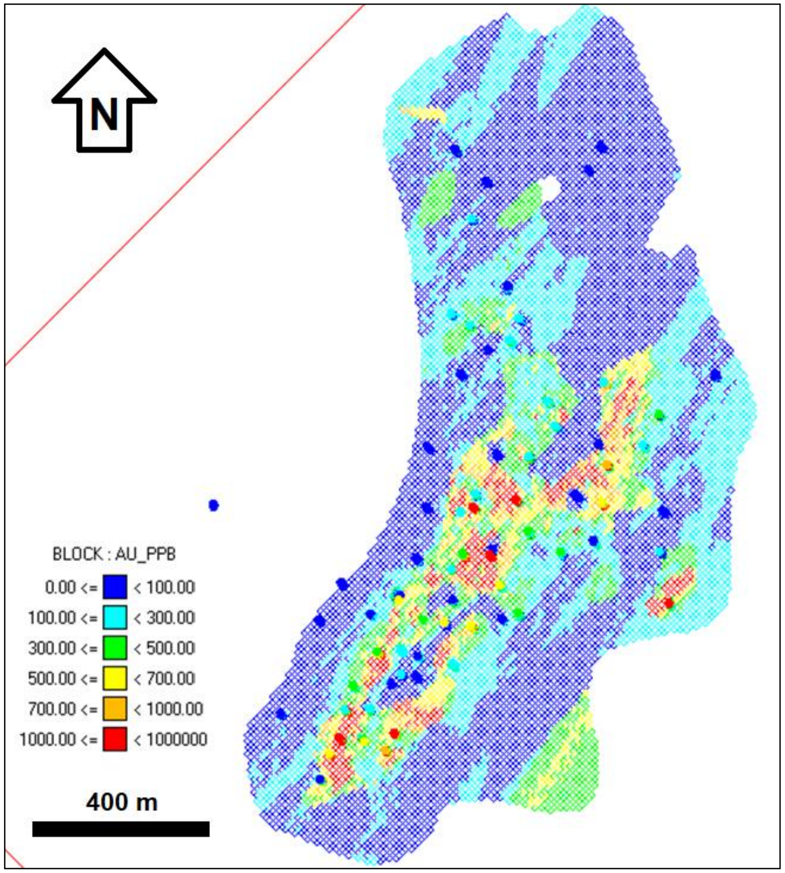
Global Bias, Log-Probability Plots and Smoothing Effect validations have been performed for the Dorado Block Model. Other validation procedures are described below.

Visual Review

Block model validation began with visual comparisons (which are qualitative in nature) of the resulting block grades against the informing drill hole samples on benches as a (Figure 14-23 through Figure 14-26). Additional visual evaluations were conducted whereby the contoured gold grades from the drill hole data were compared against the corresponding estimated block grades for selected vertical sections (Figure 14-27 through Figure 14-30).

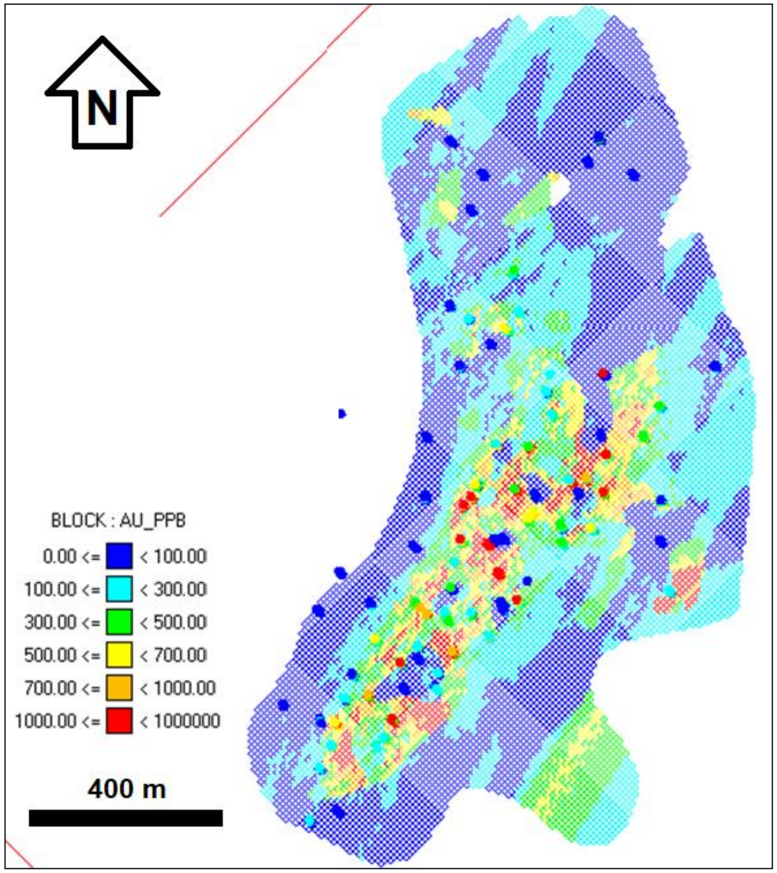
It can be seen that good general agreement is present between the drill hole samples and the estimated block grades in the cross-sectional images. Similarly, although some significant differences can be observed on a detailed scale, there is good overall agreement between the contoured gold grades and the estimated block grades in plan (bench) view. It is expected that the level of agreement between the drill hole sample data and the estimated block grades will improve as the level of data density increases.

Figure 14-23: Bench Plan 4505, Dorado Block Model



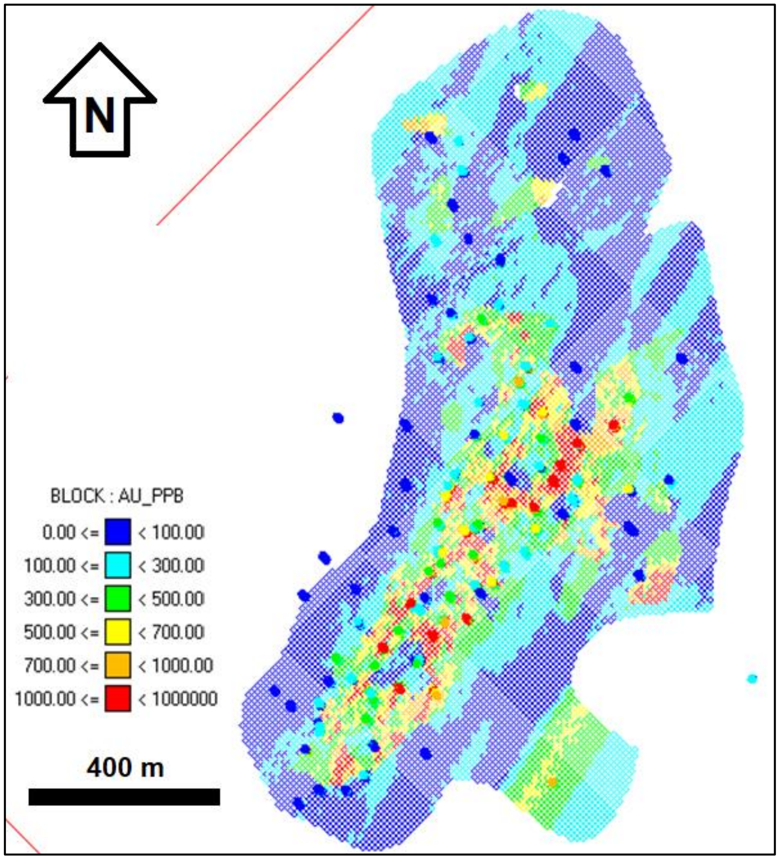
Note: Figure supplied by SRK Consulting.

Figure 14-24: Bench Plan 4555, Dorado Block Model



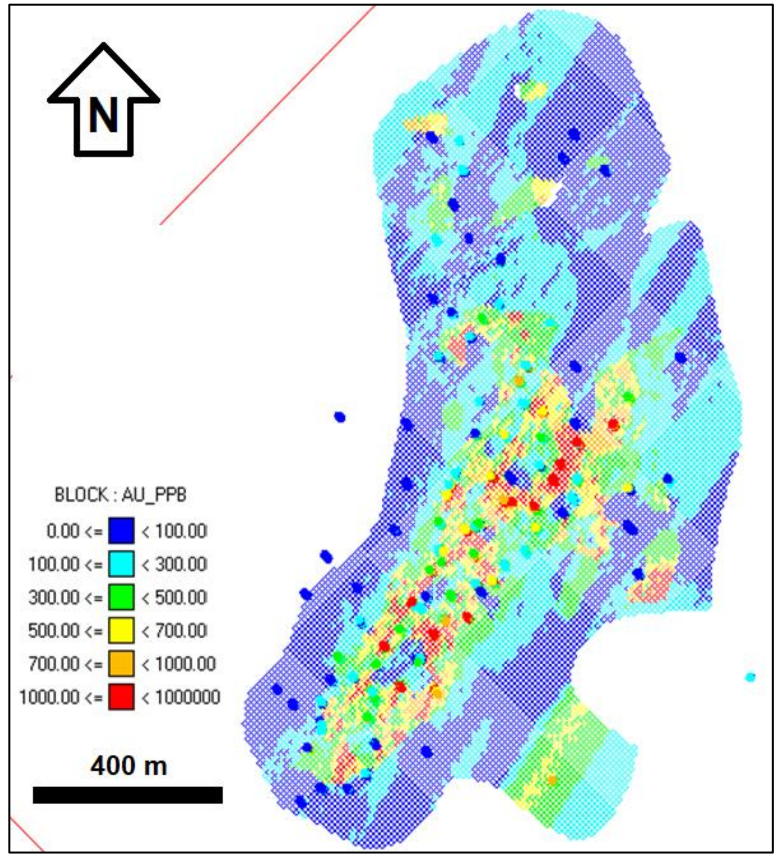
Note: Figure supplied by SRK Consulting.

Figure 14-25: Bench Plan 4605, Dorado Block Model



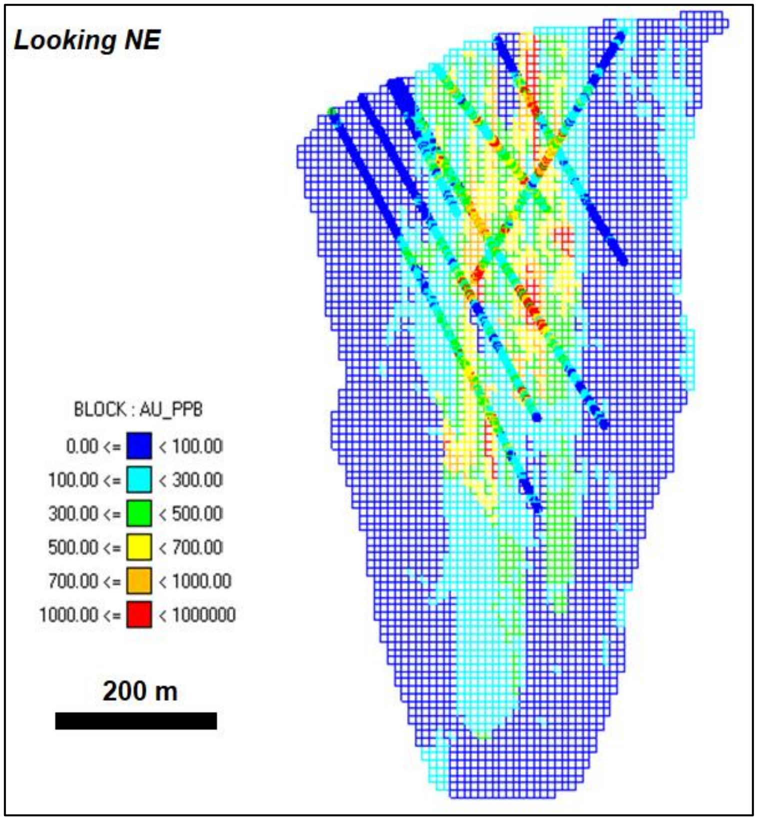
Note: Figure supplied by SRK Consulting.

Figure 14-26: Bench Plan 4655, Dorado Block Model



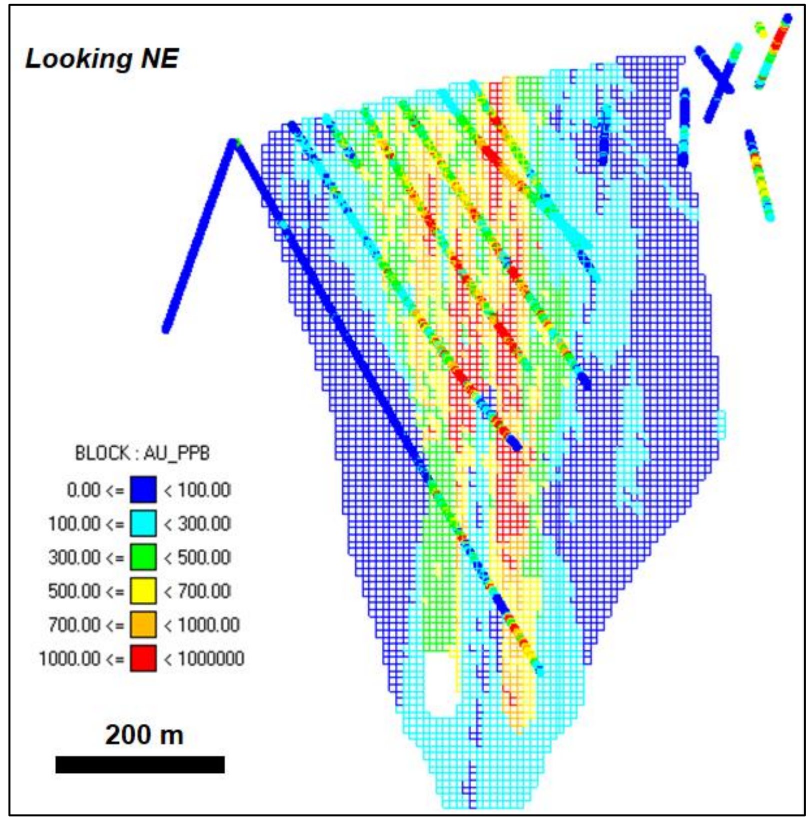
Note: Figure supplied by SRK Consulting.

Figure 14-27: DO - Main Body – South End – Vertical Section



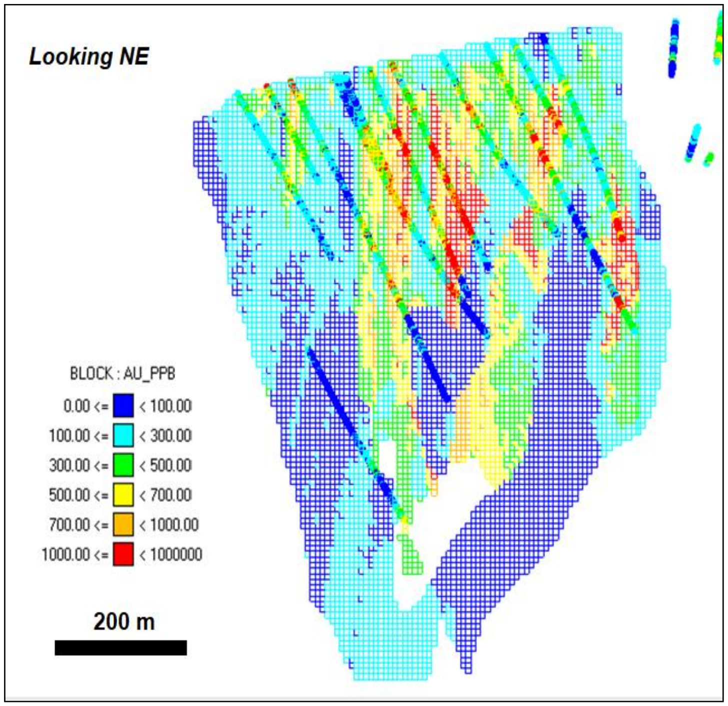
Note: Figure supplied by SRK Consulting.

Figure 14-28: DO - Main Body – Central Zone – Vertical Section



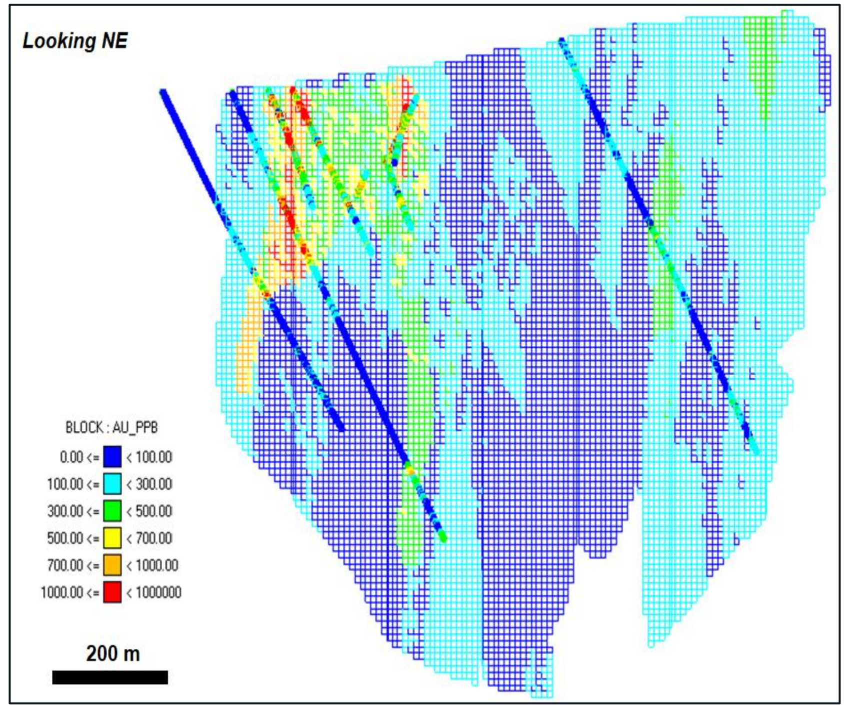
Note: Figure supplied by SRK Consulting.

Figure 14-29: DO - Main Body – North End – Vertical Section



Note: Figure supplied by SRK Consulting.

Figure 14-30: DO - Northern Body – GU 110 – 111 – Vertical Section

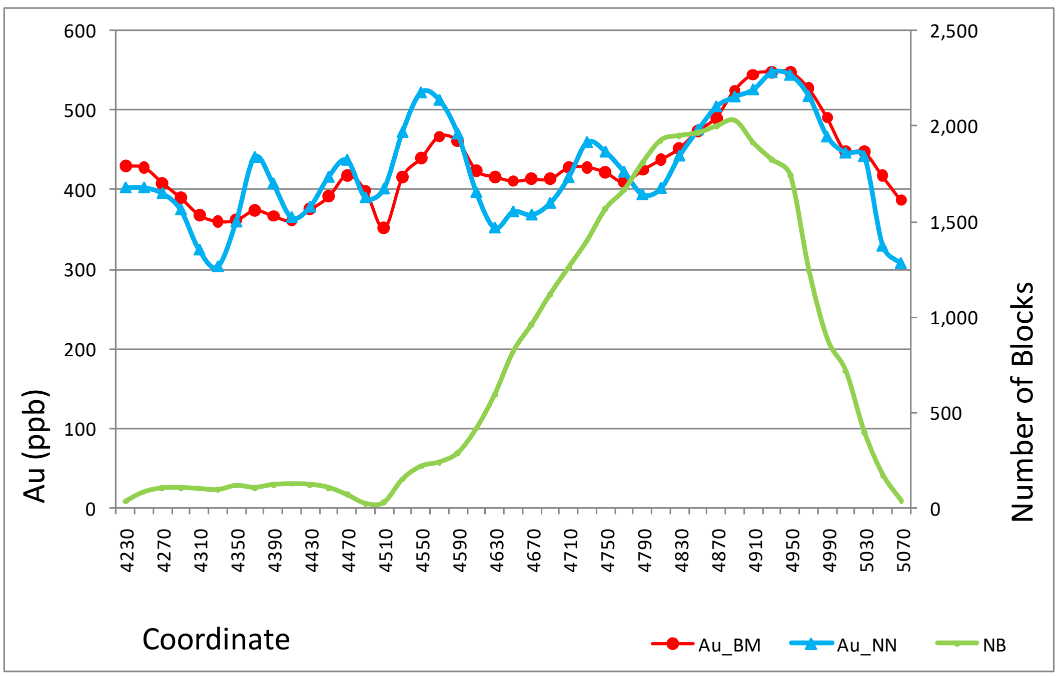


Note: Figure supplied by SRK Consulting.

Drift Analysis

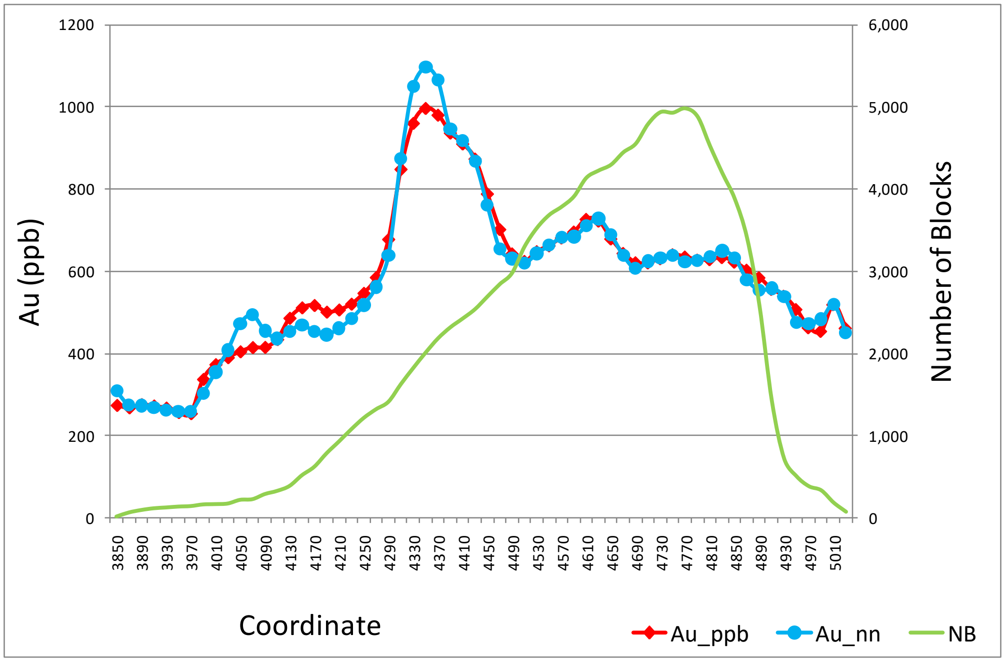
Validation continued with the preparation of drift analyses where the average block grades (for a given bench or a given cross-section slice) were quantitatively compared against the informing sample data for each of the veinlet domains and surrounding low grade envelopes. The bench elevations were spaced at 40 m while the north-south cross-sectional slices were prepared at a spacing of 100 m. The results of the drift analyses of the four mineralized domains are presented by means of the scatter plots shown in Figure 14-31 through Figure 14-33. It can be seen that, in general, the average block estimated grades for both bench and cross-sectional views reasonably reflect the average informing sample data. In general terms, it appears that the average block model grades slightly underestimate the sample average grades in the high-grade areas. Conversely, in general terms, the average block model grades slightly overestimate the sample average grades in the low grade areas. These estimation errors are considered to be a result of the smoothing effect that is inherent with the application of interpolation algorithms such as the Ordinary Kriging system to delineation-stage drill hole data. It is expected that the correlation between the estimated block grades and the informing sample grades will improve with increased sample density.

Figure 14-31: Drift Analysis for the DO (Norte) Domain (Code 100/101) (Bench data are presented on the y-axis while cross-sectional data are presented on the x-axis)



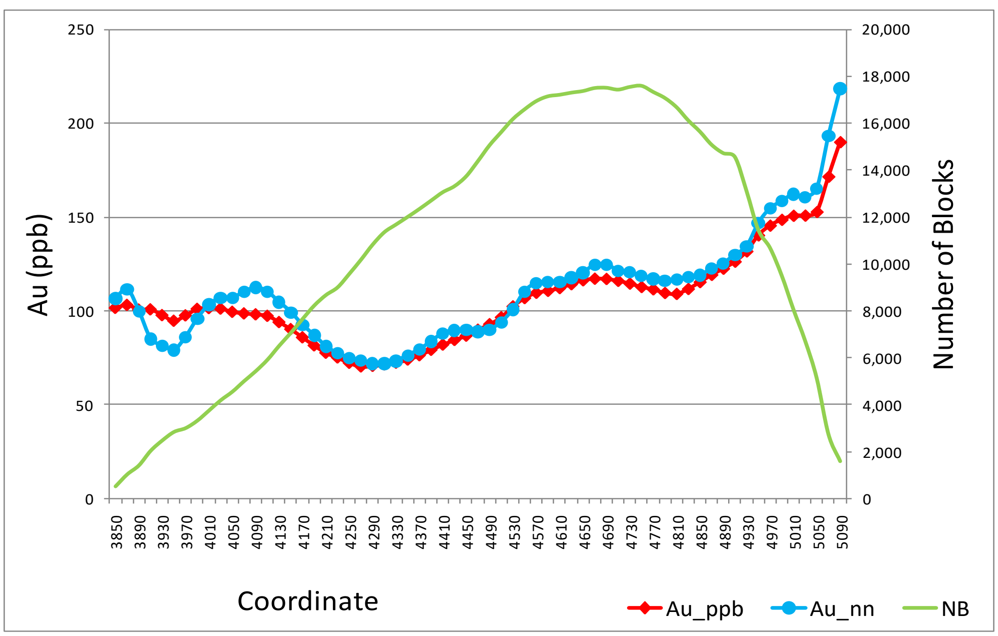
Note: Figure supplied by SRK Consulting.

Figure 14-32: Drift Analysis for the DO (Sur) Domain (Code 121) (Bench data are presented on the y-axis while cross-sectional data are presented on the x-axis)



Note: Figure supplied by SRK Consulting.

Figure 14-33: Drift Analysis for the DO Domain (Code 100/101) (Bench data are presented on the y-axis while cross-sectional data are presented on the x-axis)



Note: Figure supplied by SRK Consulting.

Dispersion Analysis

Validation was completed with the preparation of a dispersion analysis, which began with a comparison of the average grades of the drill hole data against the average of the estimated block grades for each of the modelled domains (Table 14-10). It can be seen that good agreement exists between the average estimated block grades and the informing composite samples.

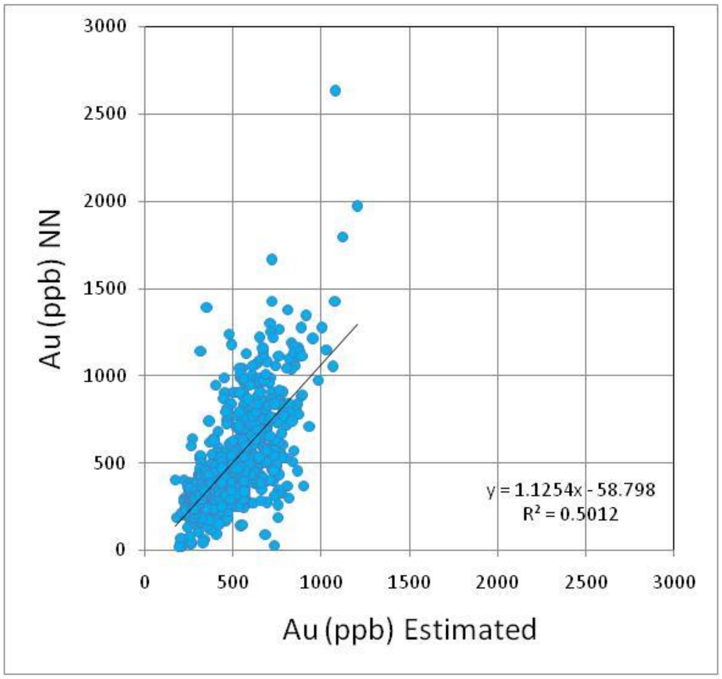
Table 14-10: Comparison of Average Grades of the Drill Hole Samples Dataset vs. Estimated Block Grades by Domain, Volcan Project

Domain	Composite Samples (g/t Au)	Block Estimates (g/t Au)
DO Low Grade Halo (100/101)	0.105	0.103
DO Veinlet (Norte, 110/111)	0.514	0.467
DO Low Grade (Sur, 120)	0.474	0.484
DO Veinlet (Sur, 121)	0.692	0.676
DC Low Grade Halo (2000)	0.120	0.153
DC Veinlet (2002)	0.470	0.440
DE Low Grade Halo (3000)	0.096	0.098
DE Veinlet (3003)	0.538	0.508

Table supplied by SRK Consulting.

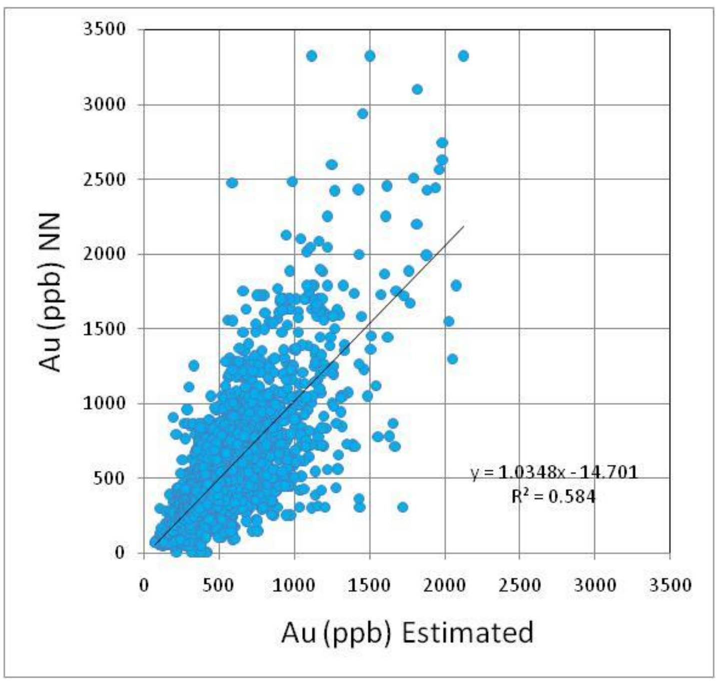
A set of dispersion graphs were then prepared, where the block estimate is compared in detail with the surrounding composite samples. This is achieved by creating larger blocks than were used for the block model estimates (in this case, 50 m x 50 m x 20 m) and by averaging those model blocks and the samples that are found within this larger volume. The resulting information regarding the grades of each large block is then plotted as an ordered pair of estimated block grade versus informing sample grade, and the procedure is carried out for each of the modelled domains separately. The results of the dispersion analysis are presented in Figure 14-34 through Figure 14-36. Good general agreement can be seen to exist for each of the mineralized domains.

Figure 14-34: Dispersion Graph for DO (Norte 110/111), All Samples



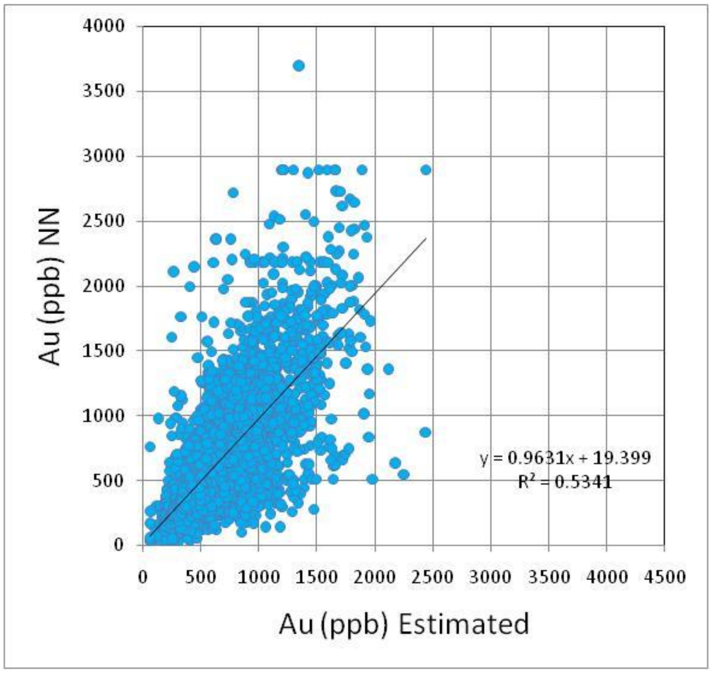
Note: Figure supplied by SRK Consulting.

Figure 14-35: Dispersion Graph for DO (Sur, 120), All Samples



Note: Figure supplied by SRK Consulting.

Figure 14-36: Dispersion Graph for DO (Sur, 121), All Samples



Note: Figure supplied by SRK Consulting.

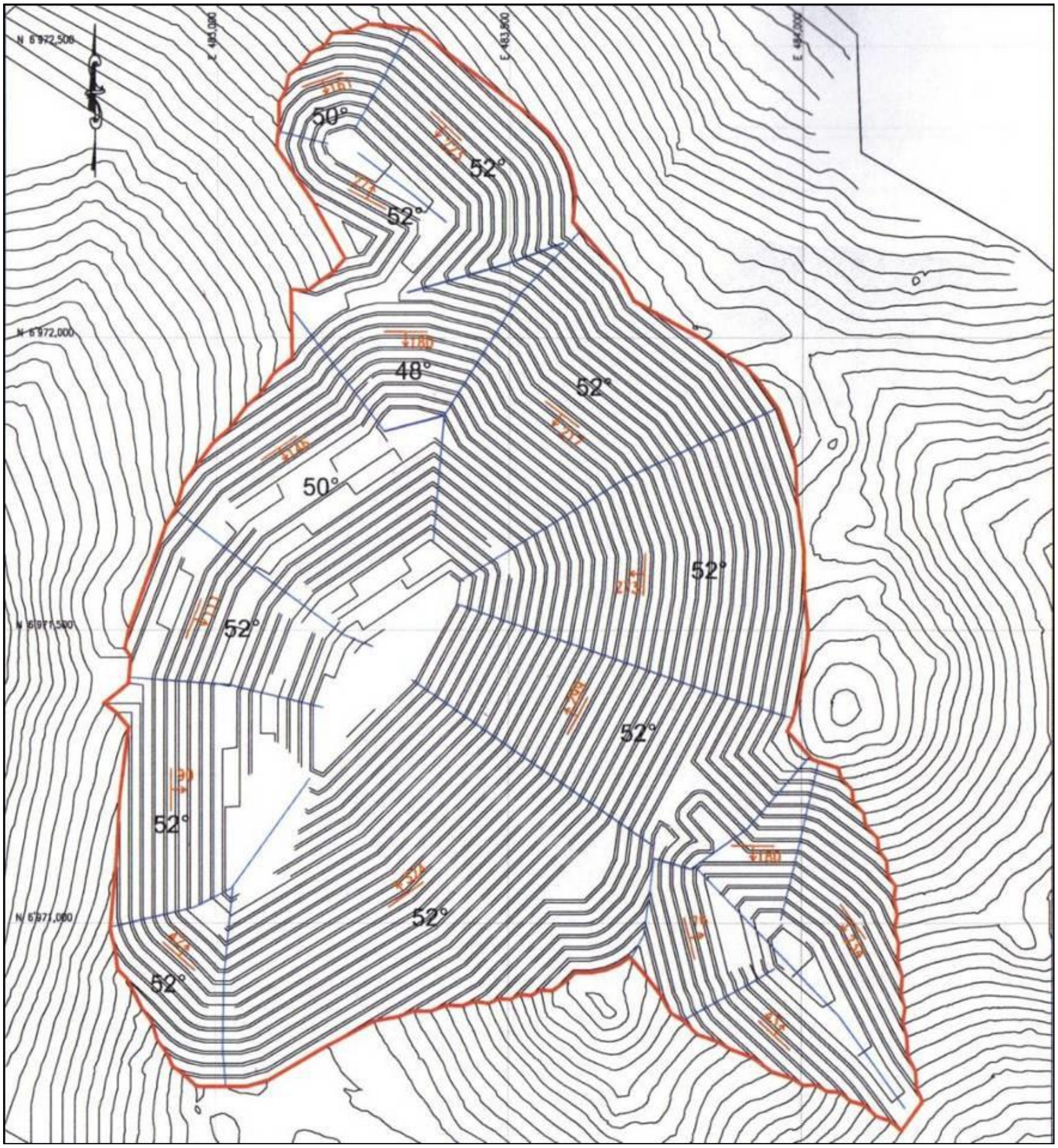
14.5 Mineral Resource Estimation

14.5.1 Open Pit Optimization

Open pit optimization was completed using Datamine NPVS open pit optimization program and was carried out by Alan J. San Martin, MAusIMM(CP). This program uses the Lerchs-Grossmann algorithm to determine the optimal economic open pit limit for a given set of economic assumptions. For the pit shell resource, the Volcan resource block model was used as a basis for the pit optimization.

Resource classifications and mineralized domains were used to develop rock codes which determined the possible routing of an individual block during optimization (process feed or non-economic rock). Because a variable metallurgical recovery was used for the Dorado Oeste and Este deposits, a recovered gold grade was also calculated. Lastly, using the Vector recommended pit slopes (Figure 14-37), each block was flagged by its individual slope sector. Bench heights of 10 m were used for all optimization runs in all types of material.

Figure 14-37: Preliminary Overall Wall Slope Sectors, Dorado Area Open Pits, Volcan Project



Note: Figure supplied by Vector, 2009. Schematic plan not to scale.

A digital topographic map prepared to a 2-m vertical resolution was provided by Hochschild for the area in the immediate vicinity of the four deposits in the Dorado sector of the Volcan Project. This topographic map was supplemented with lower-resolution (10 m vertical resolution) topographic data for the surrounding area so as to provide sufficient coverage to prepare preliminary layouts for such items as non-economic rock storage areas, mine infrastructure and leach pad areas.

Table 14-11: Summary of Input Parameters, Volcan Project

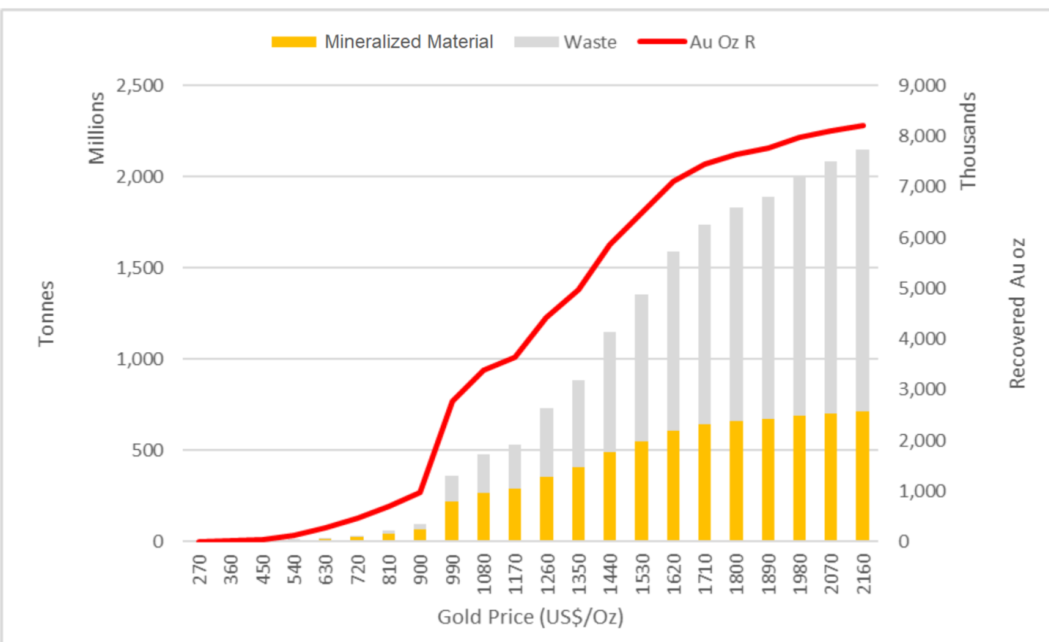
Area	Units	$/Unit	Source
Mineralized material Mining Cost	US$/Tonne	2.22	Deswik 2022
Rehandle Cost	US$/Tonne	1.00	Deswik 2022
Heap Leach Cost	US$/Tonne	6.15	Ausenco 2022
G & A	US$/Tonne	1.40	Hochschild Finance Team
Met. Recovery (DC)	%	25.00	Ausenco 2022
Met. Recovery (DE & DO)	%	64.00	Ausenco 2022
Base Gold Price	US$/Troy Ounce	1,800.00	Hochschild Finance Team
Gold Refining Cost	US$/Troy Ounce	5.00	Hochschild Finance Team
Gold Payable	%	99.50	Hochschild Finance Team

Pit optimization sensitivity runs were completed using measured, indicated and Inferred resources (M, I & I) for gold prices ranging from US$270/oz up to US$2,160/oz, however, mine operating costs were supplied by Hochschild based on similar-sized operations in the area.

For the block model, mining dilution and mining recovery factors were not applied in the determination of the pit shell resource. Capital expenditures were not considered during pit optimization. The results of these runs are shown Figure 14-38 and a view of the optimized pit shell for the base case scenario is presented in Figure 14-39.

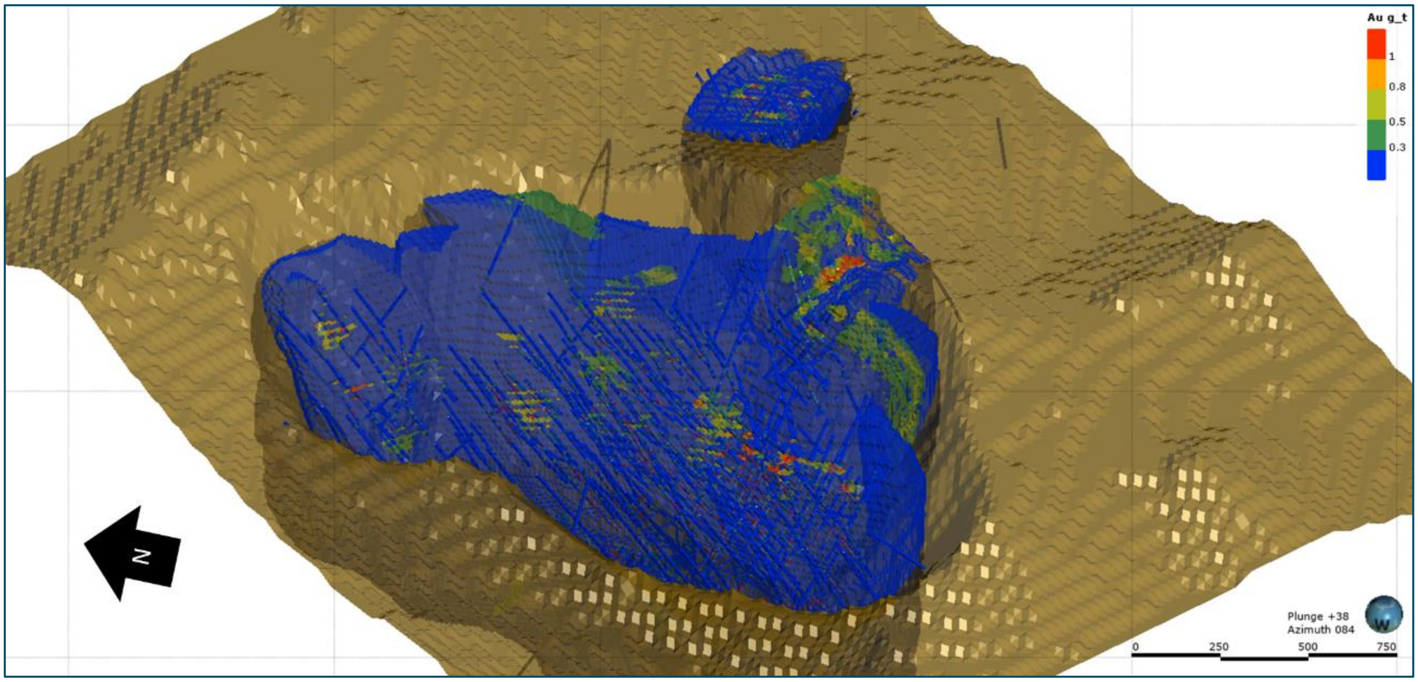
For the DC area potential resource material is only available as heap leach at a fixed gold recovery of 25%. For potential heap leach feed for DE and DO uses a gold recovery of 64%.

Figure 14-38: Hochschild Volcan Pit Shell Gold Price Sensitivity (Base Case is US$1,800/oz Au)



Note: Figure supplied by Micon, 2022.

Figure 14-39: Isometric View of the Dorado Area Block Model and Base Case Optimized Pit Shell (Looking northeast)



Note: Figure supplied by Micon, 2022.

14.5.2 Cut-Off Grade Estimate

The estimates of the economic parameters presented above were used to establish a gold cut-off grade for reporting purposes. A summary of the estimated cut-off grades by deposit is presented in Table 14-12. For the purposes of preparation of this mineral resource estimate, a gold price of US$1,800/oz was selected.

Table 14-12: Summary of Cut-off Grades for the Dorado Sector Deposits, Volcan Project (using US$1,800/oz Au)

Domain	Cut-off Grade (g/t Au)
DO (Norte, 100/101)	0.29
DO (Sur, 120/121)	0.29
DC (2002)	0.75
DE (3003)	0.29

Cut-off grades for the resource evaluation at Volcan were determined using the parameters presented in Table 14-11which generated the cut-off grades presented in Table 14-12. The QPs consider the cut-off grades for each domain presented in Table 14-12 have reasonable prospects for eventual economic extraction.

14.5.3 Mineral Resource Classification Criteria

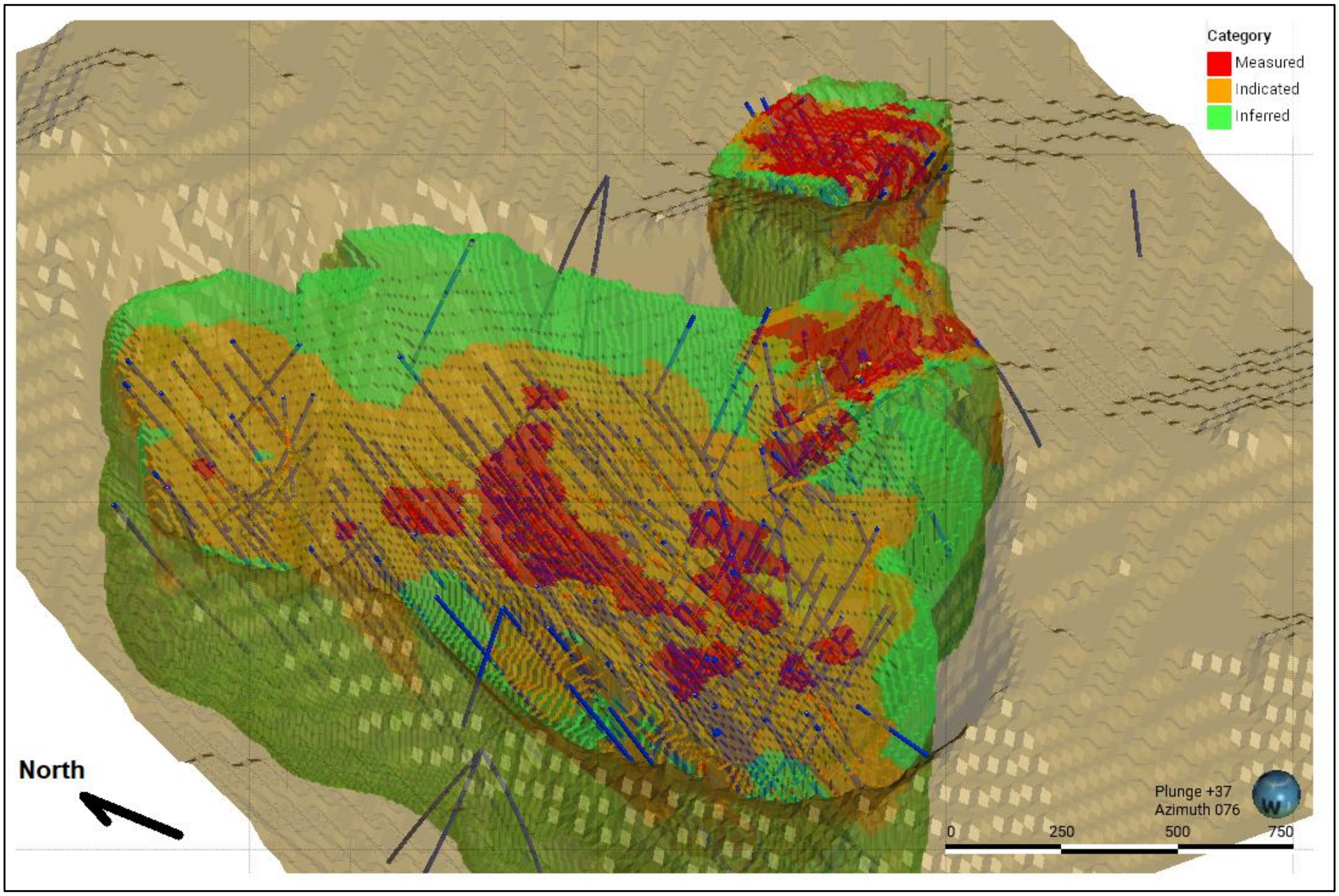
The mineralized material was either classified into the Measured, Indicated or Inferred Mineral Resource category on the basis of the geostatistical analysis presented in Magri (2010) and then cleaned up by Micon doing a detailed 3D visual inspection of the final resource categorization. The initial classification criteria are summarized in Table 14-13.

Table 14-13: Summary of the Classification Criteria for the Dorado Sector Deposits, Volcan Project

Domain	Drill Spacing	Classification
DO (Norte, Codes 100 and 101)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	50 x 50 m	Measured
DO (Sur, Codes 120, 121)	Inside the Domain Model	Inferred
	100 x 100 m	Indicated
	50 x 50 m	Measured
DC (Codes 2000, 2002)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	Less than 50 x 50 m	Measured
DE (Codes 3000, 3003)	Inside the Domain Model	Inferred
	50 x 100 m	Indicated
	50 x 50 m	Measured

In the construction of block model estimates, a lack of information resulting from a slight data gap generated by drill hole deviation is often encountered. This can result in a small number of blocks that are required to have their grades estimated using a larger search ellipse, with a subsequent reduction in their classification. Figure 14-40 shows an isometric view of the final categorization of the Volcan block model.

Figure 14-40: Isometric View of the Volcan Block Model Categorization



Note: Figure supplied by Micon, 2022.

14.5.4 Responsibility for the Mineral Resource Estimation

The estimate of the mineral resources for the gold deposits in the Dorado sector of the Volcan Project as presented in this Report was prepared by William Lewis, B.Sc., P.Geo. and Alan J. San Martin, MAusIMM(CP), each of whom is a QP as defined in NI 43-101 and is independent of Hochschild.

William J. Lewis, B.Sc., P.Geo., Senior Geologist of Micon has reviewed and supervised the updated resource estimate conducted by Ing. Alan J. San Martin on the mineral resource estimate completed for the Volcan deposit. Mr. Lewis is the QP for the resource estimate in this section of the Technical Report.

14.5.5 Volcan 2022 Updated Mineral Resource Estimate

As a result of the concepts and processes described previously, the mineral resources are considered as all potentially profitable blocks using the base case input parameters that are contained within the US$1,800/oz Au optimized open pit shell and below the topographic surface. The mineral resources are stated using the gold grades estimated by the Ordinary Kriging interpolation method and using the capped metal grades. The tabulated mineral resources for the Dorado sector deposits of the Volcan Project are set out in Table 14-14.

The mineral resource estimate is effective as of July 22, 2022. Mineral resources which are not mineral reserves do not have demonstrated economic viability.

Micon has considered the mineral resource estimates in light of known environmental, permitting, legal, title, taxation, socio-economic, marketing, political and other relevant issues and has no reason to believe at this time that the mineral resources will be materially affected by these items.

Table 14-14: Mineral Resources Volcan, Summarized by Deposit, Effective Date July 22, 2022.

Deposit	Au Cut-off g/t	Category	Tonnage kt	Au Grade g/t	Au Content kt. oz
Dorado Oeste (DO)	0.29	Measured	97,194	0.698	2,181
		Indicated	337,820	0.643	6,980
		M+I	435,014	0.655	9,160
		Inferred	74,724	0.517	1,241
Dorado Este (DE)		Measured	24,276	0.673	525
		Indicated	1,113	0.639	23
		M+I	25,389	0.672	548
		Inferred	235	0.357	3
Dorado Central (DC)	0.75	Measured	2,509	1.064	86
		Indicated	341	0.909	10
		M+I	2,849	1.045	96
		Inferred	59	0.850	2
Total		**Measured**	**123,979**	**0.700**	**2,792**
		Indicated	**339,274**	**0.643**	**7,013**
		M+I	**463,253**	**0.658**	**9,804**
		Inferred	**75,018**	**0.516**	**1,246**

Resource notes:

1. The updated mineral resources are reported at a cut-off grade of 0.29 g/t gold for the DO and DE and are reported at a cut-off of 0.75 g/t for DC.
2. The cut-off grade was calculated using a gold price of US$1,800 per ounce, mining cost is US$2.22 per tonne rehandling cost is US$1.00 per tonne, heap leach cost is US$6.15 per tonne and G&A cost is US$1.40/tonne.
3. The effective date of the updated mineral resource estimate is July 22,2022.
4. The mineral resources are reported according to the latest edition of the CIM definitions and standards which was adopted by the CIM council on May 10, 2014.
5. Mineral resources which are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal title, market conditions and other modifying factors. At the time of this report, Micon's QPs have not been able to determine any factors that would adversely impact the current mineral resource estimate.

14.5.6 Updated Mineral Resource Estimate Gold Grade Sensitivity

Micon's QP has reviewed the Volcan cut-off grades used in the sensitivity analysis, and it is the opinion of the QP that they meet the test for reasonable prospects of eventual economic extraction at varying prices of gold or other underlying parameters used to calculate the cut-off grade.

Table 14-15 summarizes the sensitivity of the Measured and Indicated resources within the Volcan deposits to gold grade. Table 14-16 summarizes the sensitivity of the Inferred resources within the Volcan deposits to gold grade

Table 14-15: Gold Grade Sensitivity of the Measured and Indicated Resources within the Volcan Deposits

Dorado Oeste (DO) + Dorado Este (DE)				Dorado Central (DC)				Total Volcan Deposit		
Au Cut-off	Tonnage	Au Grade	Au Content	Au Cut-off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	kt	g/t	kt. oz	g/t	kt	g/t	kt. oz	kt	g/t	kt. oz
0.15	648,747	0.53	10,973	-	-	-	-	-	-	-
0.20	555,545	0.59	10,458	1.00	1,168	1.31	49	-	-	-
0.23	522,714	0.61	10,231	0.90	1,699	1.20	65	-	-	-
0.25	503,374	0.62	10,082	0.80	2,402	1.10	85	-	-	-
***0.29**	**460,403**	**0.66**	**9,709**	**0.75**	**2,849**	**1.05**	**96**	**463,252**	**0.66**	**9,804**
0.30	449,865	0.66	9,609	0.70	3,352	1.00	107	-	-	-
**0.34	404,140	0.70	9,137	0.68	3,696	0.97	115	407,836	0.71	9,252
0.35	392,032	0.71	9,003	0.60	4,790	0.89	138	-	-	-
0.40	338,385	0.77	8,358	0.50	7,023	0.78	177	-	-	-
0.45	293,737	0.82	7,749	0.45	8,686	0.72	202	-	-	-
0.50	254,053	0.87	7,143	0.40	10,864	0.66	232	-	-	-
0.60	191,894	0.98	6,049	0.35	13,288	0.61	261	-	-	-
0.70	147,419	1.08	5,123	0.30	16,549	0.55	295	-	-	-
0.80	113,070	1.18	4,295	0.25	20,727	0.50	332	-	-	-
0.90	88,232	1.28	3,618	0.20	25,518	0.45	367	-	-	-
1.00	67,406	1.38	2,983	0.15	31,144	0.40	398	-	-	-

Notes:
The figures above are the entire Measured and Indicated Resources for the Volcan Project within the 3D pit shell limits. The DO + DE and DC, at various cut-offs, should not be added up other than in rows marked as (*) and (**). This is because other the other gold grades outside the two rows have been generated from a sensitivity graph and not calculated from first principles.
(*) The current Measured and Indicated resource numbers, have an effective date of July 22, 2022.
(**) The Measured and Indicated numbers use the current pit shell and the 2011 Pre-Feasibility study cut-off grades of 0.34 g/t Au and 0.68 g/t Au for comparison purposes only.
Micon's QP has reviewed this sensitivity table and all sensitivity cut-off grades used in this table meet the definition of reasonable prospects for economic extraction.

Table 14-16: Gold Grade Sensitivity of the Inferred Resources within the Volcan Deposits

Dorado Oeste (DO) + Dorado Este (DE)				Dorado Central (DC)				Total Volcan Deposit		
Au Cut-off	Tonnage	Au Grade	Au Content	Au Cut-off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	kt	g/t	kt. oz	g/t	kt	g/t	kt. oz	kt	g/t	kt. oz
0.15	154,691	0.35	1,755	-	-	-	-	-	-	-
0.20	109,039	0.43	1,500	-	-	-	-	-	-	-
0.23	90,758	0.47	1,374	0.90	20	0.92	1	-	-	-
0.25	84,061	0.49	1,323	0.80	44	0.87	1	-	-	-
***0.29**	**74,959**	**0.52**	**1,244**	**0.75**	**59**	**0.85**	**2**	**75,018**	**0.52**	**1,246**
0.30	72,969	0.52	1,225	0.70	131	0.78	3	-	-	-
**0.34	66,220	0.54	1,155	0.68	182	0.75	4	66,401	0.54	1,160
0.35	63,962	0.55	1,130	0.60	288	0.72	7	-	-	-
0.40	42,267	0.64	873	0.50	547	0.63	11	-	-	-
0.45	33,216	0.70	749	0.45	788	0.58	15	-	-	-
0.50	26,350	0.76	644	0.40	950	0.56	17	-	-	-
0.60	16,514	0.89	472	0.35	1,128	0.53	19	-	-	-
0.70	9,979	1.05	336	0.30	1,493	0.48	23	-	-	-
0.80	7,302	1.16	272	0.25	2,549	0.39	32	-	-	-
0.90	5,124	1.29	213	0.20	6,383	0.29	59	-	-	-
1.00	4,169	1.37	184	0.15	17,067	0.21	118	-	-	-

Notes:
The figures above are the entire Inferred Resources for the Volcan Project within the 3D pit shell limits. The DO +DE and DC, at various cut-offs, should not be added up other than in rows marked as (*) and (**). This is because other the other gold grades outside the two rows have been generated from a sensitivity graph and not calculated from first principles.
(*) The current Inferred resource numbers, have an effective date of July 22, 2022.
(**) The Inferred numbers use the current pit shell and the 2011 Pre-Feasibility study cut-off grades of 0.34 g/t Au and 0.68 g/t Au for comparison purposes only.
Micon's QP has reviewed this sensitivity table and all sensitivity cut-off grades used in this table meet the definition of reasonable prospects for economic extraction.

15 MINERAL RESERVE ESTIMATES

This section is not relevant to this Report.

16 MINING METHODS

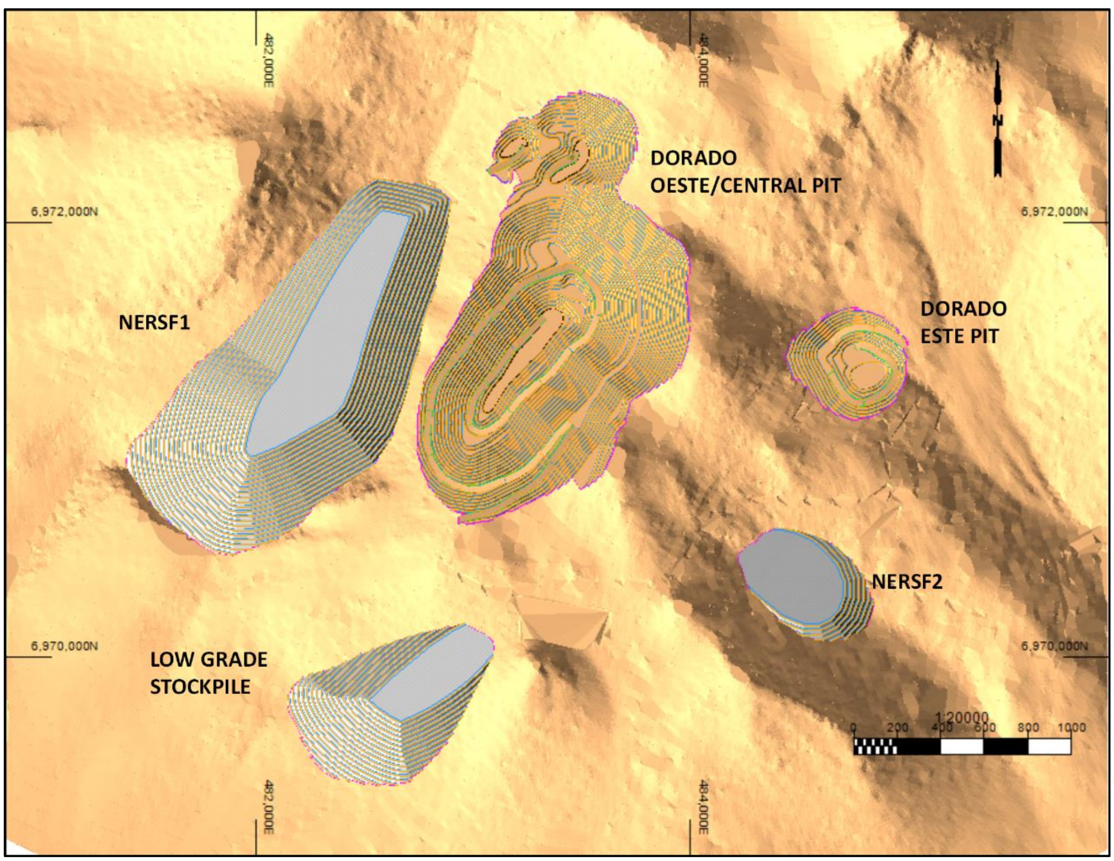
16.1 Overview

Mineralized materials amenable to open pit mining methods were estimated through an open pit optimization exercise using the Measured, Indicated and Inferred Mineral Resources. The engineered pit designs were reported using cut-off grades estimated by rock type, based on a gold price, including an allowance for refining costs, of US$ 1,587/oz. At Volcan, the mineralized material is near surface and continues at depth; therefore, underground was not evaluated.

Two Non-Economic Rock Storage Facilities (NERSF) were designed. NERSF 1 site is located on the west side of the Dorado Oeste/Central pit. NERSF 2 is located south of the Dorado Este pit, to reduce non-economic rock haulage distance. The primary crusher area is located south of the Dorado Oeste/Central pit ramp exit, as well as the low-grade stockpile. Figure 16-1 shows the general layout of pits and NERSF.

The estimated open pit mine life is 14 years, providing feed to the crushing circuit at an average rate of 60,000 t/d.

Figure 16-1: General Layout Design



Note: Figure prepared by Deswik, 2022

16.2 Geotechnical Considerations

Deswik utilized the same slope angles suggested by Vector (2009) and Micon (PFS, 2011) to run all pit optimization analysis and designs.

According to these reports, the rock observed at the cut slopes was found relatively fractured, with a rock quality designation (RQD) of less than 40%, although this degree of fracturing is only representative of shallow rock mass. The quaternary deposit was found relatively shallow due to the hill slope. No clear rock outcrops were observed, making it difficult to gather data on primary geological structures; however, evidence of main structures such as faults were not observed. The RQD index was obtained from the geomechanical database and photographic records of core samples provided by the client. The RQD graphic logs indicate very poor rock quality and high fracturing when RQD is less than 50%, which only occur in the first meters of the relogged core samples. In general, the rock mass has good to very good RQD, regardless of lithology or depth.

The rock mass rating (RMR) geomechanical classification system (Bieniawski, 1989), was used to characterize the overall rock mass quality encountered in the drill core. The basic RMR value (without adjustment by main joint sets orientation), was estimated for available core run based on RQD value, joint spacing, joint condition, hardness, and groundwater condition. This last parameter was assumed to be 10, which involves moist rock mass. In general, the basic RMR values show fair to good rock mass quality (Rock Class III and II).

Kinematic analyses were performed for each pit zone defined by the slope orientation, to evaluate the potential for occurrence of plane and wedge failure. Toppling failure was finally discarded from the analysis as its occurrence is unlikely, given no layered rock exists in the area. The risk probability, estimated for the plane and wedge failures, was combined to obtain a rating representing the probability of crest loss for each slope direction in Dorado Oeste.

At this stage of the studies, because of the lack of reliable structural information in Dorado Este, the recommendations of inter-ramp angles for Dorado Oeste zone can be preliminarily extended to Dorado Central and Dorado Este zones.

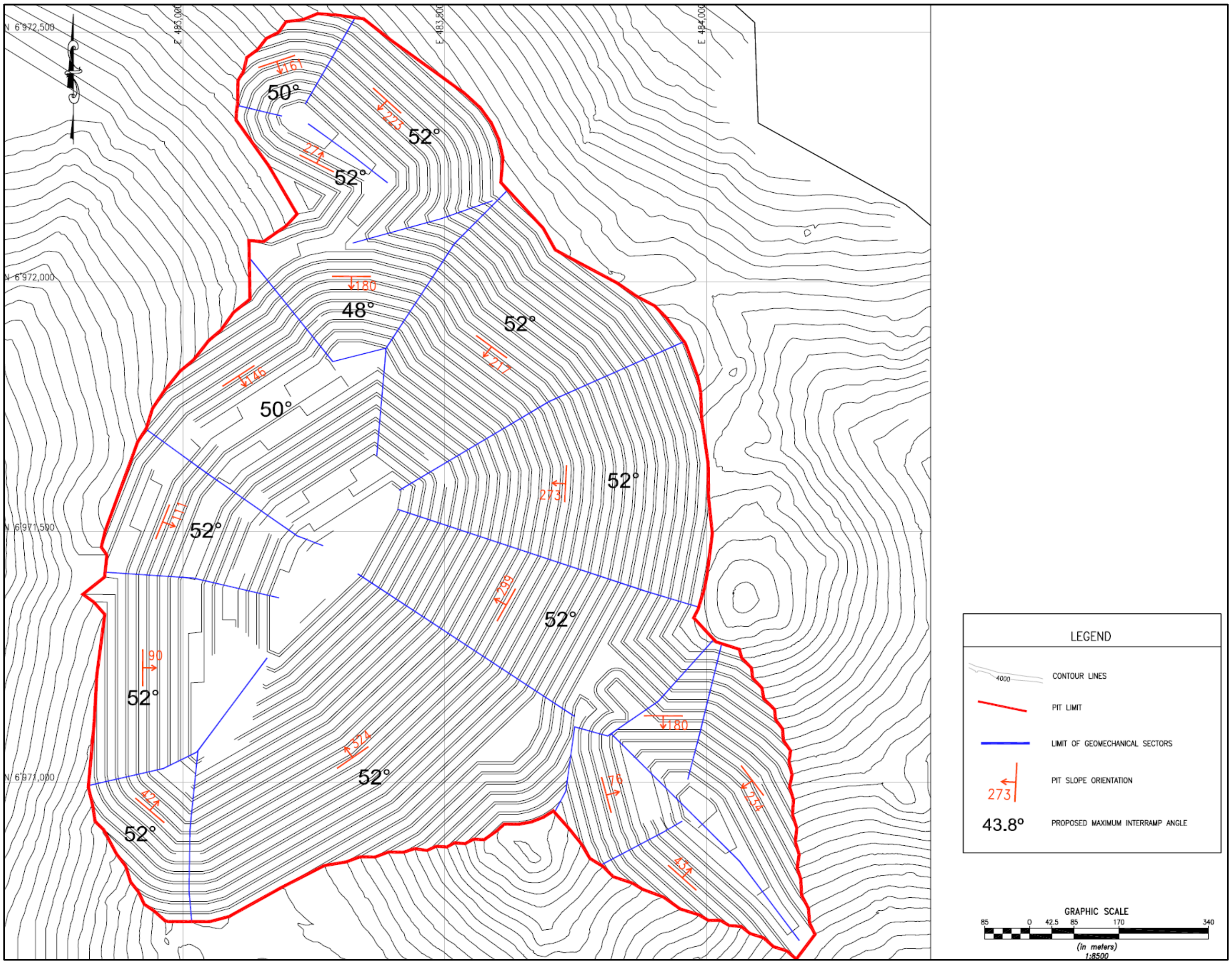
Inter-ramp angles (IRA) that were used for this study are based on geotechnical sectors and are summarized below.

Table 16-1: Inter-ramp Slope Angles

Sector	IRA	Face Slope	Bench Height (m)	Berm (m)	Notes
North-East, North and South Walls	52	73	20	9.51	Major part of the pit
South-West Wall	42	73	20	10.67	Limited extents
North Wall Subsector	48	73	20	11.89	Orientation East-West

Note: Table prepared by Micon, 2011.

Figure 16-2: Geotechnical Sectors



Note: Figure prepared by Vector, 2009

16.3 Hydrogeological Considerations

According to Golder 2012, observation of water levels in exploration and geotechnical drillholes during drilling suggest that only water added during the drilling process is observed within the drillholes and that the natural groundwater level is near or below the base of the proposed open pit. The regional hydrology and hydrogeology report (Schlumberger Water Services, 2012) states:

> *"According to the results of the perforations made in the sector geotechnical pit (GA-01 to GA-05), there is no evidence of the presence of groundwater in the sector."*

Precipitation in the basin is in the order of 1,310 L/s and evapotranspiration is 1,085 L/s, before infiltration. Estimated recharge in the zone is estimated at 24 mm/y.

16.4 Open Pit

The proposed mining operations are based on the use of hydraulic excavators and a haul truck fleet engaged in conventional open pit mining techniques.

Excavated material will be loaded to trucks and hauled to either the Run of Mine (ROM) pad, the low-grade stockpile or the NERSF. Mineralized material excavation and haulage will be monitored by quality control personnel employed by the geology department and details of material movement will be recorded by a radio dispatch system. Almost all rock is fresh rock that will be typically blasted on 20 m benches.

16.4.1 Pit Optimization

The open pit optimizations were carried out by means of the Lerchs-Grossmann (LG) 3D algorithm in NPVS software (version 4.23.242.0). Using mining costs, processing costs, selling costs, gold recovery values and an overall pit slope, the pit optimizer determines an ultimate pit shell that delineates the volume of material that can be extracted to maximize value.

A series of pit optimizations were produced using a range of gold selling prices (revenue factors) to produce an industry standard pit-by-pit graph. This process was used to evaluate the sensitivity of the pit optimizations to changes in mineral selling prices, as well as to evaluate the effect of the pit size and stripping ratios on the project net present value (NPV). The optimization process produces a series of nested pit shells that prioritize the mining of the most economic material. Less profitable material (lower grade and/or high strip ratio) is only planned in later pit shells as the input commodity selling price is increased.

From these results, appropriate pit shells for the deposit were selected as a basis for the engineered pit designs. All pit optimizations were run using reasonable and relevant economic, cost, recovery, and pit slope assumptions, and were run on diluted gold grades. The mineral resource block model utilized a block size of 10m (X) by 10m (Y) by 10m (Z). Only resource blocks classified as either Measured, Indicated, or Inferred were allowed to influence the pit optimizer.

16.4.1.1 Key Assumptions/Basis of Estimate

The key pit optimization parameters used to derive the economic pit shells for the deposits are summarized in Table 16-2. The optimizations were based on parameters and cost data projected for the project and based on current quotations for the Project.

Table 16-2: Pit Optimization Parameters

Modifying Factor	Value
Gold Price	US$ 1,600/oz
Gold Payable	99.5%
Refining Charge	US$ 5/oz
Mining Costs[1]	US$ 2.23/t mined
Processing Costs	US$ 6.15 /t mineralized material
G&A Costs	US$ 1.39/t mineralized
Metallurgical Recovery	24.34 x Au +46.81 (Upper limit 70%) 25% for Dorado Central
Mining recovery	97%
Dilution	3%
Overall pit slopes	38.2° – 52°
Face angle	73°
Bench height	20 m
Berm width	9.5 to 11.9 m
Inter-ramp angle	42° to 52°
Ramp width	32 m

[1] Mining costs are inclusive of mining G&A.

Mining costs were based on a mining contract rate quoted for this Project and on current mine scheduling and transportation profiles submitted to the contractor.

16.4.1.2 Mining Recovery and Dilution

Total dilution is calculated as the sum of planned and unplanned dilution:

- Planned dilution: non-mineralized material (below cut-off grade) that lies within the designed boundaries (mining lines) as determined by the selectivity of mining method, the continuity of the mineralized body along strike and along dip and the complexity of the mineralized body shape.
- Unplanned dilution: additional non-mineralized material (below cut-off grade) which is derived from rock outside the boundaries (mining lines), incorporated due to blast induced over break and/or the difficulty to separate mineralized/non-economic material during mining excavation.

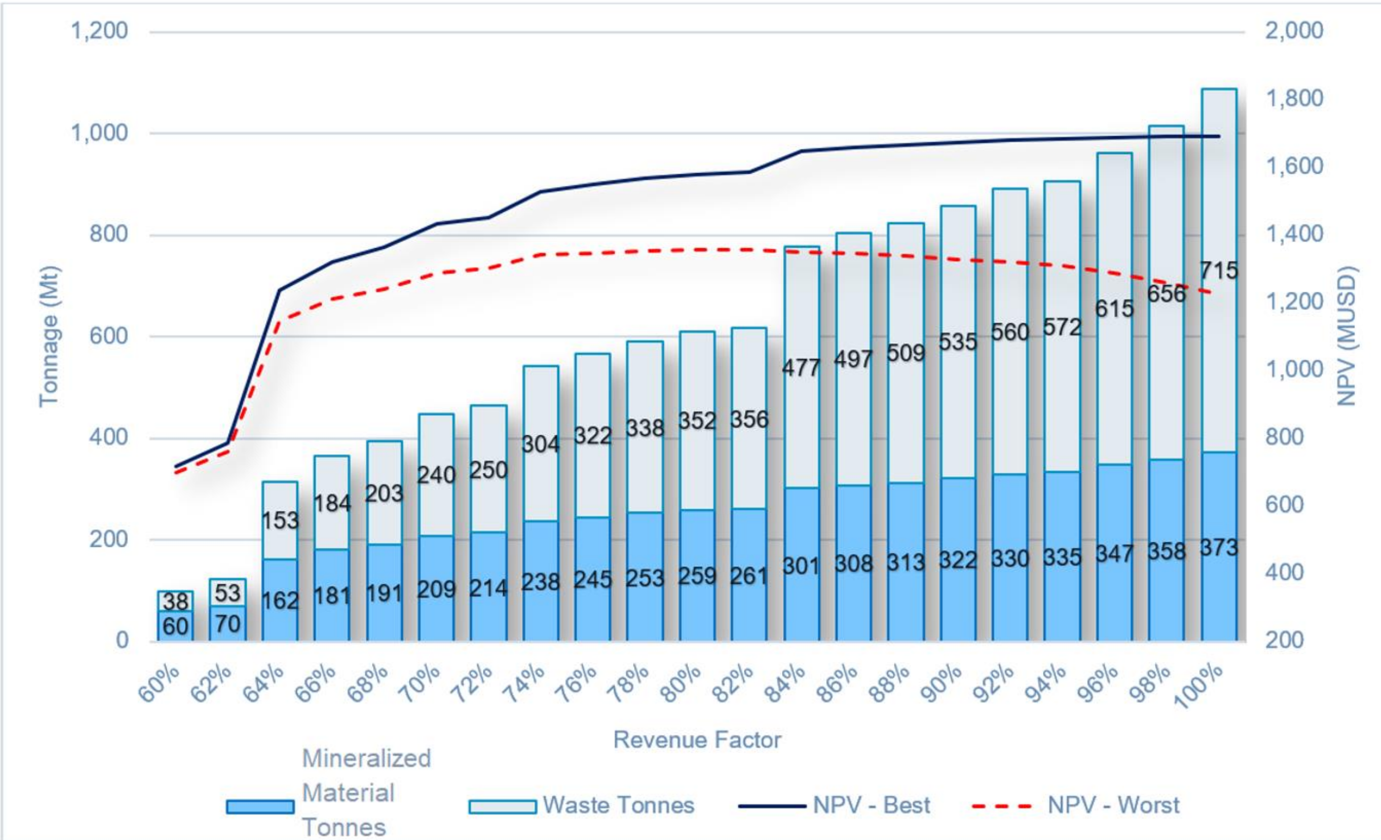
Taking into consideration the geometry of the mineralized body and the operational shape of the open pit, 3% dilution was assumed.

Mining recovery was assumed to be 97% of in situ mineralized material.

16.4.2 Pit Optimization Results

A series of pit shells were run using gold selling prices ranging from 1% to 100% of estimated selling price and using the other parameters listed in the sections above. The results of the pit optimization are presented on Figure 16-3.

Figure 16-3: Pit Optimization Results



Note: Figure prepared by Deswik, 2022

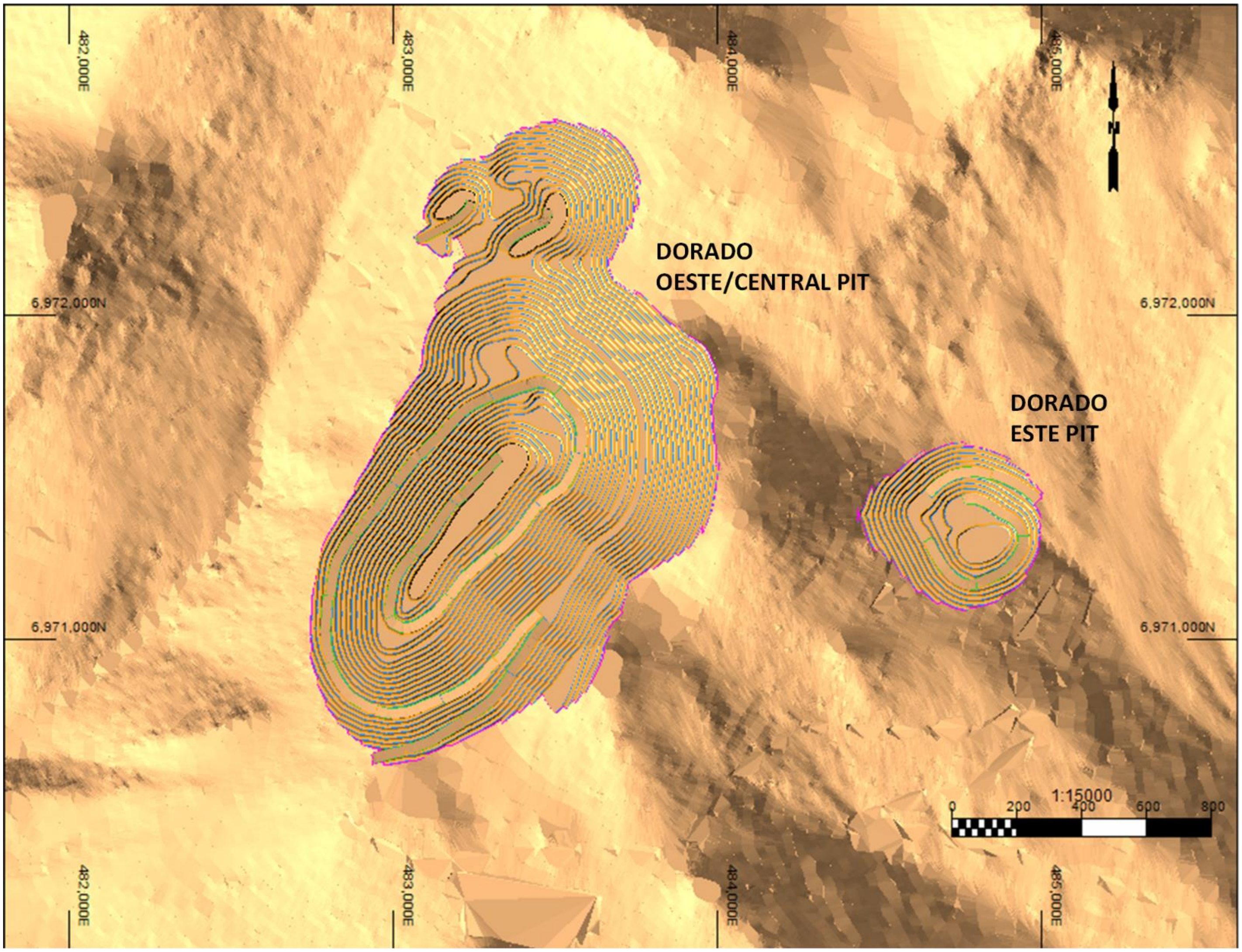
The 84% revenue factor price shell was selected as the base case for design, considering mine scheduling will be a mix of best case and worst case, that shell generates maximum mineralized material recovery before the worst-case break point.

16.4.3 Pit Design

The engineered pit designs were completed using the pit optimization shells as a guide to maximize the value and gold recovered inside the ultimate pits. The resulting pit designs include practical geometry that is required in an operational mine, such as the haul road to access all the benches, recommended pit slopes with geotechnical berms, proper benching configuration, and smoothed pit walls.

The resulting engineered pit designs are presented in Figure 16-4.

Figure 16-4: Final Pit Design



Note: Figure prepared by Deswik, 2022.

16.4.4 Cut-off Grades

The cut-off grade is the lowest average grade that a selective mining unit must have before it is considered for mining. Both planned and unplanned dilution are included. The minimum cut-off grade that defines boundary material which should be mined is the mine cut-off grade, and is estimated using the following formula:

$$COG = (M + P + O) / [r * (V - R)]$$

Where:

M = mining cost difference between mining as mineralized and non-economic material
P = processing cost
O = overhead (general & administrative) cost
r = proportion of valuable product recovered from the mined material
V = value of one unit of valuable product
R = refining costs, defined as costs that are related to the unit of valuable material produced

Considering the parameters and assumptions presented on Table 16-2, the cut-off grade calculated for the Volcan Project is 0.26 g/t gold for Dorado Este and Oeste and 0.60 g/t gold for Dorado Central.

16.4.5 Grade Control

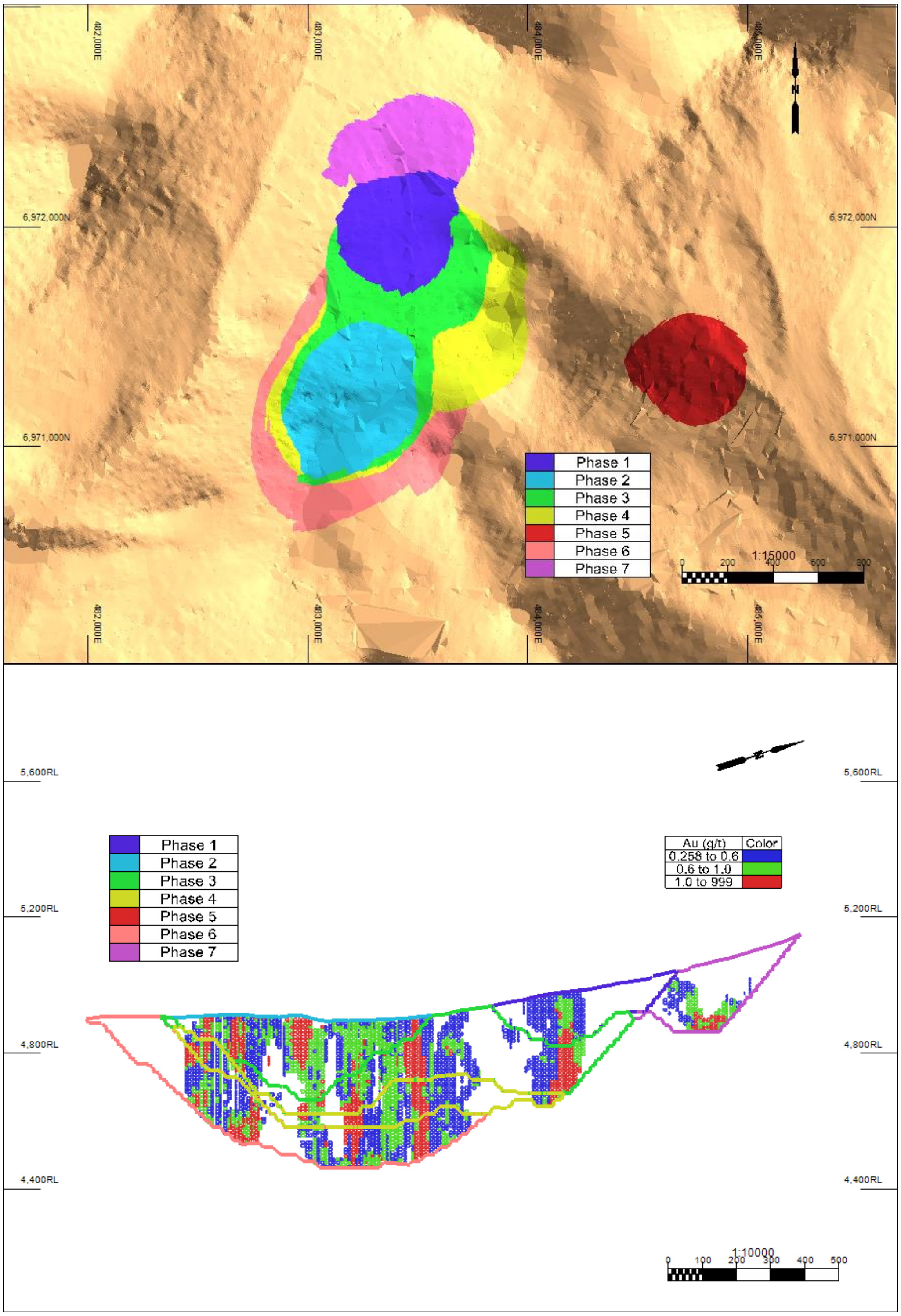
Although the project mineralization is disseminated, a grade control method should be applied to improve the accuracy and confidence level over the mined grades. A reverse circulation drill is intended to be used in the mine to perform grade control activities.

16.5 Production Schedule

Pushbacks or pit phases were designed to drive the mine scheduling. Pushbacks were designed based on pit shells from the pit optimization.

Figure 16-5 shows the designed phases of mine development.

Figure 16-5: Pushbacks



Note: Figure prepared by Deswik, 2022.

Mine scheduling assumptions are as follows:

- Crusher feed of 60 kt/d.
- Maximum 85 Mt of material movement per year.
- Low-grade stockpile to increase head grade for initial years.

Table 16-3: Strategic Mine Scheduling

Year	ROM (Mt)	Au (g/t)	Stockpile (Mt)	Au (g/t)	Reclaim (Mt)	Au (g/t)	Plant (Mt)	Au (g/t)	Non-Economic Rock (Mt)
1	21.6	0.80	12.4	0.37	0.0	0.00	21.6	0.80	38.6
2	21.6	0.79	5.8	0.33	0.0	0.00	21.6	0.79	46.6
3	21.6	0.69	8.8	0.33	0.0	0.00	21.6	0.69	48.5
4	21.6	0.69	12.3	0.34	0.0	0.00	21.6	0.69	47.5
5	21.6	0.76	8.7	0.33	0.0	0.00	21.6	0.76	54.7
6	21.6	0.57	6.4	0.31	0.0	0.00	21.6	0.57	57.0
7	21.6	0.79	12.0	0.36	0.0	0.00	21.6	0.79	46.3
8	21.6	0.83	6.6	0.33	0.0	0.00	21.6	0.83	56.8
9	21.6	0.66	3.7	0.31	0.0	0.00	21.6	0.66	44.7
10	21.6	0.77	0.5	0.28	0.0	0.00	21.6	0.77	10.7
11	0.0	0.00	0.0	0.00	21.6	0.31	21.6	0.31	0.0
12	0.0	0.00	0.0	0.00	21.1	0.31	21.1	0.31	0.0
13	0.0	0.00	0.0	0.00	21.6	0.38	21.6	0.38	0.0
14	0.0	0.00	0.0	0.00	13.1	0.40	13.1	0.40	0.0
TOTAL	**215.8**	**0.73**	**77.4**	**0.34**	**77.4**	**0.34**	**293.2**	**0.63**	**451.3**

16.6 Blasting and Explosives

The drill and blast requirements will include:

- bench height: 20 m;
- burden and spacing for mineralized material are estimated at 9.0 m x 8.0 m respectively;
- burden and spacing for non-economic material are estimated at 10.0 m x 9.0 m respectively;
- hole length 21.5 m, including 1.5 m subdrill;
- hole diameter for mineralized and non-economic material is 12 ¼ inches;
- a powder factor of 0.82 kg/t was considered for mineralized material; and
- a powder factor of 0.46 kg/t was considered for non-economic material.

In Chile the blasting activities for an open pit are generally performed by a contractor, who manages the explosives magazine, down-the-hole delivery truck fleet and completes all the paperwork for operational control and for presentation before the authorities to abide by the law and maintain good practice.

16.7 Mining Equipment

The open pit mining activities were assumed to be primarily undertaken by a contractor-operated fleet.

The proposed annual material movement is approximately 80 Mt, which is suitable for 220-ton trucks to be loaded by 29-m^3 bucket excavators. Five passes of the excavator can entirely load the truck in a total of 3.3 minutes. Hydraulic excavators have been chosen to provide a higher level of flexibility in the mine in comparison with electric shovels.

The proposed mining fleet, and peak fleet numbers, is summarized in Table 16-4.

Table 16-4: Major Open Pit Equipment Requirements

Description	Equipment Type	Class	Number of Units
Loading	Hydraulic Excavator	29 m^3	4
	Wheel Loader	25 m^3	3
Hauling	Off-Highway Truck	220 t	22
Drilling	Drill	Rotary Drill 12 1/4”	6
Support	Motor Grader	24 ft. class	4
	Track Dozer Large	850 HP	3
	Track Dozer Medium	680 HP	5
	Wheel Dozer	680 HP	5
	Water Truck	57,000 L class	4
	Excavator	6.9 m^3	2
	Wheel Loader	3.4 m^3	2
	RC Drill		2
	Fuel and Lubricant truck		2
	Flatbed Truck		2
	Light Vehicle		14
	Light Tower	Light + Genset	10
	Pumps + Generator Set		3

16.8 Labour

The mine personnel will work two shifts with four crews to provide coverage 24 hours a day, 7 days a week. The production and maintenance will be carried out by contractors. The total labour force for the mine is presented in Table 16-5 for the peak and represents a total of 654 people.

Table 16-5: Mine Labour Peak Number

Company	Position	Peak Number
Tiernan	Manager	2
Tiernan	Engineer	10
Tiernan	Geologist	5
Tiernan	Technician	15
Contractor	Manager	2
Contractor	Engineer	20
Contractor	Technician	30
Contractor	Operator	235
Contractor	Maintenance	189
Contractor	Assistant	146
TOTAL		**654**

16.9 Pit Dewatering

In the pits, any water drainage will be directed through the benches to the bottom of the pit where it will be collected in a sump and pumped to the surface. The pit sump and pump system will have to be re-established for each sinking cut. Water from the pits will be used for haul road dust suppression and/or utilized in the process plant.

Groundwater is not expected inside the pit limits. If there is any groundwater, it will not be possible to separate the surface runoff in the base of the pit from groundwater. Any water that cannot be diverted would have to be pumped from the sump at the base of the pit, or from diversion sumps on haul ramps.

17 RECOVERY METHODS

17.1 Overview

The plant is designed to operated 24 hours per day, 365 days per year.

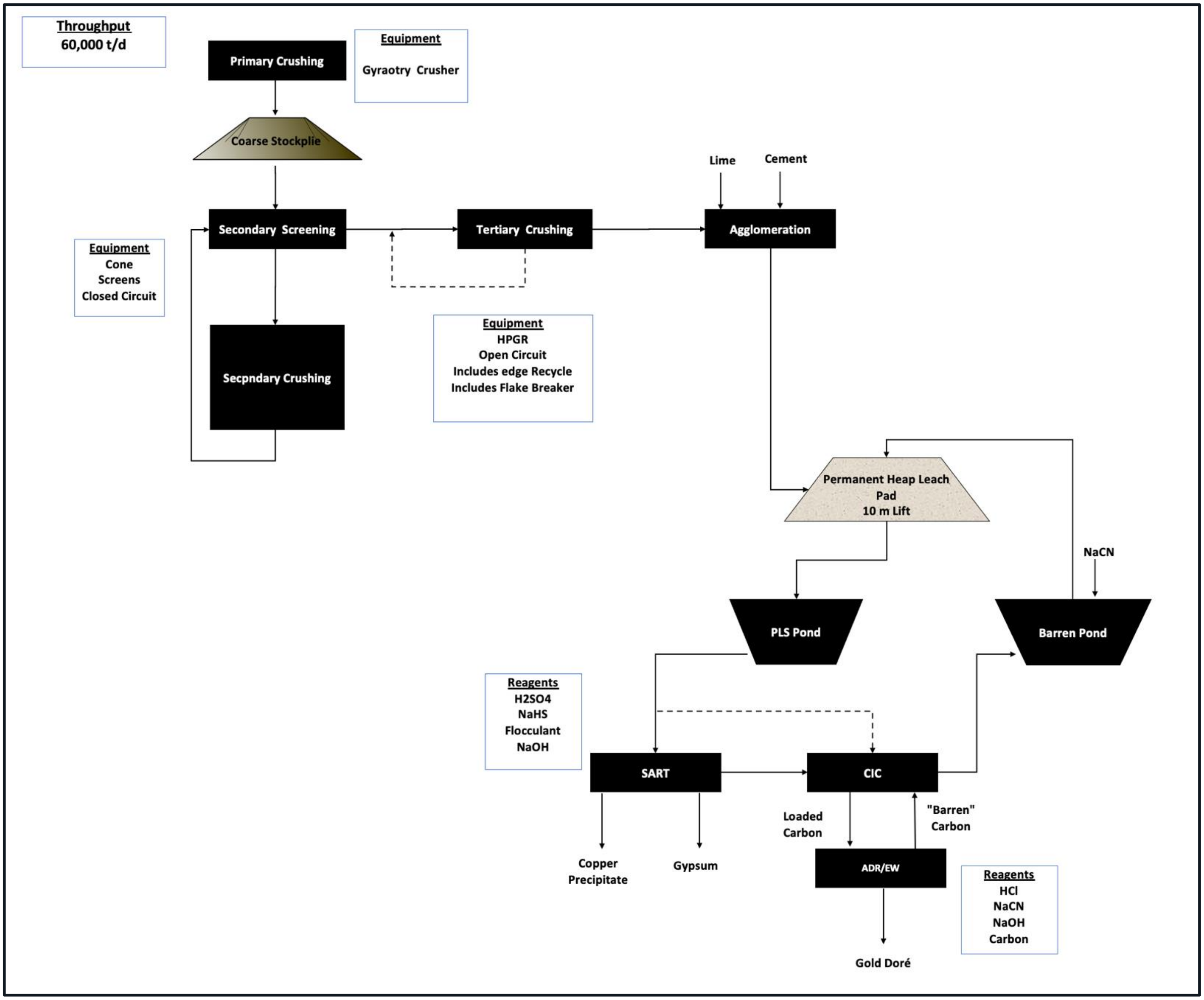
The process plant includes the following units, processes, and facilities:

- primary crushing;
- overland conveying system;
- coarse material stockpile;
- secondary crushing and screening in closed circuit;
- tertiary crushing (HPGR);
- agglomeration and heap stacking;
- heap leaching;
- SART plant;
- Adsorption, Desorption, and Recovery (ADR) - carbon-in-column (CIC), Desorption and Regeneration, and Refinery.

17.2 Process Flow Sheet

The overall proposed flowsheet is shown in Figure 17-1.

Figure 17-1: Process Flowsheet



Note: Figure prepared by Ausenco 2022

17.3 Plant Design

The process plant has been designed in accordance with established good engineering practices for traditional heap leach plants. Where data was not available at the time of flowsheet development, Ausenco's criteria for the sizing and equipment selection are based on comparable industry applications, benchmarking, and the use of modelling and simulation techniques. The process plant is designed to treat a nominal 60,000 t/d. Key design criteria used in the plant design are summarized in Table 17-1, which also summarizes the forecast feed grade and recovery data.

Table 17-1: Key Design Criteria

Description	Units	Criteria
Mine Design Basis		
LOM feed to plant	Mt	293.2
Life of mine (LOM)	years	14
Plant throughput	Kt/d	60
Ore Characteristics		
Solids specific gravity	-	2.7
ROM bulk density	t/m^3	1.7
Average moisture	%	2
Bond ball work Index	kWh/t	16.2
Average head grade - Au	g/t	0.63
Average head grade - Cu	g/t	550
Process plant overall recovery		
Recovery – Au (to doré)	%	63.9
Recovery – Cu (to solution)	%	18
Availability		
Primary crushing	%	70
Secondary crushing	%	80
Tertiary crushing	%	80
Agglomeration and leach stacking	%	80
Wet Processing	%	95
Primary Crushing		
Quantity	#	1
Type	-	Gyratory
Secondary Crushing		
Quantity of crushers	#	2
Type	-	Cone
Secondary Screening		
Configuration		Closed Circuit
Quantity of screens	#	2
Product opening	mm	50
Tertiary Crushing		
Quantity of Crushers	#	2
Type	-	HPGR
HPGR product edge recycle	%	25
Agglomeration		
Type of agglomerator	-	Drum

Description	Units	Criteria
Quantity	#	3
Residence time	s	60
Final moisture	%	6
Heap Leach		
Type	-	Permanent
Lift height	m	10
Max height	m	110
Irrigation rate	$L/h/m^2$	10
Piled bulk density	t/m^3	1.5
Leaching Cycles		
Number of cycles	#	1
Total primary leach cycle duration	d	120
Leaching ration (total)	m^3/t	1.92
Residual moisture (dry basis)	%	10
Carbon-in-Column (CIC)		
Au PLS	ppm	0.4
Au in barren	ppm	0.02
Number of columns per train	#	5
Number of trains	#	3
Loaded carbon	g Au/t	1500
Acid and Cold CN Wash		
Carbon batch size	t	6
Quantity of columns	#	2
Batches per day	#	3
Elution		
Quantity of columns	#	2
Batches per day	#	3
Stripped carbon	g Au/t	50
SART Plant		
Flow rate - feed	m^3/h	800
Cu content target in PLS	ppm	<300

17.3.1 Primary Crushing

The primary crushing circuit will consist of a single gyratory crusher for treating 60,000 t/d. ROM material will be delivered to one of two dump locations by 220-t mine haul trucks. The dump pocket is sized with 484-t capacity. The primary crusher discharges to a surge pocket which also has 484-t capacity. The surge pocket is equipped with an apron feeder to regulate withdrawal of primary crushed material to the overland conveying system.

17.3.2 Overland Conveying

Primary crushed material will be conveyed on the overland conveying system to the coarse material stockpile. The overland conveying system includes a sacrificial conveyor equipped with tramp metal magnet and metal detector, then two flights of overland conveyors with a total length of 6571 m. The overland conveying system is sized for a design capacity of 3928 t/h.

17.3.3 Coarse Material Stockpile and Reclaim

Primary crushed material will discharge from the overland conveying system to the stockpile, located adjacent to the secondary/tertiary crushing plant, with a total storage of 31,250 t of live capacity, which provides 10 hours of independent operation of the secondary/tertiary crushing plant in the case of primary crusher outage

Coarse material will be reclaimed from the stockpile with three feeders onto the reclaim conveyor. The reclaim feeders will normally operate simultaneously, but have the capacity for two feeders to deliver the crushing plant nominal capacity of 3125 t/h. The reclaim conveyor will also receive recirculating secondary crusher product for a total design capacity of 6863 t/h.

17.3.4 Secondary Crushing and Screening

The reclaim conveyor will deliver the primary crushed material along with the recirculation of the secondary crushing circuit. The feed will be distributed to two double-deck, banana-type vibrating screens with apertures of 90 and 55 mm. The oversize material from each screen will discharge to a 1000 hp cone secondary crusher at a nominal rate of 1558 t/h each. The discharge of the secondary crushers will be recirculated back to the secondary screen feed.

The undersize material (<55 mm) from the bottom screen deck will discharge to the secondary crushing product conveyor which discharges to the tertiary crushing feed bin.

17.3.5 Tertiary Crushing

The tertiary crushing feed bin has a 1302-t capacity (20 minutes residence time). Secondary crushed material will be reclaimed from the feed bin by two feeders, each of which regulates feed to one tertiary HPGR crusher at a nominal rate of 1953 t/h. Each HPGR will have 2 m diameter and 2 m length rolls and will be equipped with two 2800 kW drives. HPGR edge product (25% of the total) will discharge to two edge product recirculation conveyors which discharge to the secondary crusher product conveyer.

Each HPGR will discharge center product to a product conveyor, each feeding an HPGR product flake breaker (nominal 1563 t/h each). The flake breakers will discharge to the tertiary crusher product conveyor which discharges to the agglomeration feed bin. HPGR center product will be 80% passing 9.5 mm.

17.3.6 Agglomeration

The agglomeration feed bin will have a live capacity of 3125 t/h (1 hour residence time). Tertiary crushed material will be reclaimed from the feed bin by three feeders, each of which regulates feed to one agglomeration drum at a nominal rate of 1041 t/h. The agglomeration drum residence time will be 60 s. Cement for binding the agglomerate will be added to each agglomeration drum feed at the rate of 4 kg/t of crushed material. Lime for maintaining pH during the heap leach cycle will also be added to each agglomeration drum feed at the rate of 4 kg/t. Barren solution will be added to each agglomeration drum to attain final agglomerate moisture of 6%. The dimensions of the agglomeration drums will be 4m diameter, 13m long. The agglomeration drums will discharge to the agglomeration product conveyor which discharges to the heap leach stacking system.

17.3.7 Heap Leaching

The heap leach will be a permanent, multi-lift, placed on an impermeable base with a drainage layer and piping to recover the solution from the base of the pad. The nominal area under leach will be 480,000 m^2 and the mass under leach will be 7.2 Mt. The heap will be constructed using a conveyor stacking system at a nominal rate of 3125 t/h. Each lift of 10 m height will have a leach time of 120 days at a nominal irrigation rate of 10 $L/h/m^2$. The maximum height of the heap will be 110 m.

The solution ponds will be in the area downslope from the leach pad. The ponds will be connected by shallow overflow ditches to allow extreme event overflow from the PLS pond to the barren solution pond, and then to the event solution pond. The event pond, nominal capacity of 210,000 m^3, is not sized to provide long-term storage of solution, but to maintain appropriate levels in the other ponds in case of heavy precipitation events.

The barren solution discharging from the adsorption system will be collected in the barren solution pond which has 90,000m3 capacity. High strength cyanide solution and antiscalant will be added to the suction sides of the barren solution pumps by metering pumps. Steel headers for the barren solution will run to the leach pad from the barren solution pumps. Strainers/filters will be installed on the barren solution headers to minimize plugging of the drip emitters by fine particles.

The heap will be irrigated with a barren solution through buried drip lines and collected in the drainage piping system installed within a layer of drainage material (coarse crushed) placed over the geomembrane linear at the base of the heap. The drainage pipes will transport the solution to the PLS pond, capacity of 170,000 m^3. Pumps will pump the PLS solution directly to the absorption facility.

17.3.8 SART Plant

SART (Sulphidization, Acidification, Recycling and Thickening) is a chemical process that enables the selective recovery of copper, zinc and silver cyanide complexes in the pregnant leach solution. The principal benefit of utilizing SART is to recycle the cyanide back into the leaching circuit while generating a copper concentrate as a by-product. The SART process recovers above 90% of copper associated to cyanide in the PLS, producing a copper concentrate grade >40%. If silver is present in the pregnant solution, it will precipitate along with copper. Gold doesn´t precipitate in the SART process with losses typically < 1% to copper precipitate.

For copper removal from the cyanide leach solution, it is necessary to reduce the solution pH to below 4.5 by the addition of sulfuric acid to promote dissociation of the copper cyanide complexes, and subsequently with the addition of sodium hydrosulphide, precipitate the copper in solution as copper sulphide. The cyanide that was complexed with copper and that has been released after copper dissociation becomes available as free cyanide in the SART effluent solution which is then available for gold extraction at the heap pad, reducing the overall cyanide consumption. The cyanide recovery occurs in the primary reactor or precipitation reactor, were the product reports to the copper thickener by gravity.

The copper thickener underflow is transferred to the copper filter feed tank, where copper slurry is neutralized with sodium hydroxide (50% NaOH) to a pH of 11.0.

Horizontal plate and frame filters are used to filter the copper precipitate with a copper content higher than 45%. Copper filter cake is dried prior to bagging in maxi sacks ready for storage and transportation to market.

The copper precipitate thickener overflow, containing the recovered free cyanide, is neutralized to a target pH of 10.5 by the addition of lime in a sealed neutralization reactor tank. The overflow from the neutralization tank flows by gravity to the gypsum thickener, where flocculant is added. The underflow of the gypsum thickener is recirculated until a target solids percentage is obtained after which is filtered in a plate and frame filter before final disposal. The gypsum thickener overflow stream at pH 10.5 and containing the regenerated cyanide flows to the PLS pond.

All process equipment containing low pH solutions are covered with ventilation systems that draws air from the process equipment to a gas scrubber to prevent the escape of hydrogen sulfide (H_2S) and hydrocyanic acid (HCN) to the environment.

Operation of the SART plant is anticipated to initiate one year after the start of heap leach operations. The concentration of Cu in the leach solution inventory will increase gradually over this time and operation of the SART plant before sufficient level of Cu in solution is reached is neither economical nor required.

17.3.9 Adsorption, Desorption, and Recovery (ADR)

The carbon-in-column (CIC) adsorption facility will consist of three trains of 5 up-flow, open-top, carbon steel columns. Column dimensions will be 1.5 m active height and 4.6-m diameter and will contain 6 t of carbon. A carbon safety vibrating screen will be installed on the baren solution discharge of each train. Any fugitive carbon will be collected and recovered in tote bins.

Pregnant leach solution, pumped at a nominal flow rate of 4692 m^3/h, will gravity flow through the columns, counter-current to the carbon, until the carbon contained in the lead column achieves the design gold load of 1.5 kg Au/t carbon. The loaded carbon will be pumped to the desorption section for gold recovery. Stripped and regenerated carbon will be pumped from the desorption section to column 5 of each CIC train. Carbon will then be sequentially moved up the adsorption train from column 5 to 1 in counter-current with the descending solution flow. Carbon transfer will be conducted using recessed impeller pumps at a rate of 63 m^3/h.

Loaded carbon from the CIC circuit is later pumped to the loaded carbon screens, where carbon is washed and discharged by gravity into one of the two washing vessels.

The carbon from the screens is fed into the top of the acid wash vessel, with excess water drained to the floor sump after the complete batch of carbon has been transferred. The carbon in the wash column is soaked with prepared CN solution then rinsed with water to remove copper loaded on the carbon. After rinsing, diluted hydrochloric acid is circulated through the wash column to remove contaminants. The washed loaded carbon is then transferred to one of two strip vessels.

Carbon stripping utilizes the split AARL process, which consists of a soak with prepared cyanide strip solution prior to up-flow pumping of tail elution solution from the previous strip batch.

One of two strip columns is loaded with acid washed carbon and excess water drained to the floor sump. Cyanide soak solution is heated by a propane fired solution heater and pumped to the strip column. Stored tail elution solution from the previous batch is then pumped via a heat recovery heat exchanger and the propane fired solution heater and flows through the strip column in up-flow. Solution exiting the strip column is cooled in the heat recovery exchanger then reports to the electrowinning feed tank. Once the stored elution tail solution is exhausted, elution continues with heated water with the solution exiting the strip column reporting to the elution tail solution tank for storage in preparation for the next strip cycle.

Gold is recovered from the solution by electrowinning (EW), where it is deposited onto stainless steel wool cathodes as a weak bonded sludge. This sludge is periodically washed off the cathodes and accumulates at the bottom of the EW tank from where it is pumped to plate and frame filter. The filtered gold sludge is transferred to trays which will be periodically loaded in the mercury retort to remove mercury prior to smelting. The retorted sludge is mixed with fluxing materials then loaded to the smelting furnace. The charge is smelted then poured into bar molds, after which the doré bars are cleaned, weighed, and stamped for final destination.

A percentage of the stripped carbon from the elution vessel, will be reactivated by thermal regeneration. Carbon is pumped from the bottom of the strip column to a dewatering screen ahead of the carbon rotary kiln.

Well-drained carbon feeds the horizontal rotary kiln reaching a target temperature of 750 ºC in an inert environment, after which, it is cooled by water quench. From the quench tank, carbon is pumped to a carbon sizing screen to remove carbon fines. The fines will be periodically filtered in a plate and frame filter and bagged for sale to recover any gold content present. The carbon sizing screen oversize and stripped carbon which has not been regenerated is combined and returns to the carbon-in-column circuit.

17.4 Reagents/Materials Handling

17.4.1 Reagents and Consumables

The summary estimated consumption of each reagent is summarized in Table 17-2.

Table 17-2: Reagent Consumption

Reagent	Unit Consumption (kg/t)*	Annual Consumption (t/y)
Agglomeration		
Cement	4.0	87,600
Leaching		
Sodium Cyanide (NaCN)	1 (with SART), 1.2 (without SART)	21,900
Lime (CaO) pebble**	4.0	87,600
ADR		
Sodium Cyanide (NaCN)	0.001	22
Sodium Hydroxide (NaOH)	0.004	77
Hydrochloric Acid (HCl) 32%	0.05	1,013
Borax	0.0001	3.09
Silica	0.0001	1.55
Sodium Carbonate	0.00007	0.52
Sodium Nitrate ($NaNO_3$)	0.00002	1.55
Carbon	0.01	197
Propane	0.02	533
SART		

Reagent	Unit Consumption (kg/t)*	Annual Consumption (t/y)
Lime (CaO) milled	0.3222	7,057
Sodium Hydroxide (NaOH)	0.0095	208
Sodium Hydrosulfide (NaHS)	0.1121	2,455
Sulfuric acid (H_2SO_4) 93-97%	0.2918	6,391
Propane	0.0049	107
Flocculant	0.0007	15

* kg/t = kg reagent per tonne of material processed
** lime is physically added in agglomeration but functionally corresponds to heap leaching for pH control

Cyanide will be delivered to site in briquettes contained within ISOTainers. ISOTainers will be received in escorted convoys and placed in a designated storage area. As required, ISOTainers will be presented at the cyanide preparation facility and connected by flexible hoses. Cyanide solution preparation will be carried out by circulating solution from a mix tank through the ISOTainers until the briquettes are fully dissolved, then pumping remnant solution from the ISOTainer to the mixing tank, with a final water rinse prior to disconnecting of the flexible hoses. After preparing solution from each ISOTainer, the solution strength will be confirmed by sampling and the batch of prepared solution will be pumped to the cyanide solution storage tank, and the preparation process can be repeated with another ISOTainer. Empty ISOTainers will be stored in a designated storage area and backloaded as return freight on the escorted cyanide convoy.

Liquid reagents (including HCl, NaOH, H_2SO_4, and antiscalant) will be received in bulk tank trucks and pumped to storage tanks from where they will be distributed to various process circuits via individual metering pumps. Lime and cement will be received in dry bulk tanker trucks and will be pneumatically transferred to storage silos adjacent to the agglomeration plant from where the products will be metered to use points by screw feeders. Other solid reagents such as, flocculant will be received in maxi sack, will be mixed with fresh water to their solution strengths setpoints, respectively, in separate mixing tanks and stored in holding tanks before being added into the process circuits at various points using metering pumps.

All reagent solutions will be prepared and stored in bermed containment areas with separate berms for acidic and alkaline reagents. The reagent storage tanks will be equipped with level indicators and instrumentation to ensure that spills do not occur during preparation or operation. Ventilation, fire and safety protections will be provided at the facilities.

The major consumables used within the process plant are summarized in Table 17-3.

Table 17-3: Consumables Consumption

Area	Consumables	Units	Consumption	Annual Consumption (ton/y)
Primary Crushing	Liners	g/t	6.4	0.42
Secondary Crushing	Liners	g/t	2.3	0.15
Tertiary Crushing	HPGR Rolls	Set/y	1.37	-

17.5 Energy, Water, and Process Materials Requirements

17.5.1 Water

Water requirements are estimated at 0.15 m^3 /t of leached material for the whole process, including consumption for evaporation and residual moisture on the leach pad, resulting in a total water consumption of 3.31 million m^3/y.

17.5.2 Air

Air systems for the operation will be as follows:

- High-pressure air for various plant services will be supplied by dedicated air compressors.
- Instrument air will be dried and stored for use at the main process plant site.

17.5.3 Power

The power requirements for the Project are summarized in Table 17-4.

Table 17-4: Power Requirements

Area	Unit Consumption (kWh/t)	Annual Consumption (MWh/y)
Primary Crusher	0.45	14,155
Secondary Crusher	0.86	23,425
Tertiary Crusher	2.87	78,472
Agglomeration	0.32	8,784
Heap Leach	0.14	3,338
SART	0.27	6,132
CIC	0.04	827
ADR	0.02	1,602
Refinery	0.01	485

18 PROJECT INFRASTRUCTURE

18.1 Introduction

Infrastructure to support the Volcan Project during the LOM consists of the following items described below, identified in three main project areas:

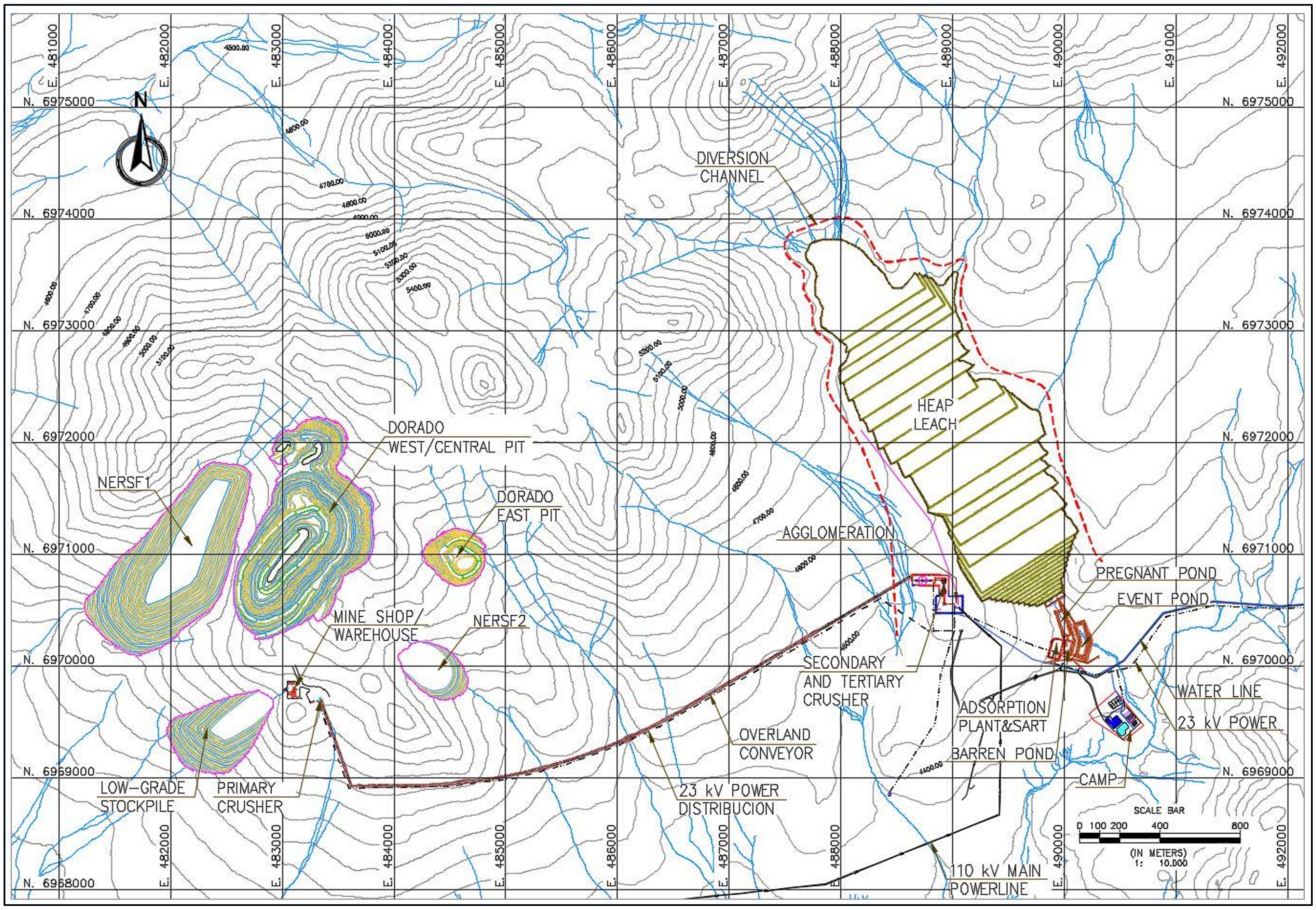
- Mine Area:
  - Open Pit
  - Non-Economic Rock Storage Facilities (NERSFs)
  - Low-grade mineralized material deposit
  - ROM pad
  - Mine Truckshop including Electromechanical, Welding shop, Tire changing & Truckwash facilities
  - Mine Warehouse
  - Diesel Fuel Storage & filling station
  - Mine haul roads
  - Mine Administrative Offices
  - Explosive emulsion storage
  - Mine Electrical Substation
- Process Plant Area:
  - Primary crusher
  - Overland conveyor
  - Coarse material stockpile
  - Secondary crusher
  - Tertiary crusher
  - Agglomerator
  - Heap Leach Pad
  - SART Plant
  - ADR Plant
  - Refinery
  - Plant Electrical Substation
  - Reagents warehouse
  - Cyanide handling facilities
  - Propane Storage Tank

  - Laboratory
  - Administrative Offices
  - Gatehouse
- Complementary Infrastructure
  - Accommodation Camp
  - Fresh Water Supply (water pipeline and pumping station)
  - Potable Water System, and Sewage Treatment Systems
  - High-Voltage Electrical Power Line
  - Access Roads
  - Interior roads
  - Surface water management
  - Solid waste disposal landfill area

Various items of the above listed mining infrastructure have been described in Section 16 “Mining Methods”. Section 17 “Recovery Methods” also describes various items of the above listed process plant infrastructure. This Section 18 “Project Infrastructure” focuses on describing the balance of items that have not already been covered in previous chapters.

Figure 18-1 shows the overall site layout of the mine & process plant areas.

Figure 18-1: Overall Site Layout



Note: Figure prepared by Ausenco 2022, UTM coordinates, WGS84 datum

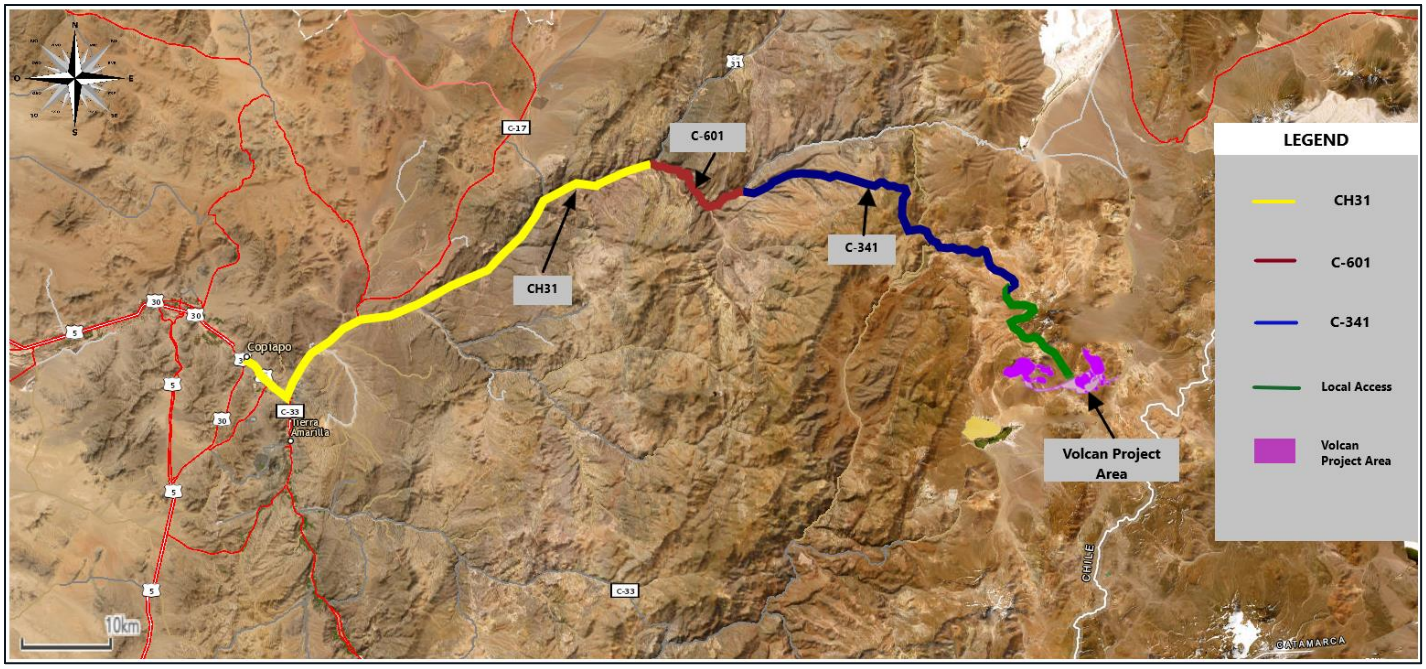
18.2 Roads and Logistics

The main access route considered for the Volcan Project is a total road distance of approximately 170 km from central Copiapo via CH31, C601 & C341 roads, and a currently unimproved private road to the project area. This route was chosen to avoid the National Park & Ramsar areas that are transited by an alternative route.

The access route commences in the center of Copiapo where paved highway CH31 begins. The route takes the Paipote turnoff approximately 8km south-east of central Copiapo, where paved CH31 heads north-eastward. After a further 16 km, highway CH31 turns east, from this point it is a well-maintained road leading to the Argentine border with both paved sections and sections of hard surfaced (bischofite treated) gravel. After a further 52 km the route turns right at La Puerta at the commencement of the recently upgraded C601 dirt road. After a further 18km the route veers right onto the commencement of C341. C341 continues for approximately 55km until the commencement of the currently unimproved private road, which arrives at the project site after a further 20 km.

Some portions of the roads will require upgrading to accommodate increased traffic for the Project, including localized improvement of C-341 & upgrading of the currently unimproved private road.

Figure 18-2: Volcan Project Access



Note: Figure prepared by Ausenco 2022

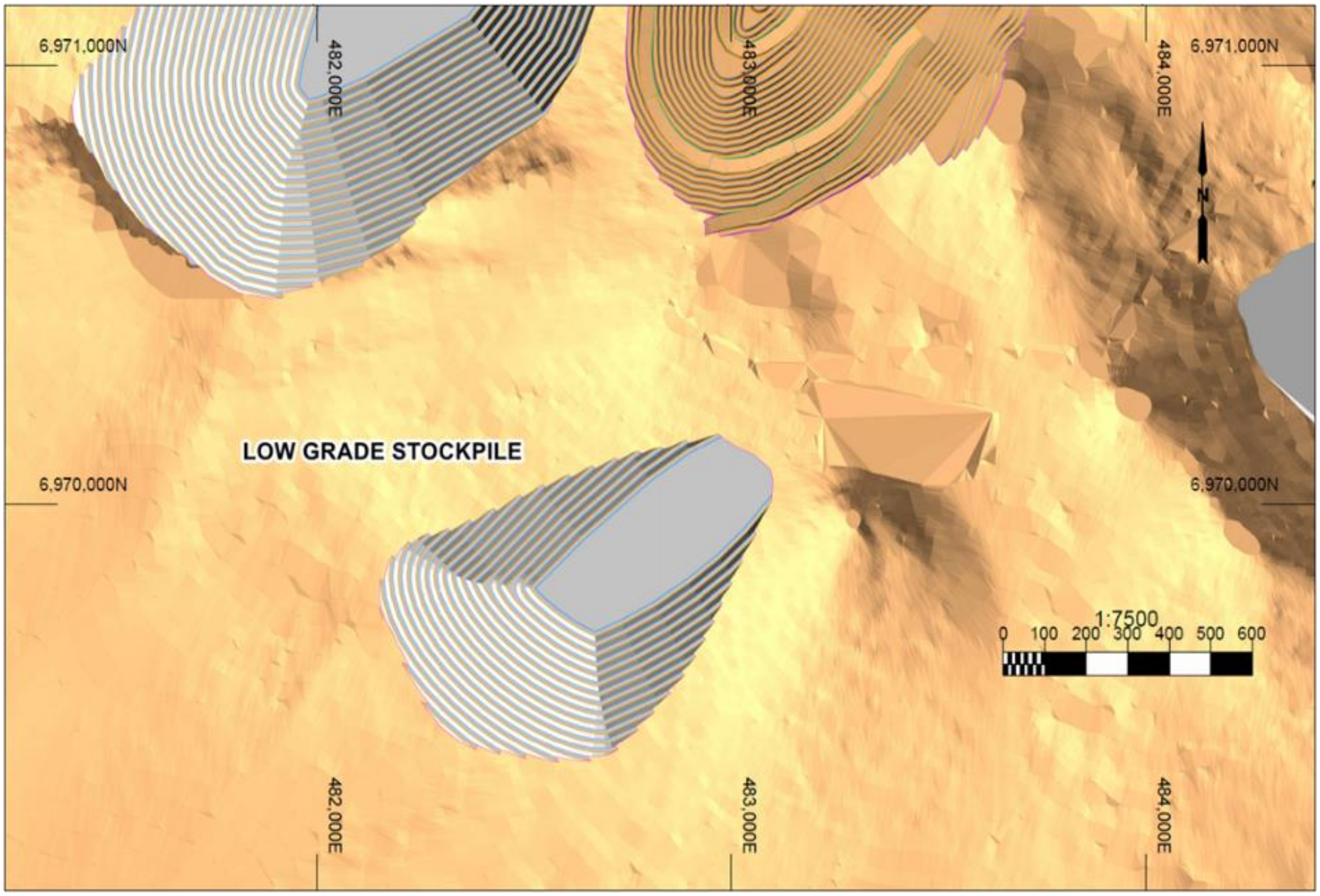
The Atacama Desert Airport (CPO) will be used to transport workers out of the region. It is in the town of Caldera, 50 km northwest of the city of Copiapo on the Pan-American Highway. Currently the CPO airport operates several daily commercial passenger flights to Santiago Airport (SCL).

Port facilities exist in central & northern Chile which are suited to servicing the well-established mining industry. These port facilities are well connected by road to Copiapo.

18.3 Stockpiles

A low-grade stockpile is envisaged for the Project to improve grades for the initial years and therefore improve project economics. Low grade mineralized material will be stocked during the operation of both pits and reclaimed at the end of the LOM. The low-grade stockpile will have a total capacity of 40 million m³ and is located near the Dorado Oeste/Central Pit exit and the ROM pad.

Figure 18-3: Low-Grade Stockpile



Note: Figure prepared by Deswik, 2022, Datum PSAD56/ ZONE 19S

18.4 Non-Economic Rock Storage Facilities (NERSF)

The rock that is sterile or below cut-off grade and will not be processed will either be stored or used on site (within the mine or on surface). Non-economic rock will mainly be deposited on the NERSFs.

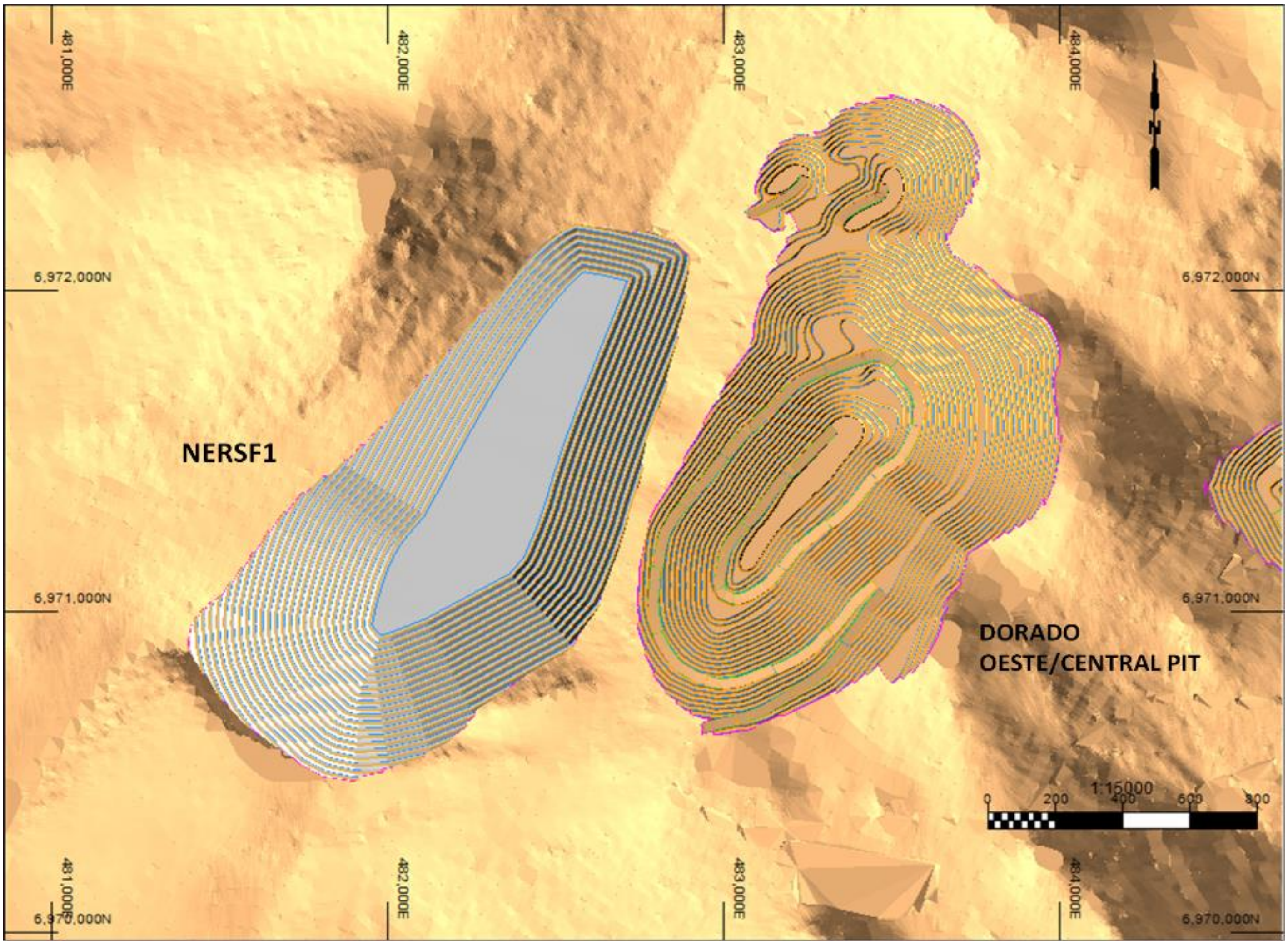
During the pre-production years, non-economic rock generated from the roads and pre-stripping may be used in the construction of bulk earthworks structures such as the collection ponds and the ROM pad.

It is envisaged that two NERSFs will be constructed to minimize haulage distance. Haul roads of a minimum width of 32m will be constructed to access the NERSFs.

Water flows into the NERSF will be limited to direct rainfall as surface runoff from higher up in the catchment will be diverted around the facility using earthwork bunds & open diversion channels as required.

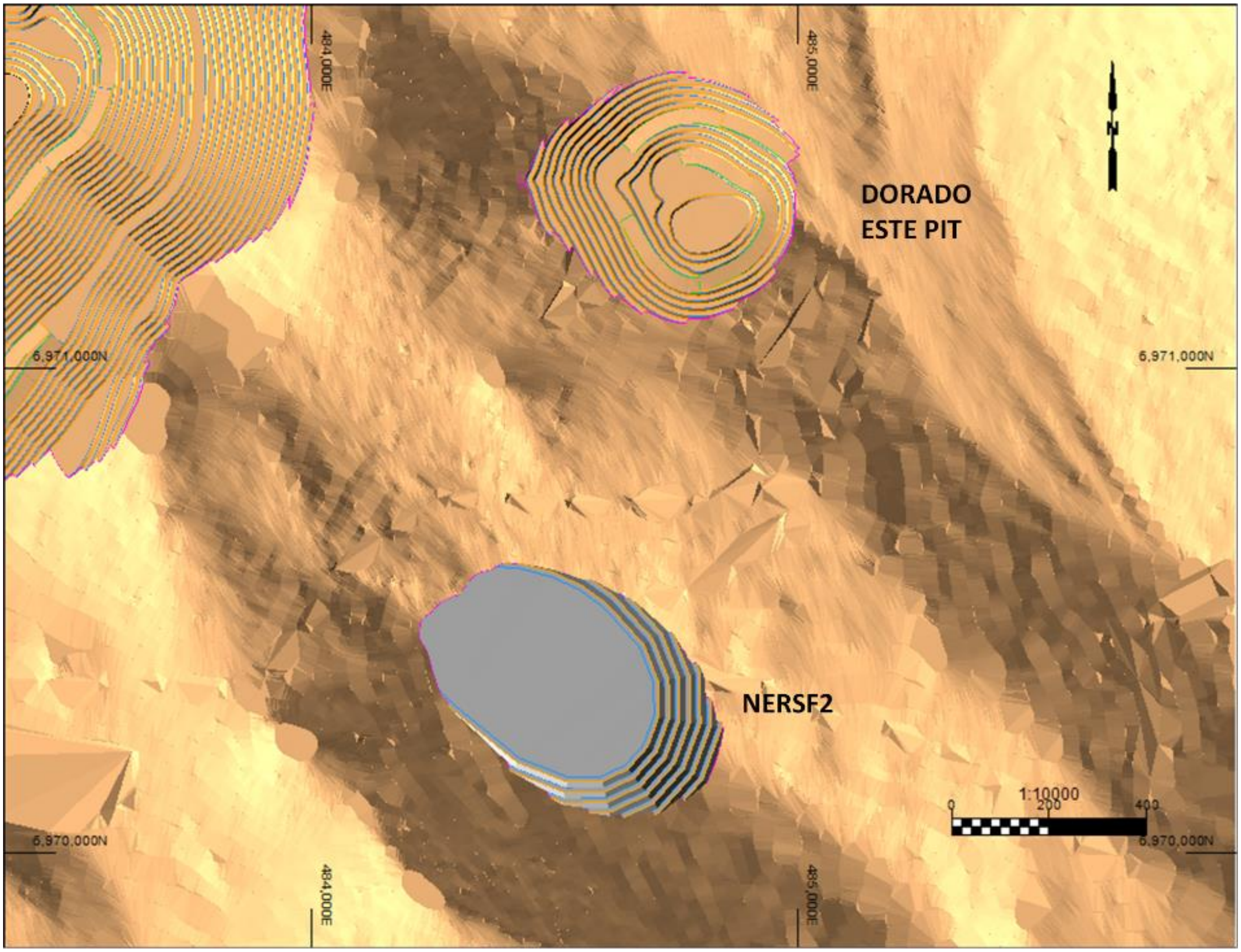
NERSF contact water will be captured in a downstream sedimentation pond to facilitate its evaporation or appropriate use in haul road dust suppression and/or in the process plant facilities.

Figure 18-4: NERSF 1



Note: Figure prepared by Deswik 2022, Datum PSAD56/ ZONE 19S

Figure 18-5: NERSF 2



Note: Figure prepared by Deswik 2022, Datum PSAD56/ ZONE 19S

Table 18-1 shows the total capacity of each NERSF.

Table 18-1: NERSF Capacity

NERSF	Capacity
NERSF 1	255 Mm³
NERSF 2	11 Mm³

18.5 Tailings Storage Facilities

The Project as currently configured does not include the production of tailings, therefore no tailing storage facilities is included in this PEA.

18.6 Heap Leach Pad

The crushed mineralized material from the Volcan deposit will be processed by heap leaching. A single heap leach facility (HLF) has been designed for the site. The HLF is located east of the El Volcan pit, in a valley with acceptable slopes for construction of a leach pad. The HLF has capacity for 293 Mt of mineralized material at a dry density of 1.5 t/m^3. The HLF will be designed in 5 Phases over the life of mine. The HLF has been designed to international standards and national standards.

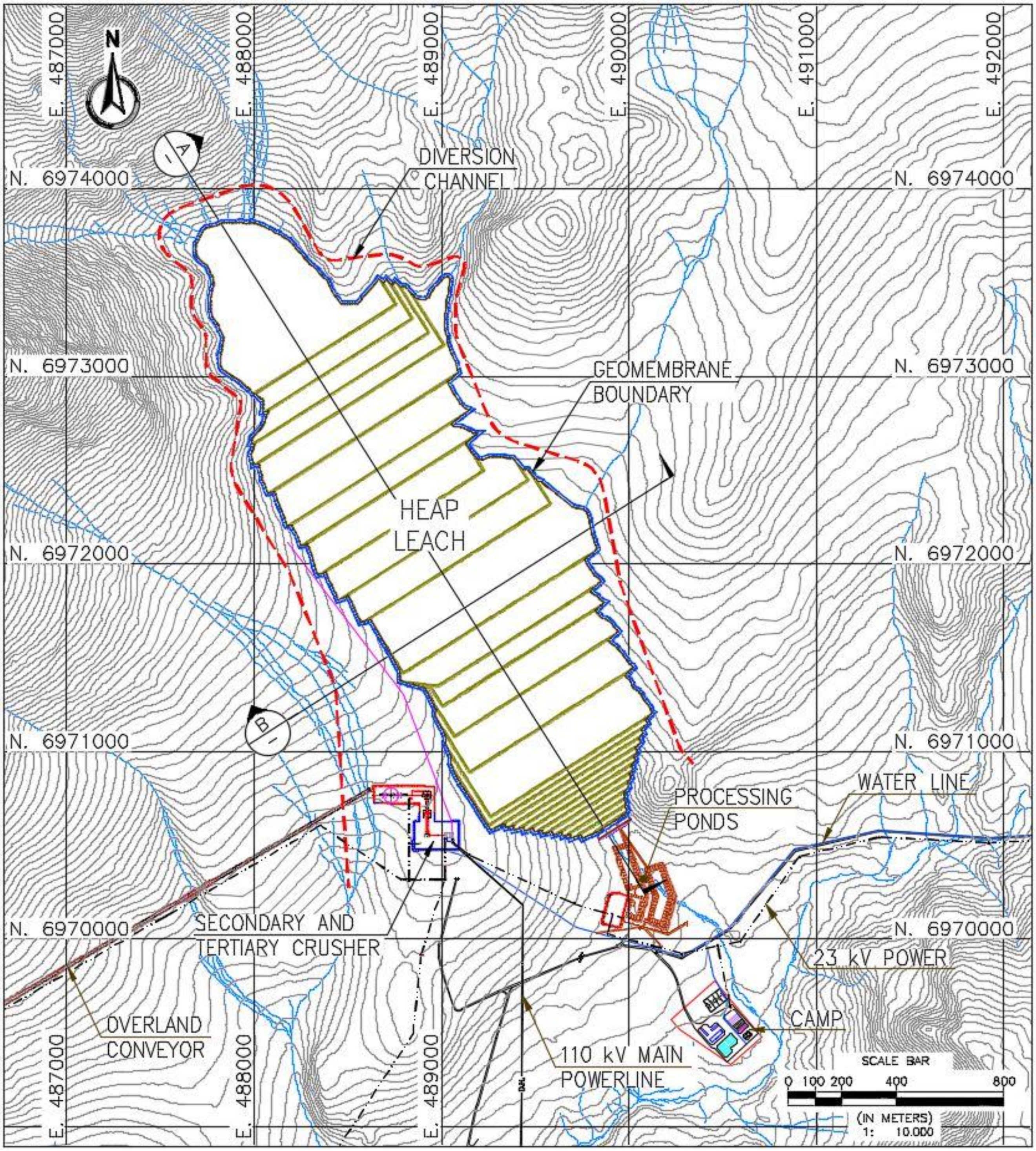
The 3.9Mm^2 HLF has a maximum depth of 110m, i.e., vertical distance from liner to maximum stacked height. Mineralized material is designed to be stacked at a rate of 3,125 tonnes per hour. The mineralized material will be crushed and agglomerated, then place on the leach pad using a fixed conveyor with tripper which feeds a series of portable conveyors (grasshoppers and bench conveyors) and finally a conveyor stacker portable in a retreating upslope configuration. The agglomerate will be stacked in10-meters lifts with benches provided between lifts to create an overall slope angle between 16 to 20 degrees, which is necessary to provide geotechnical stability and to reduce grading requirements during closure reclamation.

The foundation of the HLF consists of colluvial and alluvial soils, which consists of large to small diameter angular gravels along with sands. A bedding layer will be produced to provide cover over the foundation soils to protect the geosynthetic clay liner (GCL) and geomembrane from puncture from the underlying angular rocks. An underdrain will be placed below the liner system to capture any near surface ground water and also act as a leak detection system. Fill material needed for the ponds and leach pad foundation will be sourced from local borrow areas. The leach pad is a GCL-Geomembrane lined pad that is divided into five construction phases providing a total lined leach pad surface area of approximately 3.9 million square meters, as shown in Figure 18-6.

Each phase will include a solution collection system that tie together and drain by gravity to the Pregnant Solution Pond at the toe of the Phase 1 leach pad. During upset conditions, the Pregnant Pond overflows into an event pond.

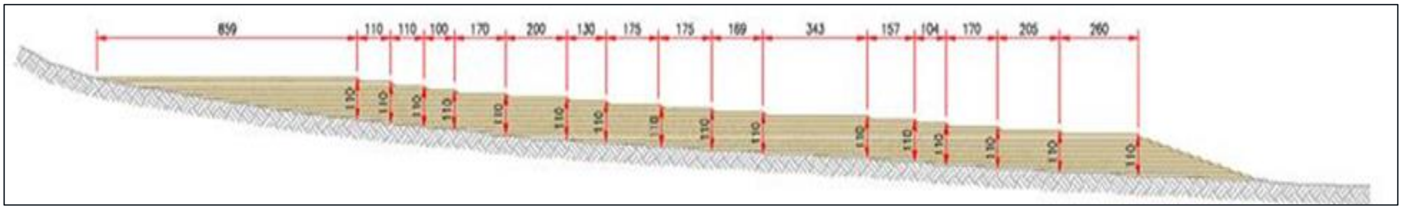
Phase 1will be constructed prior to operations consisting of constructing the southern portion of the leach pad, underdrain-leak detection system, bedding layer placement, pad geomembrane lining system, solution collection system, layer of crushed mineralized material with low fines content, construction road, solution collection system, permanent and temporary stormwater diversion facilities, the Pregnant Pond, event pond, and Barren Pond. Phases 2 through 5 will be constructed during operations in an uphill manner consisting of constructing underdrain-leak detection system, bedding layer placement, pad geomembrane liner system, solution collection system, layer of crushed mineralized material with low fines content, construction road, and solution collection system. This phasing allows heap leach pad installation costs to be deferred and is compatible with discrete construction campaigns in fair weather months which are suitable for liner installation.

Figure 18-6: Heap Leach Pad – Plan View.



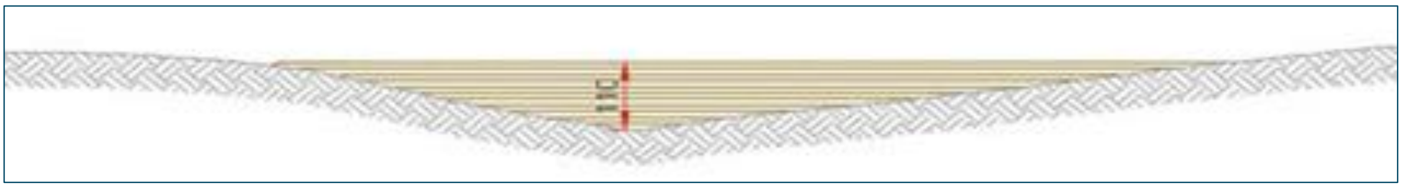
Note: Figure prepared by Ausenco, 2022

Figure 18-7: **Heap Leach Pad geometry configuration – longitudinal section A-A.**



Note: Figure prepared by Ausenco 2022

Figure 18-8: **Heap Leach Pad geometry configuration – cross-section B-B.**



Note: Figure prepared by Ausenco 2022

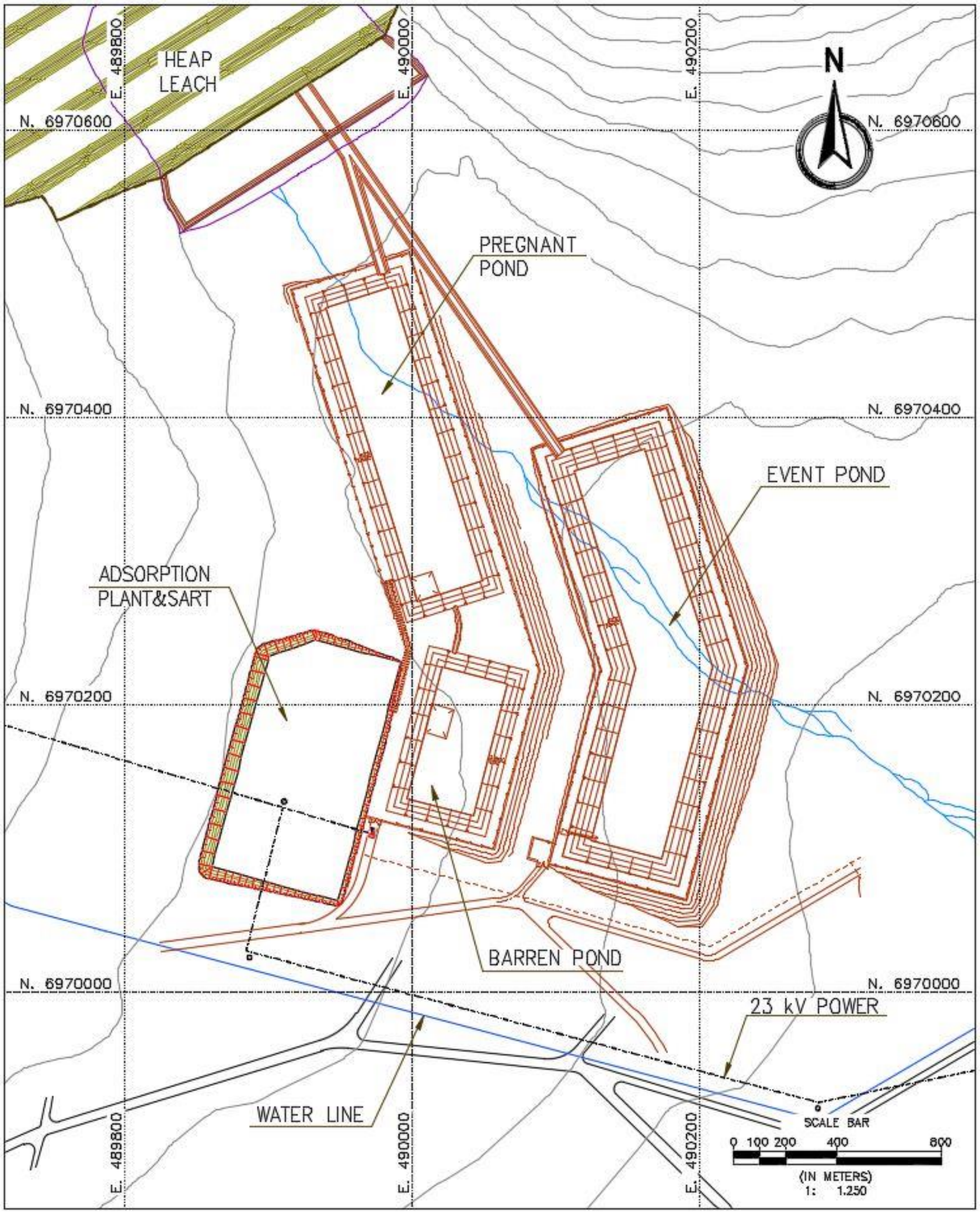
This is a summary of materials used to construct the leach pad according to the standards described above. The leach pad is designed with a grading plan to meet minimum slope stability factor of safety criteria of 1.3 static and 1.0 pseudo-static during operations. To promote positive gravity solution flow in the solution collection system above the leach pad liner consists of localized grading along the lower portions of the pad to achieve a minimum design grade of 2%. Grading also includes general shaping of the leach pad site to provide smooth surfaces with local slopes no steeper than 2.5H:1V in preparation for liner system placement. The existing incised ravines that pass through the leach pad site are designed with an underdrain leak detection system extending beneath the leach pad liner consisting of a non-woven geotextile surrounding a perforated corrugated polyethylene pipe bedded in drain gravel. The underdrain system is designed to capture near surface seepage and act as a leak detection system. The ravine drains discharge into the Events Pond at the base of the leach pad. The collection system ties into a solid wall HDPE pipe that discharges into the Events Pond. Any discharge will be sampled on a regular basis as part of leak detection monitoring operations.

The leach pad is designed with a composite liner system consisting of (from top to bottom):

- A crushed mineralized gravel with low fines drainage overliner containing a network of solution collection pipes;
- A 2.0-mm thick, single-sided textured (SST), linear low-density polyethylene (LLDPE) geomembrane;
- A high strength geosynthetic clay liner (GCL) with a permeability of no greater than 5 x 10-9 cm/sec were allowed according to the stability evaluation/criteria
- A compacted soil bedding layer; and
- Prepared subgrade to remove large rocks.

The Pregnant and Barren Ponds utilize a similar composite lining system, except using 1.5mm SST LLDPE for the primary liner, as the HLF with an additional secondary 1.5 mm HDPE geomembrane and geonet layers above the soil bedding layer. These additional layers provide a synthetic dual-containment and leak detection system. The Events Pond is included to handle storm events, extended power failures or pump/pipeline failures. The entire Events Pond will be lined with a composite liner using a 1.5mm thick HDPE membrane over geosynthetic GCL. The Events Pond should normally be empty. When solution is diverted to the Events Pond, it should be pumped back to the leach system as soon as possible.

Figure 18-9: Platforms and Ponds



Note: Figure prepared by Ausenco 2022

The drainage overliner layer placed above the leach pad geomembrane is a free-draining crushed durable mineralized gravel with a high permeability. The overliner material is placed on lined leach pad slopes flatter than 15%. Lined slopes steeper than 15% will rely on the agglomerate to convey the solution into the solution collection pipes. The minimum permeability requirement of the overliner is designed to prevent the maximum head on the liner exceeding 0.7 m.

During leaching, solution is collected above the composite liner system by a network of perforated collection pipes within the drainage layer overliner material. The perforated solution collection piping network consists of N-12 (dual wall) corrugated polyethylene pipe. The HDPE pipes convey the leachate to the Pregnant Pond located at the down-gradient end of the leach pad. The pipe type and size are selected based on the expected amount of leachate solution and the expected maximum mineralized material height that the pipe will experience.

Solution will be applied to each lift placed on the leach pad at a rate of 10 litres per hour per square meter (L/hr/m^2) for 120 days. The leachate solution is planned to be pumped and applied at a maximum total volumetric flowrate of 4800 m3/hr. Given this solution application rate and the permeability of the overliner, the collection pipe size and spacing at the base of the heap have been designed to maintain a maximum 700 mm hydraulic head on the leach pad liner system.

Storm water diversion channels are sized to contain the runoff from upstream oof the HLF resulting from the 1 in 100-year, 24-hour storm event that is a typical industry standard. The diversion channels around the HLF and process ponds are designed to convey this runoff in diversion channels. Sediment control structures are designed in drainages downstream of the facility to control sediment from runoff conveyed in diversion channels.

18.7 Water Systems

18.7.1 Fresh Water Source

The Project considers two wells and one pumping station feeding fresh water via a 24 km pipeline to the plant site, at a nominal flowrate of 105 l/s, and a maximum flowrate of 135 l/s.

Both well pumps run concurrently in normal operation, each controlled by variable-frequency drive.

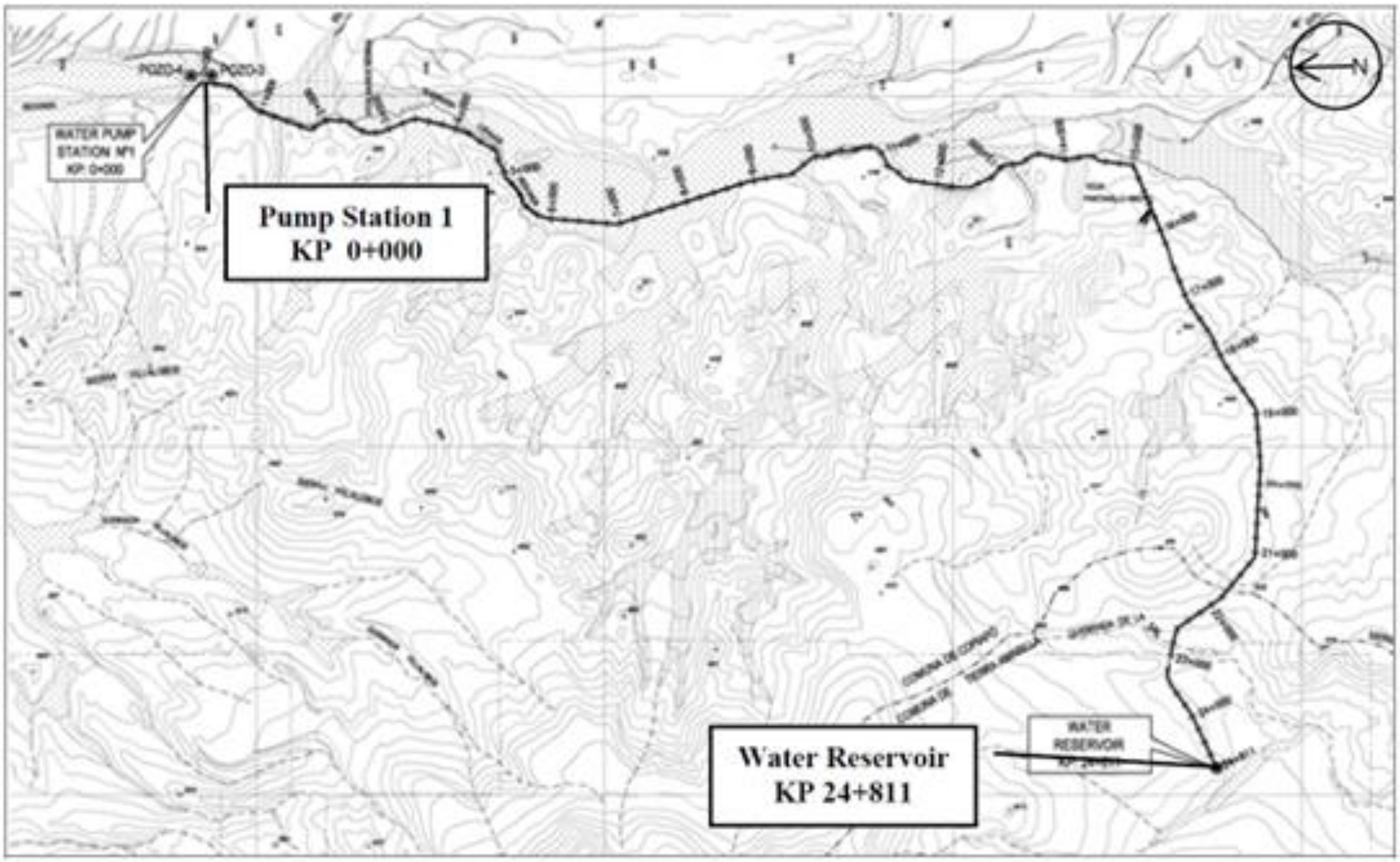
The main pipeline pump station configuration is three centrifugal horizontal multistage pumps in parallel, each controlled by variable-frequency drive, two operating plus one standby in normal operation and three operating for maximum flow. The pump station will be housed in a weatherproof enclosure suitable to protect the equipment from the ambient conditions that exist in the area.

The main pipeline consists of a 22 km of nominal 300 mm outside diameter steel pipe, and 2.8 km of nominal 250mm outside diameter steel pipe, with appropriate internal & external coating systems. The pipeline is buried at a depth of 1m to avoid freezing and to minimize the surface visual impact of the installation.

The pipeline will discharge directly to the heap leach barren solution pond, the process plant raw water/fire water tank and the head tank for the accommodation camp.

The pipeline route considered for this study is shown in Figure 18-10 and the general parameters of the water supply system are shown in table Table 18-2.

Figure 18-10: Pipeline Route



Note: Figure prepared by Ausenco 2022.

Table 18-2: Water Supply System General Parameters.

Description	Unit	Value
Pump Station Elevation (approximate)	masl	4,073
Arrival Point at Mine Elevation (approximate)	masl	4,513
Pipeline Length (approximate)	km	24,8
Elevation Difference	m	463

18.7.2 Potable Water Systems

Potable water systems will be installed in the camp area and in the process area to treat a portion of the water delivered to the plant site for domestic purposes.

18.7.3 Sewage Treatment Systems

Sewage treatment system will be installed in the camp area, in the process area and in the mine workshop area to treat wastewater generated on the site.

18.7.4 Fire Water Systems

Fire water storage tanks and pumping systems will be installed in the process plant area, in the camp area and in the mine shop area, for fire emergencies.

18.8 Surface Water Management

18.8.1 Non-contact Water Management

Non-contact water is natural surface or runoff water that has not been in contact with project areas that could alter its quality. The Project will comply with relevant legislation related to non-contact water management by designing infrastructure appropriately, including diversion systems & sedimentation ponds as required.

18.8.2 Contact Water Management

Contact water is runoff water that has contacted surfaces that could alter its quality. Contact water from the mine pit, low grade mineralized material stockpile & NERSFs will be captured in downstream containment ponds to facilitate evaporation or appropriate use in haul road dust suppression, truck wash facilities and/or in the process plant facilities. Contact water from process plant facilities will be captured in containment bunds, sumps or ponds & returned to the process.

18.9 On-site Infrastructure

Operational support facilities, such as workshops & warehouses, will be of conventional or modular construction. Construction materials will generally be metal structures with metal cladding or tensioned membrane shells.

18.9.1 Truckshop, Tire Shop, Mine Workshop & Mine Warehouse Buildings

Mining fleet maintenance will be carried out by the mining contractor. The maintenance team will be assisted on a technical basis by the original equipment manufacturer (OEM).

The Truckshop will be equipped with 9 service bays and two ramps for all daily, weekly, and monthly maintenance. Includes a bay for tracked equipment. Will be equipped with fire hydrant points and chemical extinguishers, grinding equipment and vehicle repair tools, store area, workbenches & lockers.

The tire shop will be equipped to store and replace tires.

The mine workshop will be equipped with an overhead crane, storage area for empty and full gas bottles, offices, mess room, change room & storage facilities for items such as hydraulic hoses, filters and hydraulic components.

The mine warehouse will store wear parts and operating supplies. It will have covered storage areas as well as a large, uncovered area, totally enclosed by a metal fence. The warehouse will be equipped with a firefighting system attached to the Project's fire protection network.

18.9.2 Truckwash

Designed to cater for washing of trackless machines. Wash bay will be equipped with a high-pressure water cleaner, a silt trap to separate the grit and an oily wastewater treatment station. Facility will include chemical extinguishers, high-pressure water cleaning equipment, oil separator and small tools.

18.9.3 Electromechanical Workshop

Will include the machining and sub-assembly (mechanical) workshop and the electrical and instrumentation workshop. The mechanical workshop will handle service exchange, sub-assembly services, refurbishment of components and small stores holding. It will be equipped with hydraulic bench press, workbenches, grinding equipment, drilling machine, lathe machines, bandsaw and tools as required.

The electrical and instrumentation workshop facility will handle service exchange of motors, sub-assembly services, refurbishment of components and testing. It will be equipped with electrical test bench for equipment, electrical motor testing equipment, motor vehicle testing equipment, electrical cable store and small tools as required.

18.9.4 Welding Workshop

Will handle minor emergency rebuilds for equipment, piping repairs, general steelwork maintenance and hold related stores.

18.9.5 Process Plant Administration Building

The plant administration building will be sized to accommodate key administration, supervisory, engineering, geology, and accounting personnel.

18.9.6 First Aid Clinic

A clinic will be constructed on site. Emergency medical staff will be available on site and an ambulance will be available for emergency transport of workers.

18.9.7 Laboratory

A full-service laboratory will be constructed on site to run all sample analyses required for mining and process operations. The laboratory is sized to process up to 300 solid samples per day and up to 100 solution samples per day.

18.9.8 Process Plant Buildings

Most of the process operations will be housed in buildings suitable for all weather operation. The process plant buildings will be as follows:

- Overhead cranes will be installed to facilitate equipment repairs where necessary.
- Operator workstations will be positioned to allow unobstructed views of key operating equipment.
- Crushed mineralized material stockpile will be enclosed.
- The refinery will be in a secure area of the same building with the desorption facilities.

18.9.9 Explosives magazine & emulsion plant

Explosives, detonators, and emulsion will be trucked to site under a contract supply arrangement. Distances from the magazines and the emulsion plant will be in accordance with the local regulations for the storage of explosives. The emulsion will be stored in a vertical silo.

18.9.10 Solid Waste Disposal

Solid wastes will be disposed of in a manner complying with local regulations. Allowable products will be disposed of in a solid waste landfill constructed on site. Products not allowed to be disposed of in the landfill will be transported to appropriate facilities off site.

18.9.11 Roads

Haul roads a minimum width of 32 m will be constructed within the mine area, which will connect the pit, low-grade stockpile NERSFs, mine workshop and primary crusher. Access roads for light vehicles will be built to connect the various plant & infrastructure locations.

18.9.12 Gatehouse

The Volcan site is relatively remote and, as such, it is not considered to be necessary to fence the entire project site. Specific parts of the project facilities will be fenced including the HLF and the truck shop area. A gatehouse will be staffed at the entry to the property and will be manned 24 hours per day.

18.10 Off-site Infrastructure

18.10.1 Communications

External communications will be established connecting to existing regional infrastructure in the Copiapo area. Options exist to connect via fibre optic cable or wireless communication.

18.11 Accommodation

18.11.1 Construction Camp Housing

Camp size based on estimated direct manhours & the peak construction manning estimate of 1530 beds. Construction workers will be housed 4 per room with a shared bathroom. Construction supervisors will be housed 2 per room with a shared bathroom.

These are class 5 camp size estimates. These camp size estimates are subject to change as a construction schedule is developed.

It is considered that the construction camp will remain & be utilized by operations personnel.

18.11.2 Operation Staff Housing

Operations full time employees will all be provided with a private room and bathroom. These operation camp rooms will be renovated construction camp rooms

18.11.3 Dining Facilities

A kitchen and dining facility will be constructed and located adjacent to the construction staff housing. Following the main construction period, a portion of the dining area will be converted to training rooms.

18.11.4 Recreation Facilities

A recreation building will be included in the accommodation camp

18.12 Power and Electrical

The off-site power supply includes the following which deliver 110kV to the Main plant substation at Volcan Project where it is transformed to 23 kV.

- 38 km of 110-kV power lines from Maricunga to Volcan,
- Switching substation adjacent to existing Maricunga substation;

The above is based on the assumptions that the nearby Maricunga Project is not reopened, and access to the available high-voltage system capacity can be obtained via the Chilean free access regulation and/or negotiation with current or future owners.

Figure 18-11: Proposed Transmission Line 110 kV route.

Note: Figure prepared by Ausenco 2022

On-Site power considers 23 kV distribution from main project site substation to area substations.

In the event of a power failure, diesel-fired backup generations will be used to supply emergency power for project safety and security. Backup electric power will be supplied to the following facilities:

- Critical process equipment.
- Offices.
- First aid station.
- Camp.
- Communications facilities.
- Building heat and miscellaneous items such as critical ventilation fans, pipeline heat tracing and similar items.

18.13 Fuel

Diesel fuel will be delivered to the mine site via tanker trucks and stored in tanks on site. The storage tanks will be in placed in lined bunded areas to assure no fuel is leaked to the environment. Fuel trucks will be used to deliver fuel to the mine mobile equipment. The diesel fuel vendor will supply and install the necessary tankage and equipment required for fuel storage and dispensing.

Propane Gas for process heating will be delivered to the mine site via tanker trucks and stored in tanks on site.

18.14 Hazard Considerations

The main physical hazards to the project infrastructure include:

- Seismic activity.
- Geohazards (avalanches, landslides).
- High-Altitude weather: Snow, wind & ice
- Fires.
- Floods.
- Volcanic activity.

From seismic available data catalogues, the project area is in a tectonically active area within Chilean Seismic Zone 2, which is categorized as having potential for moderate seismic activity. The project infrastructure will be designed considering these above hazards.

19 MARKET STUDIES AND CONTRACTS

The main product planned from the Volcan Project is gold and economically insignificant amounts of silver contained in doré bars. A small quantity of copper precipitate as generated from the SART process will also be produced.

19.1 Market Studies

No market studies were completed in support of this Technical Report. Gold doré production can generally be sent to any number of refining operations and refined into gold and silver. Gold and silver are readily traded commodities and, for the purposes of this Technical Report, it is appropriate to assume that the products can be sold freely and at standard market rates.

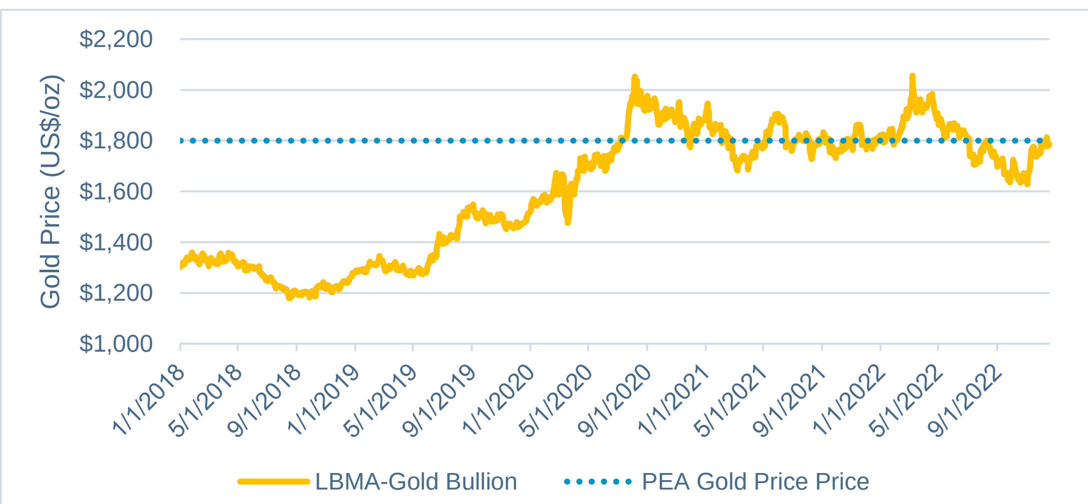
19.2 Commodity Price Projections

Pricing of the products is shown in Table 19-1; these values were used in the economic analysis. These prices are in accordance with a rounded 3 year moving average from January 2020 to December 2022 of prices for these commodities (see Figure 19-1and Figure 19-2). Silver is not present in any significant quantity and is not relevant economically to the Project.

Table 19-1: Pricing Assumptions for Economic Analysis

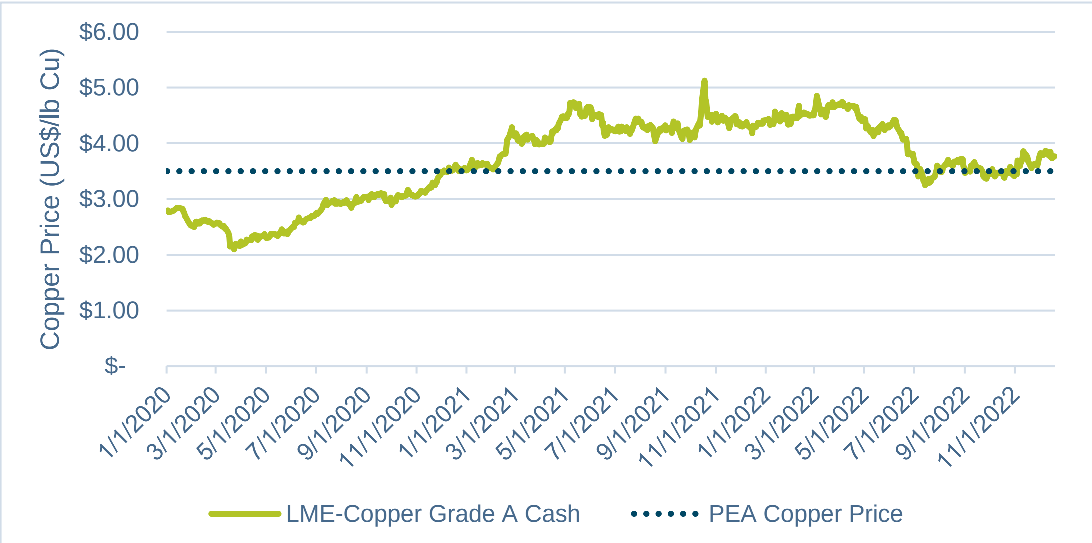
Commodity	Price
Gold (Au)	$1,800/oz
Copper (Cu)	$3.50/lb

Figure 19-1: Historic Gold Prices



Note: Figure prepared by Ausenco 2022. Data from S&P Capital IQ

Figure 19-2: Historic Copper Prices



Note: Figure prepared by Ausenco 2022. Data from S&P Capital IQ

19.2.1 Copper Precipitate

Copper is recovered in the SART process, as a high-grade copper sulphide precipitate. Key assumptions for the sale of the precipitate are similar to a traditional copper concentrate and are summarized in Table 19-2 below.

Table 19-2: Copper Concentrate Terms

Description	Units	Value
Copper Concentrate Grade	% Cu	65
Copper Concentrate Moisture Content	% w/w	8
Copper payability	% of contained	96.5
Freight Charges	$/wmt	125
Treatment Charges (TC)	$/dmt	75
Losses	%	0.25
Refining Charges (RC)	$/lb Cu	0.075
Penalties	$/dmt	nil

No deleterious elements are expected to be produced in quantities which would result in material selling penalties. Due to small volumes, the precipitate is to be packaged in one-tonne bags ("maxi sacks") and transported to local Chilean copper smelters by truck. Ausenco considers this practice to be similar to other operations that have successfully operated SART processes in the vicinity of the Volcan Project.

19.3 Contracts

The company has no relevant contracts in place.

19.4 Comments on Market Studies and Contracts

The qualified person has reviewed these analyses and that the results support the assumptions in the Technical Report. Commodity prices can be volatile, and there is the potential for deviation from the forecast.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Considerations

The Volcan property is located approximately 700 km north of Santiago, the capital of Chile, approximately 170 km (by road) east of the mining and agricultural city of Copiapo, and approximately 40 km west of the border with Argentina. The property is in Region III (Atacama) of northern Chile in the Province of Copiapo and Tierra Amarilla commune (see Chapter 4, Figure 4-1).

The Project is in the Andean highlands area of the Atacama Region, which is characterized by extreme environmental conditions for biotic development. In this area, hyper-arid conditions, intense solar radiation, high wind speeds and daily surface freezing of watercourses constitute adverse conditions for vegetation and in general for the occurrence of biota (Earle et al., 2003). Human settlements are also scarce, due to the lack of available water resources and the hostile climatic conditions during the winter, with the exception of lands used by Indigenous communities, some tourism and conservation activities.

The main environmental consideration for the Project is its location near protected areas. The protected areas in proximity to the Project are the Nevado Tres Cruces National Park, the Laguna del Negro Francisco and Laguna Santa Rosa Ramsar site and the Priority Sites for Biodiversity Conservation Nevado Tres Cruces and Corredor Biológico Pantanillo (further details in section 20.1.1.8).

20.1.1 Baseline and Supporting Studies

Environmental baseline studies were conducted within the Project area of influence and were presented in an Environmental Impact Study (EIA) submission in 2012 (EIA *Proyecto Minero Volcan*, GHD, 2012). The information that is presented in the following sections has been extracted from this document, which includes baseline information collected between 2009 and 2011. Additionally, an Environment Scoping Study was completed by consultants to the Company (GAC, Scoping Ambiental Proyecto El Volcan, June 2022) in the first half of 2022, which included site visits to the Project and desktop studies based on other work completed by the consultants in the Project area. The adequacy of previously completed baseline studies and collected information (2009 to 2011) will be reviewed as part of the future EIA scoping efforts in consideration of updated guidance for baseline studies provided by the Chilean environmental authority[2].

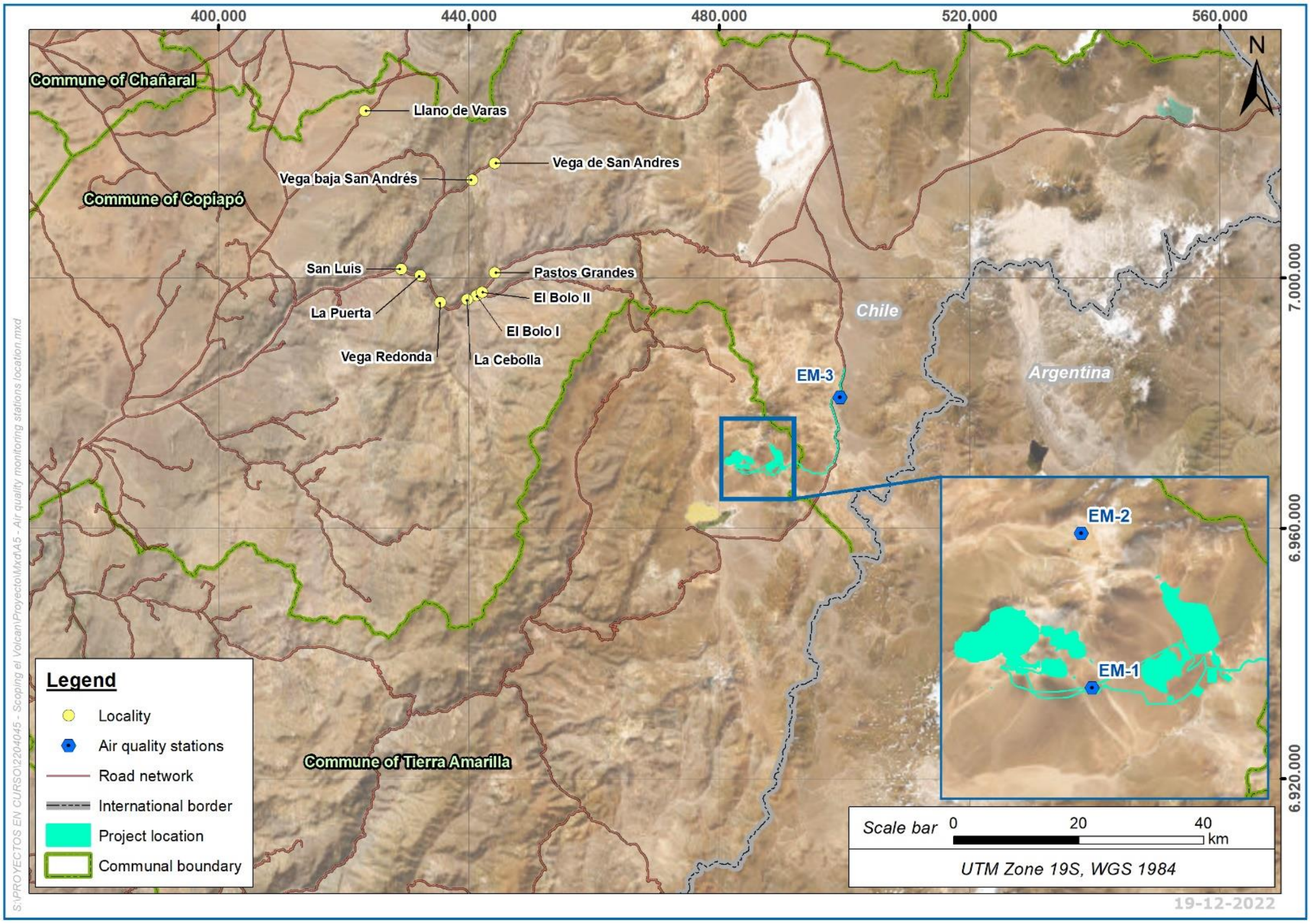
20.1.1.1 Air Quality

Air quality monitoring was conducted during the period from April 2009 to April 2010 with three stations (EM-1, EM-2 and EM-3) installed in the Project area, shown in Figure 20-1.

The range of PM10 (respirable particulate matter) for the monitored period was between 4 and 8 ug/m^3 (very low ambient levels) which indicates extremely good air quality.

[2] Several environmental guidelines and technical and assessment criteria have been issued by the environmental authority since 2011, the most recent being the Technical Criteria for Fauna Field Campaigns and Data Validation (2022) and the Technical Criteria for the Environmental Assessment of Hydric Resources (2022). Additionally, the environmental authority has announced the publication in 2023 of new guidelines for flora and vegetation, wetlands, and climate change criteria.

Figure 20-1: Air quality monitoring station locations



Note: Figure prepared by GAC, 2022.

20.1.1.2 Glaciology

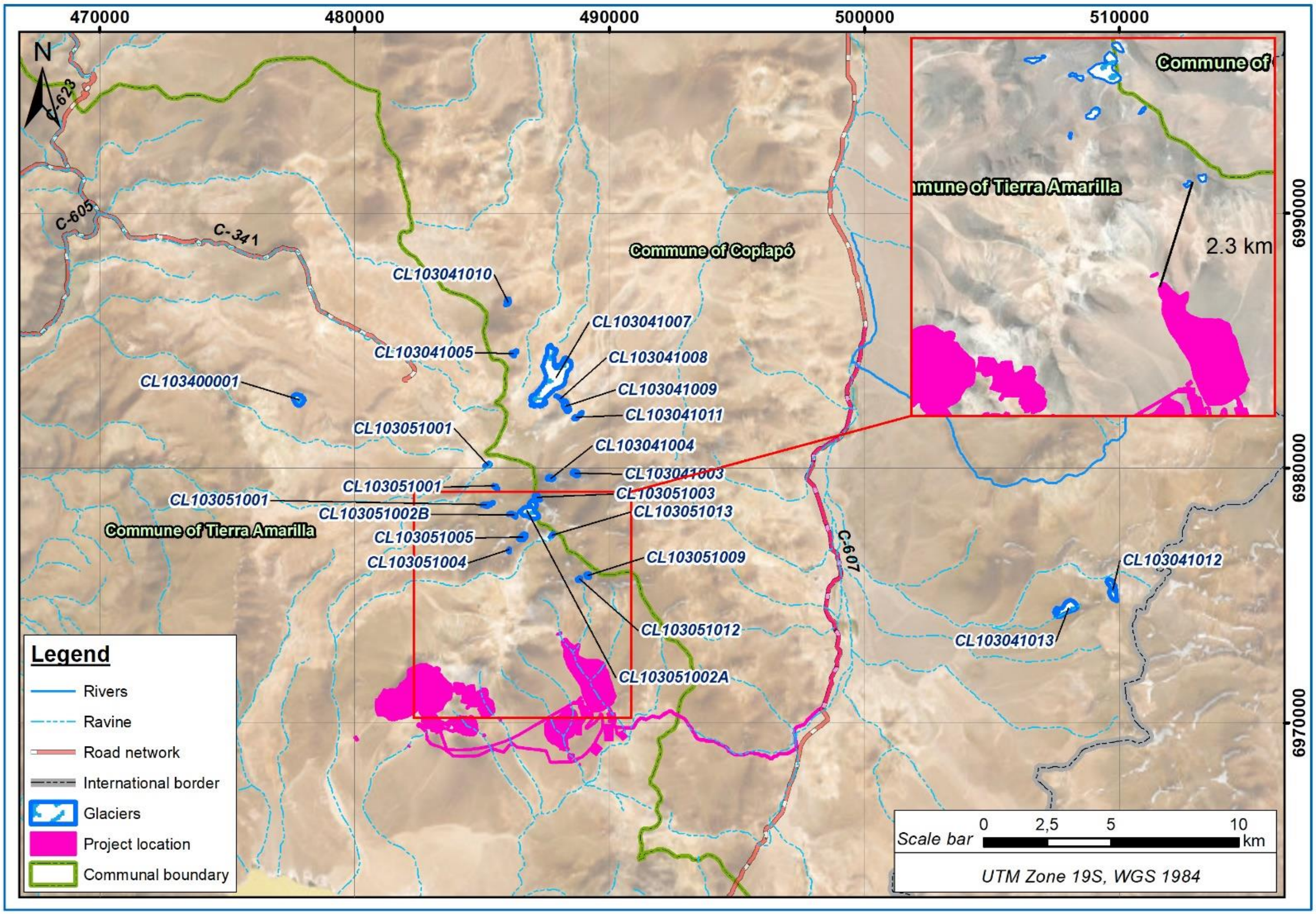
Based on the 2022 version of the national Public Inventory of Glaciers in Chile, there are two glaciers located in the Project area: CL103051009 and CL103051012. The glaciers are located on the southeast slope of the Sierra del Azufre Mountain range, at the source of the Quebrada de La Sal stream. The nearest Project infrastructure is located 2.3 km south of the nearest glacier, as shown in the inset in Figure 20-2. Other glaciers are shown in the larger section of the figure.

The Chilean General Directorate of Water (DGA) has summarized and outlined the current status of glaciers in the country through the National Glacier Strategy (2009)[3]. Chile does not have a specific glacier law (it is currently under review in Congress), however general environmental legislation (Law 19.300 modified by D.S. 20.417 and its regulation) does require assessment of impact to glaciers from developments within their area of influence as part of an EIA. The SEIA

[3] Available at CIREN Digital Repository (https://bibliotecadigital.ciren.cl/handle/20.500.13082/32663).

Regulation D.S. 40/2012 further specifies the studies required for glaciers in an EIA, including their area, thickness, surface reflectance, ice-core characterization, movement assessment, and runoff calculations. DGA developed a national inventory of glaciers as part of the DGA's series of online mapping tools. The national inventory is recognized as a repository of available glacier data used for environmental assessments with the potential for additional site-specific studies required for a given project.

Figure 20-2: Glaciers in proximity to the Project Area

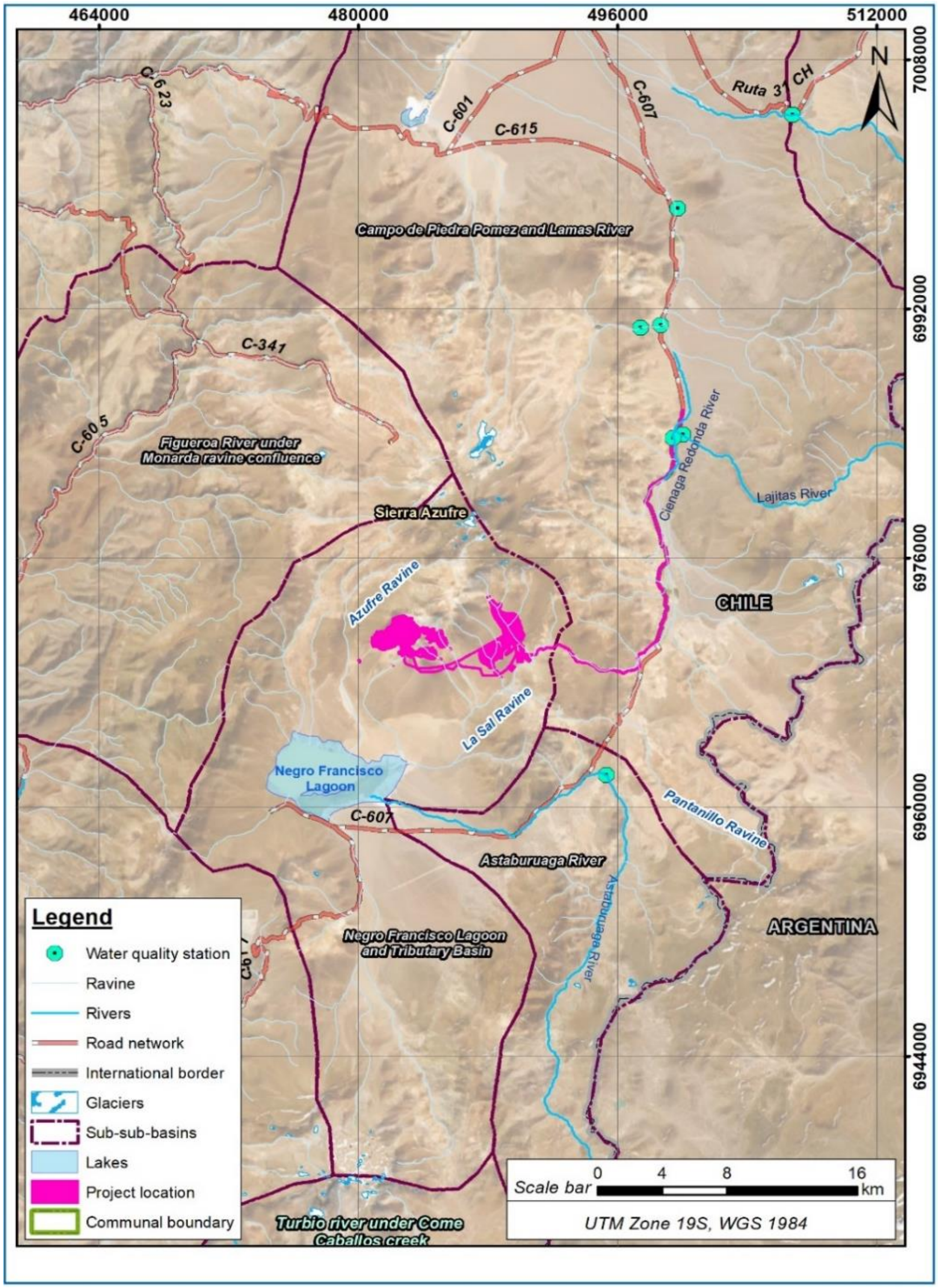


Note: Figure prepared by GAC, 2022. Based on Chapter 2, EIA Proyecto Minero Volcan (GHD, 2012).

20.1.1.3 Hydrology and Water Balance

The main water bodies within the Project area are La Sal and Azufre ravines, Negro Francisco lagoon, and Cienaga Redonda and Astaburuaga rivers. All of these water bodies and their sub-basins, except for the Astaburuaga river (which flows into the the Negro Francisco lagoon), are considered as part of the Project area of influence, as shown in Figure 20-3 below. The DGA monitoring stations shown are part of the national hydrometric network.

Figure 20-3: Watersheds and drainage basins, glaciers, and water quality monitoring stations (DGA)



Note: Figure prepared by GAC, 2022, based on information from DGA (2019).

The Cienaga Redonda river basin and valley (location of the proposed water pipeline) is comprised by rivers with perennial flows, but with discontinuous surface courses.

The Negro Francisco lagoon sub-basin and tributary basin (location of the mine and plant sectors) is an endorheic basin, which receives contributions from the Sierra de Azufre through two streams with perennial flows, but discontinuous courses: the Azufre stream and La Sal stream. The flows measured in the La Sal stream fluctuated between approximately 16.0 L/s and 31.4 L/s. Both flows infiltrate into the sub-surface of the alluvial plains before reaching the lagoon.

The water balance for the Project area has been assessed by previous environmental baseline studies (GHD, 2012) for both the La Sal (mine and plant sectors) and Cienaga Redonda (water pipeline sector) sub-basins.

In the La Sal sub-basin, a hydrological characterization and water balance of the Project area was conducted mainly in the pit area and facilities, as well as the hydrogeological environment located downstream. The results of the water balance indicate that total precipitation in the basin corresponds to approximately 1,310 L/s, of which approximately 1,085 L/s are lost by evapotranspiration before infiltration. The approximate effective precipitation corresponds to 220 L/s. Of these 220 L/s, between 15 and 40 L/s are lost through evapotranspiration in the wetlands and streams of the La Sal, Desague and Azufre streams. The remaining 180 to 205 L/s discharge to the slopes, lagoons and wetlands of Laguna del Negro Francisco. Of this remaining flow, approximately 50 L/s are discharged into the brackish lagoon and 130-155 L/s into the springs and wetlands around the salt flat.

Five surface water quality monitoring rounds were carried out and presented in the EIA (GHD, 2012), which covered the Negro Francisco lagoon, the Cienaga Redonda river and other water bodies adjacent and around the Project footprint. Between April 2010 and March 2012, samples at 23 locations (88 samples in total) were field tested and collected for analysis of physicochemical and biological parameters, including metals, nutrients, TPH, and others. Surface water in the area is characterized by elevated concentration of metals such as aluminum, arsenic, boron, copper, iron, manganese, molybdenum, and zinc, inorganic parameters such as chloride and sulfate, and moderate to high levels of electrical conductivity. These high concentrations are caused by the dissolution and leaching of the soil's mineral salts and metals, a product of the lithology and volcanic origin of the basin. Part of the Negro Francisco lagoon shows total dissolves solids and salts consistent with hypersaline conditions.

20.1.1.4 Hydrogeology

According to the Geotechnical Feasibility Study for Volcan Open Pit report (Golder, 2012), observation of water levels in exploration and geotechnical drillholes during drilling at the mine site suggest that only water added during the drilling process is observed within the drillholes and that the natural groundwater level may be near or below the base of the proposed open pits. The regional hydrology and hydrogeology reports completed by Schlumberger Water Services in 2012 for the EIA[4] appears to corroborate this finding. Additional hydrogeological monitoring and testing within the Project area especially in the vicinity of the open pits and Project infrastructure is required to more fully understand and develop a conceptual model of shallow and deep groundwater flow within the Project site.

In the Cienaga Redonda sub-basin, a conceptual hydrogeological model was developed by CPH in 2012 for the EIA[5] to describe the hydrogeological environment of the water extraction area in the Cienaga Redonda valley to supply the Project.

[4] Schlumberger Water Services reports for the EIA: *Informe de Linea Base Componente Hidrogeología,* March 2012, and *Modelamiento Hidrogeológico Numérico y Evaluación de Impactos*, April 2012.
[5] CPH report for the EIA: *Modelo Hidrogeológico Barros Negros – Ciénaga Redonda*, July 2012.

According to the conceptual hydrogeological model, the water resources in the southern sector of the Salar de Maricunga are provided by the Lamas River system (surface and underground) and by the Cienaga Redonda basin (mostly of underground origin). The contributions of both basins feed the meadows located in the terminal sector of the Salar Maricunga and contribute water to a drainage system that ends in the lagoons located towards the interior of the Salar. These conclusions are preliminary in nature and predicted interactions between extraction wells and local aquifers that discharge to downgradient areas including lagoons and wetlands need be further assessed by means of additional hydrogeological monitoring, testing, and modelling.

Five monitoring rounds for groundwater quality were carried out and presented in the EIA (GHD, 2012), which covered the Negro Francisco lagoon, the Cienaga Redonda river and other areas adjacent and around the Project footprint where monitoring wells had been installed by Andina during explorations undertaken between 2009 and 2011. Between April 2010 and March 2012, samples at 10 locations for groundwater (34 samples in total) were field tested and collected for analysis of physicochemical and biological parameters, including metals, nutrients and TPH, among others. Groundwater follows a similar concentration pattern as surface water, with the higher concentrations being metals such as aluminum, arsenic, boron, copper, iron, manganese, molybdenum, and zinc, inorganic parameters such as chloride and sulfate, and moderate to high levels of electrical conductivity. The Negro Francisco lagoon basin shows much higher difference between surface and groundwater than the Cienaga Redonda river basin.

20.1.1.5 Flora and Vegetation

According to previous environmental baseline studies (GHD, 2012), 40 vascular plant species were identified in the Project area, of which 90% are herbs and 10% are shrubs. None of these plant species have been classified under conservation categories by the official species classification decrees[6].

The vegetation landscape of the Project area is a steppe whose physiognomy is determined by perennial graminoids and low woody plants with a regular distribution, although with a partial cover of the substrate. Towards the high peaks, a significant area is denuded or devoid of vegetation.

Vegetational formations in the Project area can be classified as zonal and azonal[7]. As a general overview, the azonal vegetational systems present in the Project area are of high interest and sensitivity from the biotic point of view. These systems are highly dependent on the general drainage network of the watercourses and groundwater upwellings, and they support the terrestrial and aquatic flora and fauna. Biological activity in the Project area is minimal during the winter, but it reactivates in the spring and is most productive in summer.

The zonal vegetation covers approximately 96% of the study area and is represented by a grassland formation (vegetation dominated by cespitose grasses), denuded areas (where the vegetation cover is less than 1% of the surface) and areas devoid of vegetation, which represent the largest area (84% of the total surface).

The azonal vegetations systems cover approximately 4% of the study area and are represented by five vegetation formations:

[6] Species classification decrees published by the Ministry of the Environment revised in Scoping Study: DS N° 151/07, DS N° 50/08, DS N° 51/08, DS N° 23/09, DS N° 19/12, DS N° 33/12, DS N° 41/12 y DS N° 42/12, DS N° 13/13, DS N° 52/14, DS N° 38/15, DS N° 16/16, DS N° 06/17, DS N° 79/18, DS N° 23/19, DS N° 16/20 y DS N° 44/21.

[7] Zonal vegetation is conditioned mainly by climatic factors. Azonal vegetation is associated with local site factors, such as salinity, soil conditions or the permanent presence of humidity or saturated conditions.

- Hydric wetlands: located where water availability is constant due to the contribution of various underground and/or surface water courses. The vegetation is found in compact globose cushions between which it is possible to observe areas of water accumulation. The surface that is not covered by vegetation or water has an incipient saline outcrop.
- Saline wetland: like the wetland condition, is located where water availability is constant; however, the formation is incipiently degraded due to the percentage of saline outcrops and/or mineralized soil, which is higher than 5%.
- Hydric scrubland: The dominant vegetation of the formation corresponds to grasses of cespitose growth whose height exceeds 30 cm. Accompanying these herbaceous species are cushion species, remnants of hydric wetlands. It is important to highlight the higher percentage of surface covered by salt crust in this formation (between 5%-10%).
- Hydric-saline grassland: composed mainly of grass species, as in the hydric scrubland formation, however, they present a more degraded condition, which is reflected in the percentage of saline outcrops and/or mineralized soil, which is higher than 30%.
- Alluvial plain (in Spanish, *vega*): located mainly in the northern and northwestern sector of the Negro Francisco Lagoon and Salt Creek wetlands. The vegetation is composed of small herbaceous species Saline outcrops cover an area of less than 20%.
- Salt marsh: represents the most degraded situation of the azonal systems. It is located mainly in the northern and northwestern sector of the wetlands of the Negro Francisco Lagoon and the southern part of the wetlands of the Ramsar site. Saline outcrops cover an area of more than 20%.

The azonal systems with respect to the Project area are mostly located around Negro Francisco lagoon and specific areas of the Cienaga Redonda biological corridor, therefore there is a low probability that any azonal formations will underlie the Project disturbance footprint.

20.1.1.6 Fauna

According to previous environmental baseline studies (GHD, 2012) and a recent site visit during the Scoping Study (GAC, 2022), a total of ten animal species under a protection category were observed in the Project area. These species and their IUCN[8] category are listed below.

[8] International Union for Conservation of Nature (IUCN). Categories are provided according to official species classification decrees by the Ministry of the Environment.

Table 20-1: Threatened Animal Species in The Project Area

Class	Species name	Common name	Category (IUCN)
Reptiles	*Liolaemus rosenmanni*	Rosenmann's lizard	Vulnerable
Reptiles	*Liolaemus patriciaiturrae*	Patricia Iturra's lizard	Vulnerable
Birds	*Chloephaga melanoptera*	Piuquen	Least concern
Birds	*Attagis gayi*	Mountain plover	Least concern
Birds	*Fulica cornuta*	Tagua	Near threatened
Birds	*Phoenicopterus chilensis*	Chilean flamingo	Near threatened
Birds	*Phoenicoparrus jamesi*	James's flamingo	Vulnerable
Mammals	*Lama guanicoe*	Guanaco	Endangered
Mammals	*Lycalopex culpaeus*	Culpeo fox	Vulnerable
Mammals	*Vicugna vicugna*	Vicuna	Vulnerable

Note: Figure prepared by GAC, Scoping Study, 2022.

In arid zones, wetlands constitute a food resource for terrestrial fauna species. The azonal vegetation systems distributed along the Cienaga Redonda creek constitute a biological corridor (Pantanillo-Cienaga Redonda Biological Corridor) that connects the Maricunga salt flat basins to the north with the Negro Francisco lagoon basin to the south. It is in these azonal vegetation formations that most of the fauna was registered, in particular birds and small mammals. Zonal grasslands and areas devoid of vegetation had a higher presence of reptiles and larger mammals.

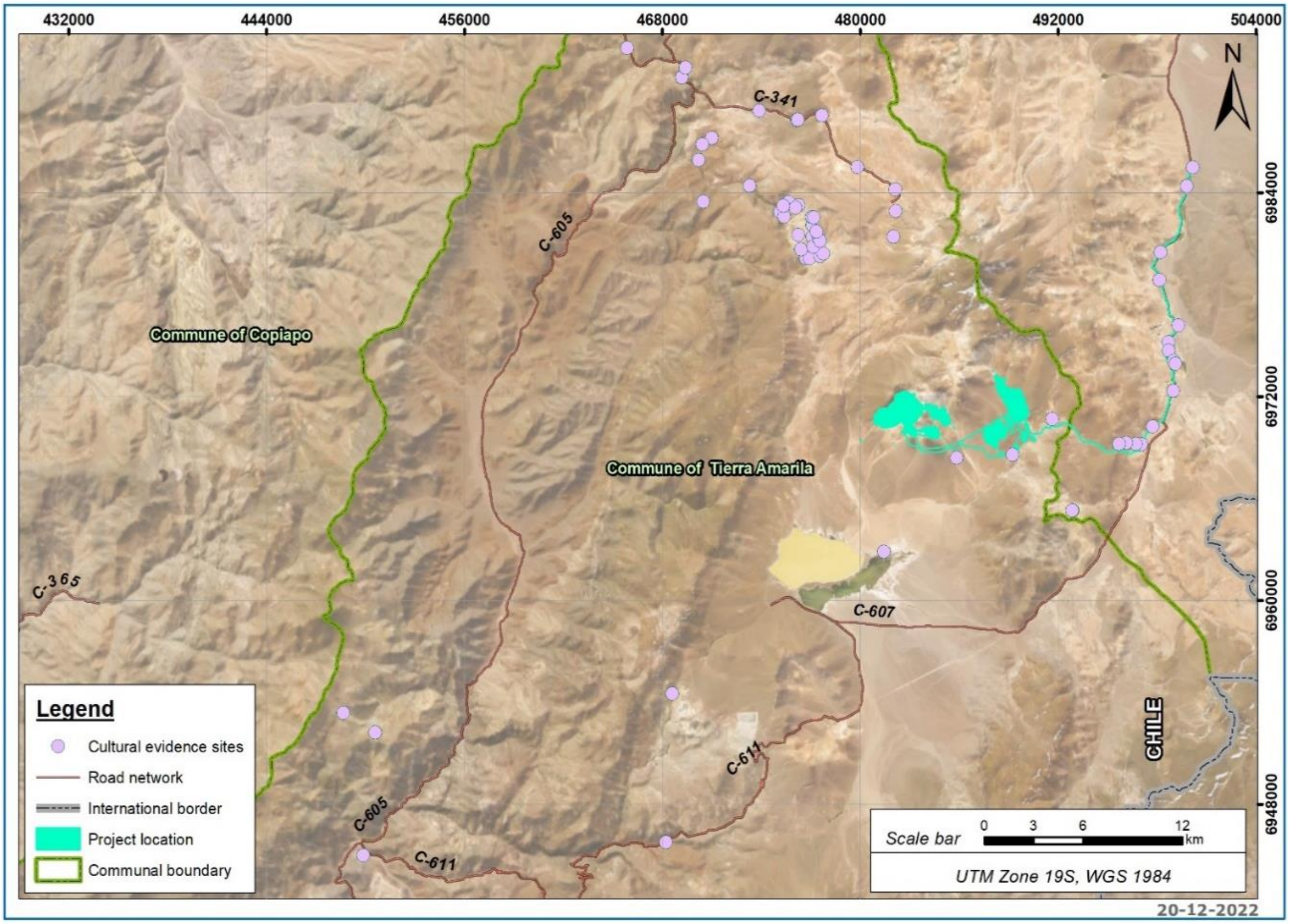
In the Negro Francisco Lagoon, bird surveys were conducted as part of previous environmental baseline studies (GHD, 2012). A total of 22 bird species were identified, where the most frequent species were the juarjual duck (*Lophonetta specularioides*), followed by the horned coot (*Fulica cornuta*) and the three flamingo species present in Chile: Andean flamingo (*Phoenicoparrus andinus*), James's flamingo (*P. jamesi*) and Chilean flamingo (*Phoenicopterus chilensis*).

For other fauna, 288 indirect records were collected in previous environmental baseline studies (GHD, 2012). Donkeys (*Equus africanus asinus*) presented the highest frequency of records, followed by the Guanaco (*Lama guanicoe*), which showed a slight increase with respect to the frequency of records taken in previous years; however, the presence of Vicuñas (*Vicugna vicugna*) was not recorded. The presence of Guanaco in the Project area may be explained as a transit to higher altitude areas where this species normally lives.

20.1.1.7 Cultural Heritage and Archeology

Thirty-five (35) cultural heritage items have been identified in the Project area based on studies which supported the previous EIA (GHD, 2012). Most of these items correspond to archeological sites (28), including lithic concentrations (10), stone walls (7), workshop quarries (4) a road (1) and an Inca high-altitude sanctuary (1) and isolated lithic finds (5). Other cultural items (7 in total) correspond to broken structures associated with modern elements without archaeological materials on the surface (although archaeological evidence may remain hidden from a superficial inspection). Cultural evidence sites are shown in the Figure 20-4. Two of these sites are located close to the Project footprint, immediately to the south.

Figure 20-4: Cultural Evidence Sites Identified in Previous Studies



Note: Figure prepared by GAC, based on project registry of the Environmental Evaluation Service (www.sea.gob.cl).

20.1.1.8 Protected Areas

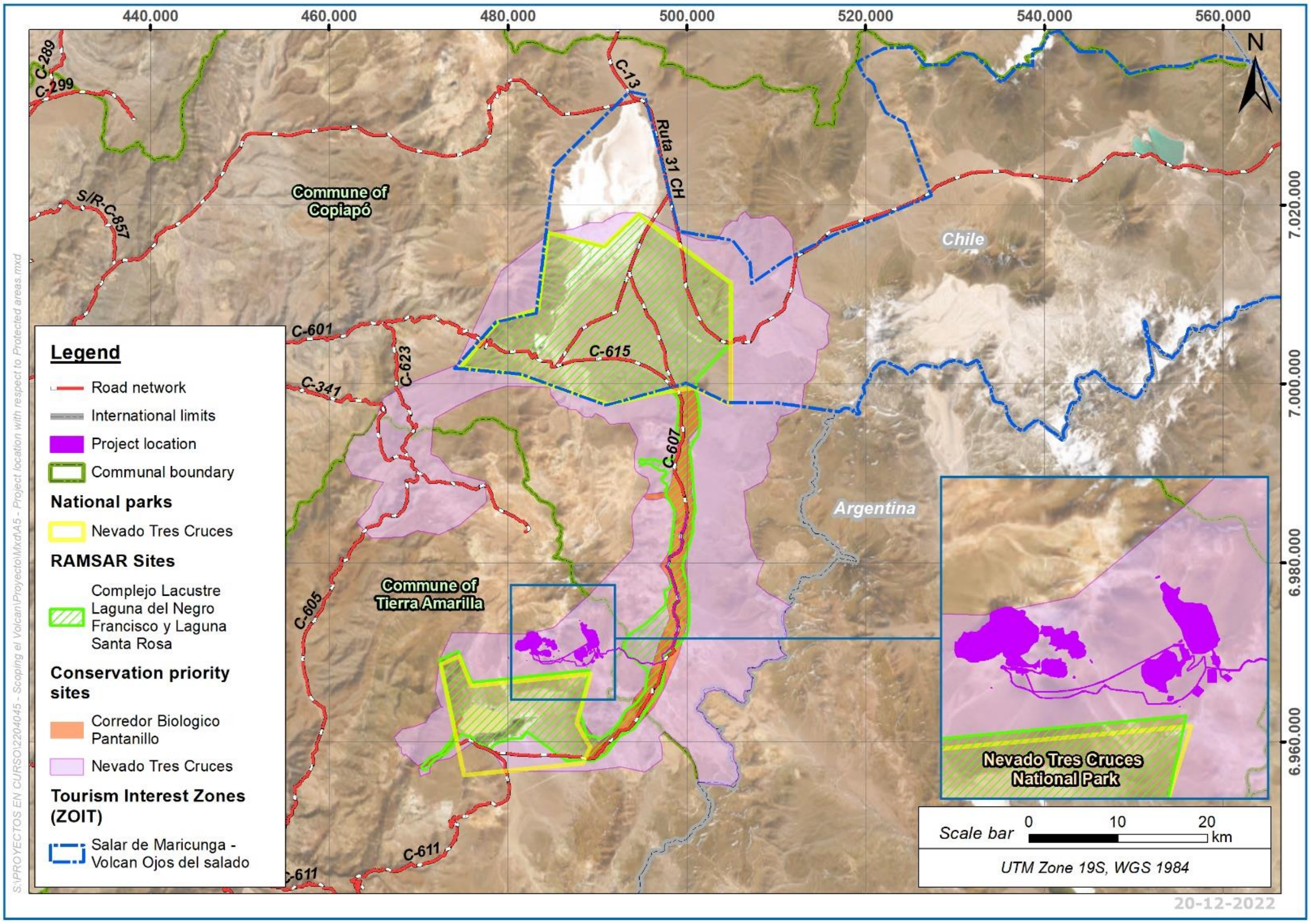
Chilean legislation establishes different categories of protected areas with correspondingly levels of restrictions for land usage associated with development projects. National Parks, Ramsar Sites and Touristic Interest Zones (ZOIT) are all considered as "areas under official protection" for the purpose of entering the SEIA. Priority Sites for Biodiversity Conservation are not categorized as "areas under official protection" but as "protected areas" (included in the Regional Biodiversity Strategy) and tend to be valued as biodiversity significant sites for the assessment of environmental impacts and typically require the presentation of an EIA (as opposed to an Environmental Impact Declaration). Priority Sites do not possess the same level of protection and restriction as the other areas categorized as under official protection.

Table 20-2 lists the protected areas located within or near the Project areas and their general description. Figure 20-5 shows the Project location with respect to these protected areas.

Table 20-2: Protected Areas

Area Name	Description
National Park "Nevado Tres Cruces"	Nevado Tres Cruces National Park comprises two different zones: a northern one containing the Santa Rosa Lagoon and a southern one containing the Negro Francisco Lagoon. The park is also a Site of Scientific Interest that requires a specific permit to support mining activities. The Project area is located 13.1 km from the northern zone of the park and about 900 m from the southern zone of the park near Laguna Negro Francisco.
Ramsar site "Negro Francisco Lagoon and Santa Rosa Lagoon Lacustrine Complex"	This Ramsar site includes the area surrounding the two saltwater lagoons and the connecting area of the Pantanillo-Cienaga Redonda biological corridor. It covers a large portion of the territory already enacted as the Nevado Tres Cruces National Park. The Project area is located 325 m from the Ramsar Site boundary.
Touristic Interest Zone (ZOIT) Maricunga Salt Flat - Ojos del Salado	This area comprises the Santa Rosa Lagoon and the Maricunga salt flat and their surroundings, overlapping with the northern part of the Nevado Tres Cruces National Park and the Ramsar site. The Project area is located 24.3 km from the ZOIT boundary.
Priority Site for Biodiversity Conservation "Nevado Tres Cruces"	The Priority Site Nevado Tres Cruces is a regional-level protected area and surrounds the National Park and Ramsar site areas, overlapping with the latter in some areas. The Project is located within the boundaries of this Priority Site.
Priority Site for Biodiversity Conservation "Corredor Biológico Pantanillo"	It corresponds to the biological corridor between the two sections of the National Park, overlapping almost completely with the Ramsar site in the area. The Project area is located 5.8 km from the Priority Site boundary.

Figure 20-5: Project Location with Respect to Protected Areas



Note: Figure prepared by GAC, 2022.

20.1.2 Environmental Monitoring and Management

The Project will establish an environmental monitoring and management system to confirm environmental impact predictions, prevent additional impacts and manage risks affecting the different environmental components of the Project area. A summary of the environmental monitoring system is provided below based on the environmental monitoring plan proposed in the previous EIA (GHD, 2012). These measures will be reviewed as part of the preparation of an updated EIA submission for the Project (which will support an application for an Environmental Licence) and a review of the results for existing and new baseline studies that may be required.

Any monitoring measures/commitments that are outlined in the environmental assessment will have a corresponding periodic reporting requirement (e.g., annually or biannually) to the Environmental Assessment Service (SEA) and/or other authorities. These reports will provide timely updates to the regulatory authorities on the results of the various monitoring programs and the status of environmental management for the relevant environmental components of the Project.

Table 20-3: Summary of environmental monitoring measures for relevant environmental components, based on 2012 EIA

Environmental Component/Parameters	Summary Description	Project Phase
Air quality, climate and meteorology	Air quality and meteorology stations will be established and monitored. PM2,5, PM10 and SPM (sedimentable particulate matter), measurements will be collected at monitoring stations at established set frequencies. Meteorological parameters will be continuously monitored. Meteorological parameters will likely include wind speed, wind direction, temperature, humidity, air pressure, solar radiation, snow depth and precipitation.	Construction, operation, closure and post-closure.
Noise and vibrations	Noise and vibrations will be monitored at different monitoring stations around the Project and close to environmentally sensitive areas, during construction and operation. Parameters include equivalent continuous sound level (Leq), maximum effective level (Lmax), minimum effective level (Lmin), peak particle velocity (PPV).	Construction and operation
Geomorphology and geotechnical	Glaciers will be inspected during all Project phases. The slopes of the non-economic rock storage and the heap leach will be continuously monitored using laser scanners, deformation measurement stations, GPS, extensometers and clinometers to ensure geotechnical stability. A qualified geotechnical engineer will be responsible for interpreting the collected field data.	Not specified
Geologic risks	The stability of the natural slopes around the mining site (particularly in La Sal ravine) will be monitored by a qualified environmental inspector.	Construction, operation, closure and post-closure.
Edaphology	Soil humidity and temperature will be continuously monitored at representative locations during all Project phases. Soil volumetric humidity and salinity will be monitored using soil pits two times per year (spring and summer). The Project will be monitored to ensure that disturbance is limited to areas that are approved for construction/disturbance.	Construction, operation, closure and post-closure. Limitation of interventions only during construction.
Hydrochemistry	Surface water and groundwater will be monitored at established locations for physical-chemical, organic, inorganic, metals and microbiological parameters. A water management and contingency plan will be implemented to reduce and eliminate risks to surface water and groundwater contamination at the mine and the plant areas, as well as to the downstream Laguna del Negro Francisco wetland.	Construction, operation, closure and post-closure.
Hydrology	Water flow will be continuously monitored at stream monitoring stations (when possible given weather conditions).	Construction, operation, closure and post-closure.
Hydrogeology	Groundwater levels in monitoring wells will be recorded on a daily basis during construction and operation. Also periodically, during closure and post-closure.	Construction, operation, closure and post-closure.

Environmental Component/Parameters	Summary Description	Project Phase
Vegetation and flora	Vegetation parameters such as vegetation coverage, species abundance and frequency will be monitored using transects during different seasons. Satellite imagery analysis will be utilized to assess photosynthetically active vegetation areas. An early warning system and continency plan will be implemented to manage for potential impacts on azonal vegetation formations associated with groundwater extraction.	Construction, operation, closure and post-closure.
Fauna	Fauna species counting and registration will be conducted for camelids, reptiles, micromammals and other groups. Parameters such as number of individuals, species richness and abundance will be evaluated using a variety of methods such as transects, camera traps and direct observations. A contingency plan will be implemented to manage any additional risks for fauna.	Construction, operation, closure and post-closure.
Aquatic biota	Benthic and ictic fauna, amphibians and periphyton will be monitored in different seasons and in different water bodies.	Construction, operation, closure and post-closure.
Human environment	Actions to prevent and control community impacts will be monitored through the documentation and record of communications with communities as well as follow-up resolution of claims and concerns. These efforts will be facilitated through community meetings under the leadership of a community relations manager.	Not specified
Landscape	Landscape mitigation actions will be monitored to minimize the impacts of Project facilities on the colours and forms on the landscape.	Not specified

20.1.3 Water Management

20.1.3.1 Water Supply

The Project's current water extraction rights are for approximately 7.8 Mm^3/year (from two separate wells) with an average pumping rate of 124 L/s and a permitted maximum of 170 L/s. A preliminary evaluation carried out in 2008, concluded that the wells supply could last for 30 years if water was produced at a rate of not more than 124 L/s, but the evaluation recommended additional and more detailed hydrogeological studies to confirm this initial estimate. These studies will be conducted to support the preparation of the future EIA. Further details on the water supply system are available in Section 18.7 of this Report.

For the purposes of this Report, water from these wells is considered to be an available source for water supply and is considered to be the base case for the mining operations. Given the hyper-arid conditions of the area and subject to the results of further hydrogeological studies planned for the water extraction sites, there may be regulatory expectations in the future to minimize the use of water rights for continental water or groundwater and to review and assess options for other water sources. For example, some commercial water supply ventures are currently being proposed which could potentially transfer desalinated sea water to the Project area via pipeline.

20.1.3.2 Surface Water, Runoff and Pit Water Management

During the Project life, potential impacts to water quantity and quality will be minimized by means of the diversion of "non-contact" water and the management of "contact" water, based on the implementation of the following measures:

- Maximizing the capture, containment, and reuse of contact and process waters used in mineralized material processing on the heap leach pads, thereby minimizing the use of external clean water sources and the potential for contaminant impact to surface waters generally.
- Providing adequate protection to internal infrastructure, personnel, and downstream receiving waters from the uncontrolled effects of surface water runoff during storm events.
- Preventing sediment entry to receiving waters and preventing erosion discharge points.
- Installation of diversion ditches around the non-economic rock storage facility, pit, and heap leach facilities to convey clean or non-contact surface water around these mine facilities and preventing the discharge of surface water that could have adverse environmental impact.

Contour channels will be installed around mine areas, non-economic rock storage facilities and infrastructure. Collection channels have been designed at the base of uncontacted areas to pass clean surface runoff water to discharge points downstream of the property. These channels will be designed based on a runoff derived from the maximum 24-hour rainfall over a 100-year return period with a verification period of 1,000 years. The drainage channels are designed with a triangular cross-section and consist of an excavated channel lined with low permeability backfill soil, which is then protected with a tightly packed layer of riprap rock. These channels must be maintained during the closure and post-closure phases to maintain chemical and physical stability.

For the management of "contact" mine waters with low risk of contamination, these waters will be directed to settling ponds to allow for sediments to settle and to provide the opportunity to monitor water quality prior to being released to the environment. Along the roads, runoff water will be captured in constructed ditches and directed also to settling ponds and then returned to natural watercourses. Where runoff water from the Project interacts with facilities potentially resulting in contact water that is contaminated such as pits, mineralized material stockpiles and non-economic rock storage facilities, each of these facilities will have a designed ditching system that will capture and direct contact water to collection ponds where it can be appropriately managed. Potentially impacted water will be monitored and treated, if necessary, prior to being released to the receiving environment.

20.1.4 Emissions and Wastes

The activities that will take place during the construction, operation, and closure phases of the Volcan Project will generate different types of wastes and emissions. Table 20-4 presents the different types of wastes and emissions currently expected for the Project and general management and mitigation measures to be utilized. More specific measures will be established during the future environmental impact assessment process. Most of these emissions are subject to specific permits to be issued as part of the EIA approval process.

Table 20-4: Waste and Emissions of The Volcan Project

Type of Waste/Emission	Management
Atmospheric emissions	Must be mitigated with dust control strategies for compliance with air quality standards.
Domestic and industrial non-hazardous wastes	Solid wastes will either be disposed at a Project sanitary landfill (that requires a special permit) or stored temporarily and trucked to an authorized sanitary landfill located outside the Project area. Sewage treatment system will be installed to service the camp area, the process area and the mine workshop area to treat wastewater generated on the site. Water from the truck wash bay will be treated by means of a silt trap and an oily wastewater treatment system.
Hazardous waste	Hazardous wastes will be disposed at a Project specific landfill (that requires a special permit) or stored temporarily and trucked to an authorized disposal site located outside the Project area.
Mining wastes	Mining wastes include low grade mineralized material and sterile rock (non-economic rock), Both of these will be managed at specially designed storage facilities located adjacent to the open pit areas (refer to Chapter 18).
Acid Rock Drainage (ARD)	Both the EIA (GHD, 2012) and the Pre-feasibility Study (KCA, 2010) indicate that the non-economic rock material has a moderate to high potential for ARD generation. However, acid generation and subsequent metal leaching will only occur if materials are exposed to water. Given the hyper-arid condition of the Project location, the interaction between the material and natural waters will be minimal and will be further reduced by the installation of contour channels at non-economic rock storage facilities. Any contacted waters will be collected, tested, and treated if necessary before being released to the environment. Contact water will also be recirculated to the extent possible back into the process.

20.2 Closure and Reclamation Planning

In Chile, Law 20.551 requires that a closure plan and accompanying cost estimate is submitted to and approved by the National Geology and Mining Service (SERNAGEOMIN) to ensure the protection of life, health and safety of people and the environment, mitigate any negative environmental effects, ensure physical and chemical stability of the areas where mining has occurred and establish guarantees for the effective closure of mining facilities.

Guidance on closure costing and bonding under Law 20.551 was updated in 2018. The SERNAGEOMIN approval of a closure plan and cost follows both the successful resolution of the EIA (which includes a summary version of the closure plan to comply with the corresponding sectorial environmental permit) and sectorial permit processes that are required before the start of construction.

20.2.1 Closure and Reclamation Plans

The closure plan will be developed and designed to ensure long-term stability of both physical and chemical properties of the site, and to blend with the high-altitude, rocky environment. Specific closure items shall include:

- Reagents and supplies managed and appropriately disposed.
- Above ground electric facilities will be dismantled or demolished.
- Foundations will be demolished and covered to approximate as closely as possible pre-mining landscape.

- Excavations, berms, and walls should be regraded to approximate pre-construction land contours. If soil contamination is detected around any facility, further environmental site assessment will be conducted, remedial options will be evaluated and clean-up undertaken.
- Access to areas such as the open pit, non-economic rock storage facilities and the heap leach facilities shall be restricted.
- The pit will be allowed to fill to the phreatic level.
- Drainage from spent mineralized material on the heaps shall be managed in accordance with locally accepted best practice in consideration of the hyper-arid conditions and requirement to protect the downstream receiving environment.
- Heaps will be covered to isolate spent mineralized material, limit influx of atmospheric water and oxygen, and control upward movement of oxidation products.
- Removal and re-grading of all access roads, ditches and borrow areas not required beyond mine closure.
- Long-term stabilization of all exposed erodible materials.

20.2.2 Closure Cost Estimate

A detailed closure cost will be developed in future to support the mine closure sectorial permit application, supported by feasibility level design. Based on the aforementioned closure measures, a preliminary estimate for closure costs, net of salvage value, of $30 million has been incorporated in the Project economics for this PEA. This cost will be refined further during the PFS and FS stage of the Project.

20.3 Permitting Considerations

Permits required by any project are classified in two categories: Environmental Permits and Sectorial Permits. The Environmental Permits are granted for any project approved within the SEIA and comprise the Environmental Licence (RCA for its abbreviation in Spanish) and the Sectorial Environmental Permits (PAS for its abbreviation in Spanish). All applicable PAS must be presented along with the Environmental Impact Study (EIA) and cover relevant environmental aspects.

On the other hand, Sectorial Permits (PS) cover non-environmental topics and need to be applied for separately with the corresponding government authority (a typical mining project can require more than 500 sectorial permits). Once the RCA is issued, the proponent can seek individual sectorial permits for construction and operation, some of which are an extension of a PAS. The most significant of these are the water use and water diversion schemes from DGA, sanitary permits, archaeological permits, mining permits (non-economic rock storage facilities) and the closure plan approval and mining license from SERNAGEOMIN. Each of these can be initiated during the EIA review period, however they cannot be granted until the EIA review concludes with a favourable decision.

The following subsections outline the Environmental Permits (Section 20.3.1) and Sectorial Permits (Sections 20.3.2 and 20.3.3) required for the execution of the Project, in its construction, operation and closure phases.

20.3.1 Environmental Permits

In Chile, mine developments similar to the Volcan Project size, and in this case near protected areas, will typically trigger the requirements for an EIA. The steps that are included in the process to develop the EIA include baseline studies, predictive modelling, social and Indigenous peoples assessments, management plans, risk assessments, mitigation plans and emergency response plans. Community consultation is required as inputs for the social assessment, in the form of community meetings.

An EIA for the Volcan Project was submitted by Andina Chile for evaluation by the environmental authority in July 2012. As part of the EIA review process, in November 2012 the regulatory authorities commented and requested additional information and clarifications, which were received by Andina Chile following its acquisition by Hochschild, who decided to withdraw the Volcan Project EIA submission from the Environmental Impact Assessment System (SEIA).

In accordance with the provisions of Article 3 of Law 19.300 (Environmental Base Law), the Volcan Project will likely be required to submit an EIA compiled under current regulations and with updated baseline information. The timeframe to obtain the RCA will depend on the questions and additional requests from the environmental authority. The Project may trigger the requirement for an Indigenous People Consultation Process under the requirements of the International Labour Organization (ILO) Indigenous and Tribal Peoples Convention 169[9].

The exploration drilling phase was environmentally approved through RCA No. 363/2008 (El Volcan Project Prospecting Drilling) and RCA No. 270/2011 (Volcan Project Prospecting Drilling Modification), which approved modifications to the original exploration project. To carry out future exploration drilling work previous to the preparation of the EIA, an environmental analysis must be conducted to evaluate the possibility of using the existing authorizations or to assess the need for a new environmental license, most likely through the presentation of an Environmental Impact Declaration (DIA).

In accordance with the requirements of Article 18 of the SEIA Regulation (D.S. N°40/2012), the EIA must also contain the technical and formal contents to comply with the requirements for each of the PAS, which are associated with a particular article of the SEIA Regulation. The following are the most likely PAS applicable to the Project:

- Article 132 – Permission to conduct archaeological, anthropological, and paleontological excavations.
- Article 136 – Permission to establish a mineral waste dump or mineral accumulation.
- Article 137 – Permission for approval of the closure plan for a mining site.
- Article 138 – Permission for any public or private work for the evacuation, treatment or final disposal of drains, sewage of any nature.
- Article 139 – Permission for any public or private work for the evacuation, treatment, or final disposal of industrial or mining wastes.
- Article 140 – Permission for the installation of any place intended for the accumulation, selection, industrialization, trade or final disposal of garbage and waste of any kind.
- Article 141 – Permission for the construction of a landfill.
- Article 142 – Permission for any site for the storage of hazardous waste.
- Article 146 – Permission to hunt or capture specimens of animals of protected species for research purposes, for the establishment of breeding centres or hatcheries and for the sustainable use of the resource.
- Article 155 – Permission for the construction of certain hydraulic works (Article 294 of the Water Code)
- Article 156 – Permission to make channel modifications.

[9] The ILO Indigenous and Tribal Peoples Convention 169 was subscribed by Chile in 2009 and establishes a mandatory consultation of indigenous people for measures that affect them.

- Article 157 – Permission to carry out Regularization or Defense Works[10] of Natural Channels.
- Article 160 – Permission to subdivide and urbanize rural land.
- Article 161 – Permission for the construction of industrial or warehousing facilities.

20.3.2 Mining Permits

Sectorial Permits associated with mining operations are granted by SERNAGEOMIN. At this stage, several permits are considered applicable to the Project, but the most relevant ones, based on the engineering requirements and processing times, are:

- Authorization to establish a non-economic rock storage facility (NERSF) or mineral stockpile (related to PAS 136);
- Authorization of open-pit exploitation method.
- Mineral Treatment or Benefit Plants Project Approval; and
- Authorization of the Project's Mine Closure Plan (related to PAS 137).

Depending on the level of engineering and the amount of information provided, these permits can have extended processing times (up to one year) and need to be obtained before construction. Several other permits and notifications are also required to be presented at the beginning of the construction or operation phases, such as the notification for starting the construction works on the tailings deposit or the approval for the Occupational Accident and Illness Prevention Program, among others, but none of them relate to the design of infrastructure, deposits, or the mining process.

20.3.3 Additional Permits and Authorizations

Other sectorial permits are granted by different government authorities. At this stage, the following permits are considered applicable to the Project, with the most relevant ones, based on their engineering requirements and processing times, listed below:

- Project approval for the Construction, Repair, Modification and Expansion of any Public or Private Work Designed for the Management of Sludge from Sewage Treatment Plants, the Evacuation, Treatment or Final Disposal of Drainage, Sewage of Any Nature and Waste Industrial or Mining (related to PAS 138).
- Approval for the Project for the Accumulation or Treatment of Industrial Waste (related to PAS 140).
- Approval for the Project of a Landfill Facility (related to PAS 141).
- Approval for the Hazardous Waste Storage Facility Project (related to PAS 142).
- Authorization of Intervention of Species Classified as Endangered, Vulnerable, Rare, Insufficiently Known or Out of Danger (related to PAS 146).
- Approval for the water intake hydraulic works project and construction (related to PAS 155).
- Authorization of Channel Modification and Regularization Works (related to PAS 156).
- Authorization to carry out Regularization or Defense Works of Natural Channels (related to PAS 157).

[10] According to the legal definition, regularization works are defined as those aimed at directing the current in a natural channel (or returning it to it) by altering its section, slope, layout, or the materiality of the riverbed bed and/or the banks. Defense works are those located in a natural channel whose purpose is to protect the adjacent land, population or infrastructure from flooding and/or channel erosion.

- Favourable Report for Construction (IFC) (related to PAS 160).
- Authorization of a Favourable Health Report (related to PAS 161).
- Authorization for the Project Design of a Private Drinking Water Supply System.
- Building Permit.

The approval times for these permits vary, but they all need to be obtained before construction starts. Several other permits are required and presented during construction or at the start of the operation. Most of these additional permits relate to the authorization for the operation of waste storage, wastewater and drinking water facilities, waste transport, permits for minor support infrastructure like fuel tanks, electric systems, gas systems and roads.

20.4 Social Considerations

Due to its geographical and climatic conditions, the Volcan Project area is sparsely populated, but there are several local stakeholders, who are part of the Colla ethnic group, who use the natural resources of the area and could be affected by the Project construction and operations.

20.4.1 Community Identification

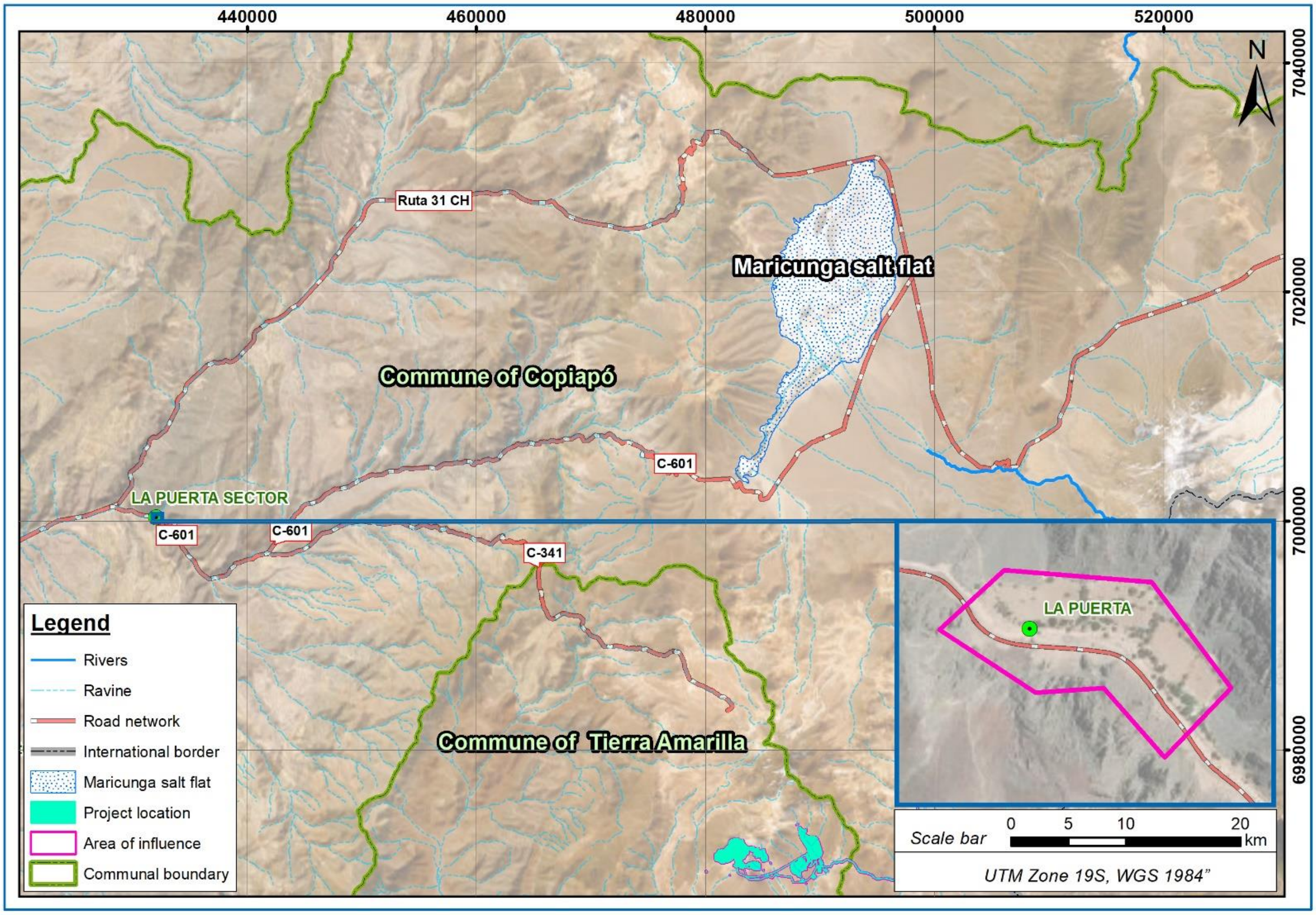
Social baseline studies were conducted as part of the 2012 EIA preparation. Based on the most recent information available (GAC Scoping Study, 2022), there are at least nine community groups within the Project area: one non-Indigenous group at La Puerta sector in Quebrada Paipote (community of Copiapo), seven Indigenous communities (communes of Copiapo and Tierra Amarilla), and one Indigenous association (registered in the commune of Tierra Amarilla).

20.4.1.1 Non-Indigenous Communities

In relation to the non-Indigenous population, there is a family located in the La Puerta sector (Figure 20-6), who´s activities include agricultural production and livestock grazing. Family members permanently reside in three dwellings. Although their permanent residence is in La Puerta, the residents of the sector constantly move between La Puerta and urban sectors of Copiapo as well as other higher elevation areas, where they move their cattle in summer.

The interaction between the Project and the non-Indigenous groups that reside in La Puerta would occur due to vehicular traffic during the construction and operational phases, since they are located immediately adjacent to Route C-341.

Figure 20-6: La Puerta Sector (non-Indigenous community)



Note: Figure prepared by GAC, 2022, based on Chapter 03 – EIA ENAPAC Distribucion Este (GAC, 2021).

20.4.1.2 Indigenous Communities

The Indigenous communities of the Project area (as of 2021) are part of the Colla ethnic group, which is recognized by Indigenous Law No. 19,253. Table 20-5 lists these Indigenous communities, along with their location coordinates.

Table 20-5: Location of Colla Indigenous Communities in The Project Area

Sector	Community	Area name	Coordinates UTM WGS84 H19S	
			East	North
Quebrada Paipote	Comuna de Copiapo	El Bolo I	441.187	6.997.167
		El Bolo II	442.086	6.997.714
	Pastos Grandes	San Luis	429.135	7.001.403
		La Cebolla	439.696	6.996.535
	Sol Naciente	Pastos Grandes	444.142	7.000.786
	Pai Ote	La Puerta	432.187	7.000.377
		Vega Redonda	435.375	6.996.129
Llano de Varas	Runa Urka	Llano de Varas	423.389	7.026.653
Vega de San Andrés		Vega Baja San Andrés	440.511	7.015.591
	Sinchi Wayra	Vega de San Andrés	444.136	7.018.325
Río Jorquera	Río Jorquera and its affluents	Río Figueroa	No Information	No Information

Note: Figure prepared by Chapter 03 – EIA ENAPAC Distribucion Este (GAC, 2021).

The lifestyles of the Indigenous population are rooted in the Colla history, identity, and territory, but at the same time is linked to Chilean modern society. The communities have a settlement pattern that combines residences in urban and rural areas with traditional territorial practices. Thus, Estacion Paipote and Copiapo in the district of Copiapo constitute the urban population centers, while Quebrada Paipote, Llano de Varas, Vega de San Andrés and Río Jorquera constitute the permanent residential enclaves of the communities in rural areas.

The economic activities and cultural manifestations of the communities are characterized by the cultural practice of transhumance along ravines and meadows, alternating lower (elevation) wintering areas with higher summer areas both at the Chilean and the Argentinean side of the border. This activity is complemented by small-scale agricultural production.

The settlement pattern combines a permanent occupation by some community members and a temporal occupation by other community members that alternate between rural and urban settings. The occupation of ravines and meadows is also dependent upon the growth cycle of seasonal herbs.

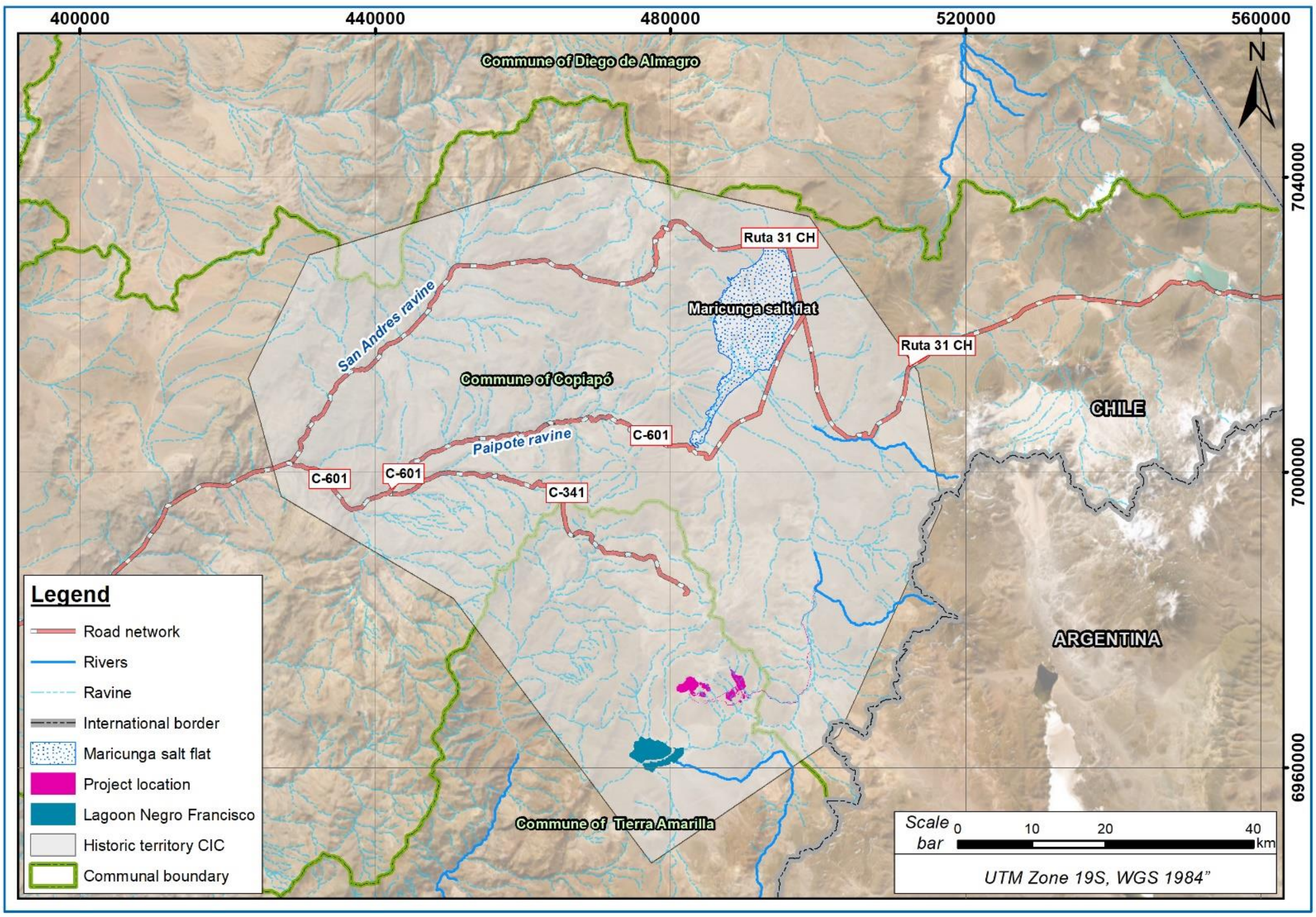
The situation of land ownership and water rights varies among the communities. While communities such as Sinchi Wayra, Comuna de Copiapo and Pastos Grandes have land titles, the communities of Pai Ote, Runa Urka and Sol Naciente do not. Only the community of Comuna de Copiapo has formal water rights. Notwithstanding this, other Indigenous communities in the Project area are in the process of requesting land and water rights.

The distribution of water, flora, and fauna on the land define the boundaries for areas that communities utilize. In the case of the Indigenous communities of Comuna de Copiapo, Pastos Grandes and Sol Naciente, this territory spans from the Llano de Varas in the north to the Río Jorquera in the south, and from the Ruins of Puquios in the west to the Puna de Atacama in the east (Figure 20-7).

Regarding the sites of cultural significance, they constitute a circuit of cultural importance in the Project area. Experiences of grandparents, parents and current members of the Indigenous communities are interwoven. Communities recognize animal raising, the knowledge of medicinal herbs, the transhumance routes and the construction of stone walls and corrals as trades of cultural significance.

An interaction between the Project and the life dynamics of the Indigenous communities present in the territory is anticipated. To establish the degree and magnitude of this interaction, a more extensive evaluation will be developed for each community in the Project´s EIA to be submitted for the Environmental Licence application.

Figure 20-7: Territory of Indigenous Communities of Comuna de Copiapo, Pastos Grandes and Sol Naciente (referential boundaries)



Note: Figure prepared by GAC, 2022, based on Chapter 03 – EIA ENAPAC Distribucion Este (GAC, 2021).

20.4.2 Community Relations Plans or Stakeholder Communications Strategy

As part of the new EIA for Volcan Project, human environment baseline studies will need to be carried out to clearly identify the surrounding community and its characteristics, economic activities and their relevant cultural heritage sites and traditions. Based on these results, a Community Relations Plan and Strategy will be developed that will include details such as stages of stakeholder communication, meetings, stakeholder information and participation methods and record keeping.

In terms of legal requirements, part of the environmental permitting process of an EIA is the Community Consultation Process (PAC for it acronym in Spanish) where the community (Indigenous and non-Indigenous) will become familiar with the Project and can communicate (or later submit) their questions and concerns. Additionally, the Project may be required to conduct an Indigenous Peoples Consultation Process, given its location within Indigenous territory. It is typical that during this process, issues raised by the community are addressed (sometimes with additional measures) for the Project to be granted the RCA. As for sectorial permits, the Mine Closure Permit requires, as part of its contents, the preparation of a Communications Program to inform the community of the beginning of any partial, temporary or complete closure activity.

20.5 Comments on Environmental Studies, Permitting and Social or Community Impact

The Volcan Project currently does not hold an Environmental Licence (RCA) or other environmental or sectorial permits. An Environmental Impact Study (EIA) was previously prepared and submitted to regulatory authorities in 2012 but was subsequently withdrawn from the system by the owner to allow for project and corporate modifications. A new EIA will need to be prepared and presented to regulatory authorities to apply for the required RCA. The new EIA will draw on some of the EIA work previously completed, but additional scope will need to comprehensively cover the Project area and provide updated baseline studies for environmental components, as well as a comprehensive impact assessment, mitigation, reparation and compensation measures.

Based on the currently available information, the relevant environmental aspects of the Volcan Project are:

- Proximity to protected areas, including a National Park and a Ramsar site, among others, which could be affected by the Project activities. The sensitive ecosystems that are present in these areas will require effective mitigation, reparation and/or compensation measures and monitoring during all phases of the Project.
- Proximity to glaciers is relevant due to the hyper-arid conditions of the area and potential impacts to the existing water balance for the area. Interaction of the Project with nearby glaciers should be studied further and monitored throughout the active Project phases.
- Visual effects on the landscape could also be of relevance, considering the proximity of the proposed site infrastructure to one of the lookouts with the National Park area. Special consideration should be given to this aspect during the design and closure phases of the Project.
- Water quality and downstream potential impacts to sensitive habitat can be mitigated by the design and construction of effective water management infrastructure, practices, and contingency plans. This requirement of the Project should be emphasized during the next phase of project design.
- The hyper-arid conditions and the dependence of downstream ecosystem health on continental groundwater should be carefully considered. The potential effects of continental groundwater as a water source for the Project should be more fully evaluated to assess potential effects on downstream receptors. Other water sources, such as desalinated water from the coast should be considered in future to supplement water requirements.
- Human population is sparse but there is one non-Indigenous and seven Indigenous communities present in the Project area of influence. Indigenous populations move between lower urban areas and higher rural areas, where they use natural resources and transhumance practices are common. Considering this, an Indigenous Consultation Process may be required by the environmental authority, as part of the environmental approval of the EIA.

21 CAPITAL AND OPERATING COSTS

21.1 Introduction

The capital and operating cost estimates presented in this PEA provide substantiated costs that can be used to assess the preliminary economics of the Volcan Project. The estimates are based on open pit mining operations, construction of a process plant and infrastructure, as well as Owner's costs and provisions.

The following basic information pertains to the estimate of both capital and operating costs:

- Base date for these estimates is Q4 – 2022;
- All costs are expressed in United States dollars (US$);
- United States to Chilean currency exchange rate used is US$1.00 = 870 CLP$;
- Unit of measurement is metric (unless otherwise indicated); and
- Operating and sustaining capital costs are based on an estimated mine life of 14 years.

21.2 Capital Costs

21.2.1 Overview

The overall capital cost estimate was developed by Ausenco with contributions from Deswik for the mining costs. The capital cost estimate utilized historical pricing and budgetary quotations for main mechanical equipment supplemented by factored, scaled values for major disciplines from Ausenco's database of costs for similar projects in the region.

The total initial capital cost estimate for the Volcan Project is US$900.1M; sustaining capital cost is US$276.4 M; and the total project cost is US$1,176.5 M. Table 21-1 provides the Project cost summary for initial and sustaining capital cost.

Table 21-1: Summary of Capital Costs

Description	Initial	Sustaining Capital	Total
Mining	71.0	16.0	87.0
Process	331.7	146.2	477.9
Infrastructure – On site	58.1	-	58.1
Infrastructure – Off site	75.9	-	75.9
Total Direct US$M	**536.8**	**162.2**	**699.0**
Project Indirect Cost	143.4	52.4	195.7
Owner Cost	38.8	13.2	52.0
Contingency	181.1	48.7	229.8
Total Capex Class 5 – US$M	**900.1**	**276.4**	**1,176.5**

21.2.2 Basis of Estimate

The cost estimates were developed according to the requirements for a AACE Class 5 Estimate, with an expected accuracy range of –30% to +50%.

Capital cost estimate is based on:

- Preliminary mechanical equipment list (29% of the total cost of mechanical equipment was quoted);
- Quantities for mass earthworks for principal facilities were developed from preliminary take-offs. Mass earthworks for minor facilities were scaled from 2011 PFS study and benchmarked against similar projects
- Costs for the HLF and pond lining civil works were developed based on Ausenco's in-house database all in cost per m^2;
- The platework list was developed for major items from the equipment list and allowances for miscellaneous items were included based on Ausenco's in-house database;
- Bulk commodities were estimated by factoring of mechanical equipment costs based on average benchmark percentages of projects of similar plant type and capacity;
- Mechanical equipment pricing is based on budget quotation and benchmarked costs for similar projects in the region. Unit installation rates, material costs, and electrical costs were based on typical values for comparative sites; and
- Mining cost estimate was developed by Deswik

Data for these estimates have been obtained from numerous sources, including:

- Conceptual level engineering;
- Mine schedules;
- Budgetary equipment quotes from multiple potential OEMs;
- Data from recently completed similar studies and projects; and
- Information from previous engineering studied on the Project, provided by Tiernan Gold.

21.2.3 Direct costs

Direct capital costs are those costs that pertain to the permanent equipment, materials, and labour associated with the physical construction of the facilities, including refurbishment costs. Contractor's indirect costs, which include contractor's distributable costs, are contained within the direct costs. Ausenco and Deswik provided the direct costs associated with the works in their respective discipline areas.

21.2.3.1 Mining Capital Costs

The mining capital costs were estimated for the following infrastructures:

- Mine pioneering: initial haul roads, non-economic rock storage facility and low grade stockpile starter dike and surface preparation
- Workshop and infrastructure for mine equipment fleet

Considering that the operation will be performed by a Contractor, there are no capital costs for mining fleet.

All costs were based on benchmarked costs and are presented on Table 21-2 for the facilities and Table 21-3 for the roads and stockpile/ non-economic rock storage facility preparation.

Table 21-2: Mine Capex Infrastructure

Capex Infrastructure		Total Cost US$ M
Workshop	Trucks	1.73
	Shovels	0.86
	Drills	0.43
	Dozers	0.43
	Other Equipment	0.86
	Light Vehicle	0.30
Warehouse		4.20
Electromechanical Shop		2.60
Welding Shop		1.56
Tire Shop		1.80
Truck Wash		1.60
Emulsion Storage		0.68
Fuel Station		1.08
Offices		0.56
Substation		0.75
TOTAL		**19.45**

Table 21-3: Mine Capex Pioneering

Capex Mine Pioneering	Total Cost US$ M
Dike	2.5
Non-Economic Rock Storage Facility Starter	20.8
Low-Grade Stockpile	12.9
Pit to Non-Economic Rock Storage Facility Haul Road	8.3
Main Pit to Crusher Haul Road	3.1
Satellite Pit to Crusher Haul Road	2.6
Stockpile to Crusher Haul Road	1.4
TOTAL	**51.5**

21.2.3.2 Process Plant Capital Costs

The definition of process equipment requirements was based on conceptual process flowsheets and process design criteria (refer to Section 17). The estimate was developed based on a compiled priced mechanical equipment list using a combination of recent quotations and historical costs for similar type equipment. Field installation costs were applied to the mechanical equipment supply costs of each equipment list item.

Each major process area was built up with costs by separately addressing the following additional disciplines, where applicable:

- Earthworks;
- Civil (concrete);
- Structural steel;
- Piping;
- Platework;
- Architectural (buildings);
- Electrical equipment;
- Electrical bulks; and
- Instrumentation.

Costs for the above disciplines were developed by applying historical factors (percentages of total installed cost of mechanical equipment) to each. The factors are based on Ausenco's historical data for similar type of work in the region.

Process initial and sustaining direct costs are summarized in Table 21-4.

Table 21-4: Process Plant Direct Cost

Description	Initial (US$ M)	Sustaining Capital (US$ M)	Total (US$ M)
Site & Process Area General	8.3	-	8.3
Primary Crushing	31.2	-	31.2
Overland Conveying	39.2	-	39.2
Coarse Material Stockpile	13.1	-	13.1
Secondary Crushing	31.6	-	31.6
Tertiary Crushing	49.2	-	49.2
Agglomeration	20.0	-	20.0
Heap Stacking	39.9	8.9	48.8
Heap Solution Management	25.3	1.9	27.2
Leach Pad	42.5	92.0	134.5
SART	-	43.4	43.4
CIC	9.9	-	9.9
Carbon Desorption and regeneration	17.7	-	17.7
Reagents	4.0	-	4.0
Total Direct	**331.7**	**146.2**	**477.9**

21.2.3.3 Infrastructure Capital Costs – On-site

On-site infrastructure costs were developed based on a PEA-level design of plant infrastructure. Ausenco estimated infrastructure costs from in-house database and labour rates that included the following:

- Site development
  - Internal roads
- Infrastructure (general)
  - Facilities
- Power supply & distribution
  - 23kV Power supply for water
  - 23kV Site power distribution
  - Backup power supply and generator
- Water storage and distribution.

On-site infrastructure initial costs are summarized in Table 21-5.

Table 21-5: Infrastructure Direct Cost – On-site

Description	Initial (US$ M)
On Site Power	17.4
Water Storage and Distribution	7.2
Roads	0.3
Compressed Air	0.9
Facilities	10.0
Plant Mobile Equipment	3.2
Fuel Facilities	0.3
Camp Facilities	18.9
Total Direct	**58.1**

21.2.3.4 Infrastructure Capital Cost – Off-Site

Off-site infrastructure costs were developed based on a PEA-level design of plant infrastructure. Ausenco estimated infrastructure costs from in-house database and labour rates that included the following:

- Off-site Power supply;
  - 110kV power lines
  - Switching substation adjacent to existing Maricunga substation, and
  - Main plant substation at Volcan Project to reduce 110kV to 23 kV.
- Water supply
  - Wells, pumping station and piping.
- External Access Road

Off-site infrastructure capital costs are summarized in Table 21-6.

Table 21-6: Infrastructure Direct Cost – Off-site

Description	Initial (US$ M)
Off-site Power	34.5
Water Supply	17.8
Roads	23.6
Total Direct	**75.9**

21.2.4 Indirect Costs

Indirect costs included all costs that are necessary for the Project completion but not related to the direct construction cost incurred by the Owner, engineer or consultants in Project design, procurement, construction, and commissioning to support during the construction period.

Table 21-7 includes a summary of all the items considered within the indirect cost category, and the factors that were applied to the direct costs. The factors applied to each item within the indirect cost category include an allowance to account for uncertainty associated with their respective costs.

Table 21-7: Project Indirect Cost Factors

Description	Process Plant	Earthworks
EPCM	18.0%	15.0%
Temporary Facilities	2.5%	1.5%
Third Party Services	6.0%	3.5%
Catering and Lodging	1.5%	1.0%
Freights & Logistics	4.0%	0.0%
Vendor Representatives	1.5%	0.0%
Spares	1.0%	0.0%
Commissioning & Start-up	1.0%	0.0%
First Fills	0.5%	0.0%
Owner Costs	9.0%	9.0%
Total	**45.0%**	**30.0%**

Ausenco estimated a total of US$M 247.7 indirect costs, as shown in Table 21-8.

Table 21-8: Summary of Indirect Costs

Description	Initial (US$ M)	Sustaining Capital (US$ M)	Total (US$ M)
Project Indirect Cost	143.4	52.4	195.7
Owner Cost	38.8	13.2	52.0
Total Indirect	**182,2**	**65,5**	**247,7**

Owner's costs are costs borne by the Owner in Project support and execution. Ausenco included an allowance of US$M52.0 for Owner's costs, which equated to approximately 9.0% of direct costs. The main items included are Owner's staffing and expenses, pre-production labour, home office project management, home office financial, legal, insurance, bonds, licenses, and fees.

21.2.5 Contingency

The applied contingency value represents approximately 33% of the total direct costs, which is equivalent to a total of US$229.8 M, as shown in Table 21-9.

Table 21-9: Contingency Costs

Description	Initial (US$ M)	Sustaining Capital (US$ M)	Total (US$ M)
Contingency	181.1	48.7	229.8

The estimated contingencies excluded the following:

- Abnormal weather conditions;
- Changes to market conditions affecting the cost of labour or materials;
- Changes of scope within the general production and operating parameters;
- Effects of industrial disputations;

21.2.6 Sustaining Capital Costs

21.2.6.1 Mining Sustaining Capital Cost

Sustaining costs for the non-economic rock storage facility are presented in Table 21-10. These are related to lift sequences, to reduce initial capital costs.

Table 21-10: Mine Sustaining Capital Costs

Description	Total Cost US$ MM
Non-Economic Rock Storage Facility Year 2	4.6
Non-Economic Rock Storage Facility Year 5	6.0
Non-Economic Rock Storage Facility Year 7	5.4
TOTAL	**16.0**

21.2.6.2 Process Sustaining Capital Cost

The Project includes sustaining capital for the management and operation of the HLF and SART plant. The total process sustaining cost is estimated at US$260.4 M over the LOM. A breakdown of the costs in shown in Table 21-11.

Table 21-11: Breakdown of Sustaining Capital Costs

Description	LOM	1	2	3	4	5	6	7	8	9	10
Heap Stacking	8.9	--	--	--	8.9	--	--	--	--	--	--
Heap Solution Management	1.9	--	--	--	--	--	--	--	1.9	--	--
Leach Pad	92.0	19.5	19.5	--	16.3	--	--	18.4	--	--	18.4
SART	43.4	43.4	--	--	--	--	--	--	--	--	--
Total Direct Process Sustaining Capital Cost	**146.2**	**62.9**	**19.5**	**--**	**25.1**	**--**	**--**	**18.4**	**1.9**	**--**	**18.4**
Project indirect	52.4	22.7	7.0	--	9.1	--	--	6.6	0.4	--	6.6
Owners	13.2	5.7	1.8	--	2.3	--	--	1.7	0.2	--	1.7
Contingency	48.7	18.9	7.2	--	7.5	1.8	--	7.1	0.6	--	5.5
Total Sustaining Process Capital Cost-US$ M	**260.4**	**110.1**	**35.5**	**--**	**44.0**	**1.8**	**--**	**33.8**	**3.0**	**--**	**32.2**

21.2.7 Exclusions

The following items were not considered in the cost estimates:

- Escalation. This capital cost estimate is developed in current constant basis and does not include future escalation. It is noted that at the time of developing this study, high volatility in prices due to world inflation and post-pandemic conditions are present in the current market conditions (Q4 2022), which represents a high uncertainty in future prices of supply and construction in the project industry;
- Works outside the battery limit detailed in this document;
- Value-added tax (IVA);
- Other taxes and or duties not detailed in the estimate;
- Any additional participation requirement due to external financing conditions;
- Study costs not detailed in the estimate;
- Professional / consulting services not detailed in the estimate;
- Special incentives (accelerated calendar, environmental, security);
- Costs associated with accelerating/decelerating the program;
- Fluctuations between the local currency and other US dollars;
- Removal, and disposal of hazardous materials found during construction;
- Licenses, patents, royalties;
- Senior finance charges;
- Extraordinary health and safety requirements at work.
- Residual value of temporary equipment and facilities;
- Cost to the client of any downtime;

- Environmental approvals;
- Any further Project studies;
- Force majeure issues; and
- No allowance has been made for reduced productivity and/or disruption due to a religious, union, social and/or cultural activities.

21.3 Operating Costs

21.3.1 Overview

A summary of the individual components that make up the LOM operating costs is presented in Table 21-12.

Table 21-12: Summary of Operating Cost Estimate

	Units	Avg. Y 1 – Y10	Avg. Y11 - Y14	Avg. LOM
Mining	US$/t moved	1.88	0.66	1.76
Mining	US$/t processed	6.48	0.66	4.94
Processing	US$/t processed	6.61	6.60	6.61
G&A	US$/t processed	0.99	0.59	0.88
Total Operating Cost	**US$/t processed**	**14.08**	**7.86**	**12.44**

21.3.2 Mine Operating Costs

Mine operating costs were estimated based on an indicative quotation from a mining contractor and based on the following assumptions:

- Rock Density: 2.45 t/m³
- Swelling factor: 30%
- Moisture: 2%
- It is assumed that all material is expected to be blasted
- IVA and other taxes are excluded
- Contractor’s fee is included
- A 7x7 rotational shift work (roster) has been considered:
    - 7 days on x 7 days off 2 shifts of 12 hours
    - 4 crews
- No escalation formula has been applied
- Diesel price: US$4.10/US gallon

- Tiernan will be responsible for mineralized material control costs and for providing project infrastructure: camp; truck shops, fuel station, warehouse building, NERSF preparation (dikes, channels), etc.
- In addition, the following owner's costs were added:
  - Mineralized material control, and
  - Owner's team: mine planning, geology, and operation supervision.

G&A costs for the mining contractor have been included in overall site G&A costs and are not included in the mining unit costs.

Based on the mine schedule presented in Section 16, Operating mining cost summary is presented in Table 21-13. Mine operating cost weighted averages are indicated separately for the Years 1-10 which correspond to the active mining period and Years 11-14 which corresponds to low grade stockpile rehandle only.

Table 21-13: Mine Opex (US$/t moved, except where noted)

Year	Drilling	Blasting	Loading	Haulage	Ancillary	Ore Control	Total
1	0.21	0.31	0.28	0.47	0.40	0.10	**1.77**
2	0.21	0.31	0.28	0.54	0.40	0.10	**1.84**
3	0.21	0.31	0.28	0.48	0.40	0.10	**1.78**
4	0.21	0.31	0.28	0.48	0.40	0.10	**1.78**
5	0.21	0.31	0.28	0.64	0.40	0.10	**1.94**
6	0.21	0.31	0.28	0.42	0.40	0.10	**1.72**
7	0.21	0.31	0.28	0.51	0.40	0.10	**1.81**
8	0.21	0.31	0.28	0.65	0.40	0.10	**1.95**
9	0.21	0.31	0.28	0.84	0.40	0.10	**2.14**
10	0.21	0.31	0.28	1.06	0.40	0.10	**2.36**
11	0.00	0.00	0.28	0.15	0.23	0.00	**0.66**
12	0.00	0.00	0.28	0.15	0.23	0.00	**0.66**
13	0.00	0.00	0.28	0.15	0.23	0.00	**0.66**
14	0.00	0.00	0.28	0.15	0.23	0.00	**0.66**
Avg Y1 – Y10	0.21	0.31	0.28	0.58	0.4	0.1	**1.88**
Avg Y11-14	0.00	0.00	0.28	0.15	0.23	0.00	**0.66**
Avg LOM US$/t moved	**0.19**	**0.28**	**0.28**	**0.54**	**0.38**	**0.09**	**1.76**
Avg LOM US$/processed	**0.53**	**0.79**	**0.78**	**1.51**	**1.08**	**0.25**	**4.94**

Note: Averages presented are calculated as weighted averages.

21.3.3 Process Operating Costs

The following process operating cost estimate includes the following considerations:

- Operating labour rates are from benchmarks from similar projects in the region;
- Processing unit operations were benchmarked against similar or comparable processing plants;
- Crushing media consumption rates have been estimated based on the material characteristics;
- Reagent consumption rates have been estimated on the metallurgical characteristics;
- An electricity price of $0.08 per kWh was used.

The operating costs were developed based on the production of gold and copper at plant feed rates as per the production schedule. Average annual processing cost forecast for power, consumables, maintenance consumables and labour are summarized in Table 21-14.

Table 21-14: Processing costs (US$M)

Processing Cost item	Total Overall Cost	
	US$M/y	US$/t
Power	11.18	0.51
Labour	9.27	0.42
Reagents	100.40	4.58
Consumables	6.04	0.28
Maintenance	4.01	0.18
Third Party Services	12.73	0.58
Water Consumption	0.96	0.04
Total	**144.58**	**6.60**

21.3.3.1 Power

Power costs were calculated from an estimate of annual power consumption derived from mechanical equipment list and using a unit cost of US$0.08/kWh.

Annual energy consumption is estimated at 139,757 MWh for Years 1-14.

21.3.3.2 Labour

Labour costs including all processing and maintenance costs are show in Table 21-15.

Table 21-15: Labour costs

Cost Center	Number	Annual Cost (US$M)
Management	28	3.219
Operations	72	3.812
Maintenance	38	2.234
Total	**138**	**9.265**

Costs are average pays inclusive of all loadings applicable to the site.

21.3.3.3 Reagents

Reagents consumptions were estimated using the plant throughput as basis. Reagent costs shown in Table 21-16 were based on:

- Consumption rates determined from metallurgical test work; and
- Data base unit costs for the reagents.

Table 21-16: Reagent Costs

Reagent	Unit Cost (US$/t)	Annual Cost (US$M)
Agglomeration		
Cement	0.72	15.77
Leaching		
Sodium Cyanide (NaCN)	2.76	50.28
Lime (CaO) pebble	1.14	24.88
ADR		
Sodium Cyanide (NaCN)	0.002	0.05
Sodium Hydroxide (NaOH)	0.008	0.18
Hydrochloric Acid (HCl) 32%	0.016	0.35
Borax	0.0002	0.005
Silica	0.0002	0.004
Sodium Carbonate	0.0002	0.002
Sodium Nitrate ($NaNO_3$)	0.0001	0.005
Carbon	0.018	0.39
Propane	0.07	1.55
SART		

Reagent	Unit Cost (US$/t)	Annual Cost (US$M)
Lime (CaO) milled	0.09	2.004
Sodium Hydroxide (NaOH)	0.02	0.48
Sodium Hydrosulfide (NaHS)	0.15	3.19
Sulfuric acid (H_2SO_4) 93-97%	0.04	0.89
Propane	0.01	0.31
Flocculant	0.002	0.05
Total	**5.04**	**110.40**

21.3.3.4 Consumables

Consumable costs, summarized in Table 21-17, were estimated based on the plant throughput.

Table 21-17: Cost for Media and General Consumables by Area

Area	Consumables	Unit Cost (US$/t)	Annual Cost (US$M)
Primary Crushing	Liners	0.01	0.18
Secondary Crushing	Liners	0.08	1.75
Tertiary Crushing	HPGR Rolls	0.19	4.11

21.3.3.5 Maintenance Consumables

Annual maintenance spares and consumable costs were factored at 3% of total installed costs for mechanical equipment, plate work, support steel and electrics.

This results in annual maintenance consumables cost estimate of US$4.01 M.

21.3.3.6 Third Party Services

Third party services costs were estimated based on the throughput; the unit costs are summarized in Table 21-18 this results in annual cost estimate of US$16.0 M.

Table 21-18: Cost for Third Party Services

Third Party Services	Unit Cost (US$/t)	Annual Cost (US$M)
Operation of piping (irrigation system)	0.09	1.97
Installation of piping	0.03	0.66
Other services (topography, PVC and LLDPE geomembrane, drainage piping)	0.61	0.25
Contracts and maintenance (irrigation system)	0.45	13.14
Total	**0.73**	**16.01**

21.3.4 General and Administrative Operating Costs

The G&A operating costs have been derived from each area within G&A group. The estimate for each area was built up using benchmarked data from comparable projects in similar locations and estimates using industry standards. The G&A costs were divided into the following areas:

- Mining contractor administration cost;
- Camp;
- Transport of personnel to site;
- Catering for personnel at site;
- Environmental;
- Community relations;
- Safety and Security Services; and
- Administration

The annual G&A cost estimated is presented in Table 21-19.

Table 21-19: G&A summary

Area	Cost (US$ M /year)		
	Yr 1-9	Yr 10-13	Yr 14
Mining Contractor	11.2	3.2	1.8
Camp	1.5	1.5	1.5
Personnel Transport	3.2	2.4	1.5
Catering	4.0	3.0	2.0
Environment	0.7	0.7	0.7
Community Relations	0.75	0.75	0.75
Safety and Security	0.5	0.4	0.25
Administration	0.4	0.4	0.4
Total	**22.25**	**12.35**	**8.9**

22 ECONOMIC ANALYSIS

22.1 Forward-Looking Information Cautionary Statements

The results of the economic analyses discussed in this section represent forward-looking information as the results depend on inputs that are subject to known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here.

The preliminary economic assessment is preliminary in nature, that it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the preliminary economic assessment will be realized.

Forward-looking information includes:

- mineral resource estimates;
- assumed metal prices. Commodity prices can be volatile, and there is the potential for deviation from the forecast;
- exchange rates;
- the proposed mine production plan;
- projected mining and process recovery rates;
- assumptions as to mining dilution and ability to mine using open-pit mining methods as envisaged;
- sustaining costs and proposed operating costs;
- assumptions as to closure costs and requirements; and
- assumptions as to environmental, permitting, and social risks.

Additional risks to the forward-looking information include:

- changes to costs of production from what was assumed;
- unrecognized environmental risks;
- unanticipated reclamation expenses;
- unexpected variations in the quantity of mineralized material, grade, or recovery rates;
- geotechnical or hydrogeological considerations during mining being different from what was assumed;
- failure of mining methods to operate as anticipated;
- failure of plant, equipment, or processes to operate as anticipated;
- changes to assumptions in the availability of electrical power, and the power rates used in the operating cost estimates and financial analysis;
- ability to maintain the social licence to operate;
- accidents, labour disputes, and other mining industry risks;

- changes to interest rates; and
- changes to tax rates.

Calendar years used in the financial analysis are provided for conceptual purposes only. Permits still have to be obtained in support of operations, and approval for development to be provided by the Tiernan Gold Board.

22.2 Methodologies Used

An engineering economic model was developed to estimate annual pre-tax and post-tax cash flows and sensitivities of the Project based on an 5% discount rate. It must be noted, however, that tax estimates involve many complex variables that can only be accurately calculated during operations and, as such, the after-tax results are only approximations. Sensitivity analysis were performed to assess the impact of variations in gold prices, head grades, operating costs and capital costs. The capital and operating cost estimates were developed specifically for this Project (presented in Q4 2022 US$). The economic analysis was run with no inflation (constant dollar basis).

22.3 Financial Model Parameters

The economic analysis was performed using the following assumptions:

- construction starts on January 1, 2028;
- ramp-up production start-up in Q1 2030;
- mine life of 13.6 years;
- gold price at 1,800 US$/oz and copper price at 3.50 US$/lb as presented in Section 19 of the Report;
- cost estimates are constant in Q4 2022 US$;
- no price inflation or escalation factors were taken into account;
- results are based on 100% ownership;
- capital costs funded with 100% equity (i.e., no financing costs assumed);
- all cash flows discounted to beginning of construction Jan 1, 2028;
- all gold doré are assumed sold in the same period they are produced;
- project revenue is derived from the sale of gold doré and copper concentrate; and
- no contractual arrangements currently in place.

22.3.1 Taxes

The Project was evaluated on an after-tax basis to provide an approximate value of the potential economics. The tax model was compiled by Ausenco and reviewed by PricewaterhouseCoopers Consultores Auditores. The calculations are based on the tax regime as of the date of the PEA.

As of the financial analysis effective date of this report, the Project was assumed to be subject to the following tax regime:

- the Chilean corporate income tax system consists of 27% income tax;

- average IEM (Mining Specific Tax) at 5.5% average for the LOM;
- the economic model assumed an accelerated depreciation schedule;
- total undiscounted corporate tax payments are estimated to be US$555 M over the LOM; and
- total undiscounted IEM tax payments are estimated to be US$121 M over the LOM.

22.3.2 Royalties

Based on the agreements in place, described in Section 4 of the Report, gold royalty stream has been considered for the economic evaluation of the Project as per below.

- no royalty for the first 2 million gold ounces produced.
- for gold production between 2 to 4 million gold ounces, the royalty will be 5 US$/oz.
- for gold production over 4 million ounces, the royalty tax will be 1% of the NSR.
- total royalties payments are estimated to be US$9 M over the LOM.

22.3.3 Working Capital

A high-level estimation of working capital was incorporated into the cash flow based on accounts receivable (20 days), Inventories (35 days), and accounts payable (70 days).

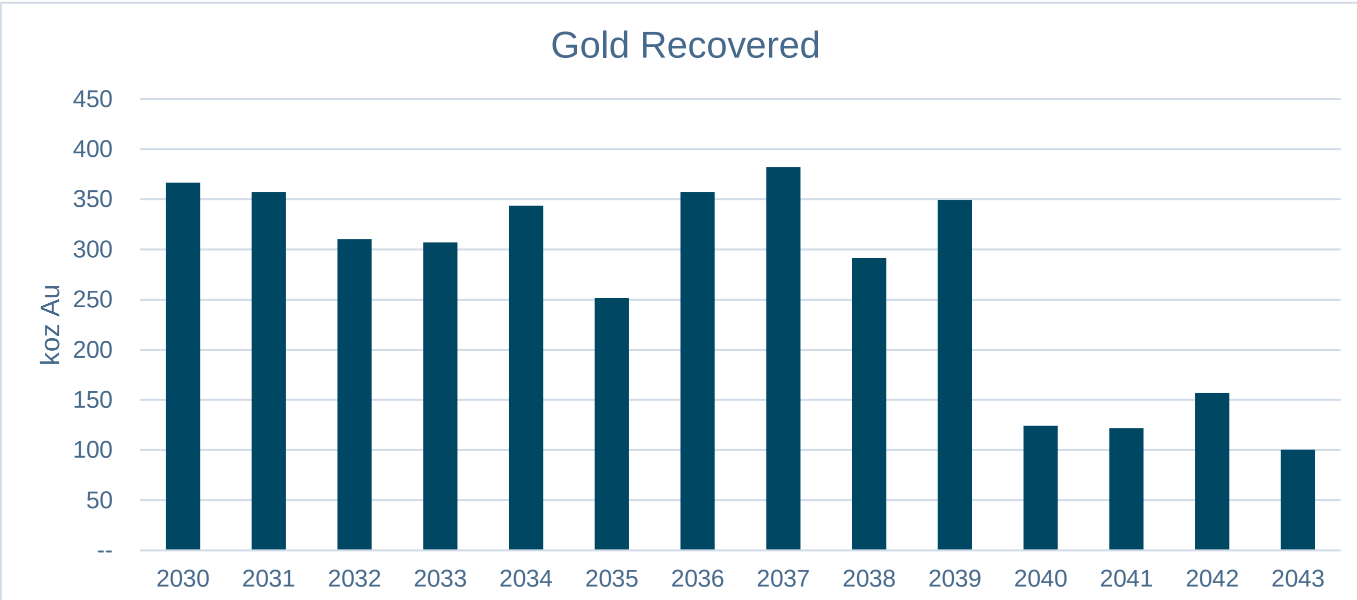
22.3.4 Salvage Value and Closure Cost

No salvage value have been considered on the economic analysis. A closure cost has been estimated at the end of the LOM of 30 US$M.

22.3.5 Metal Production

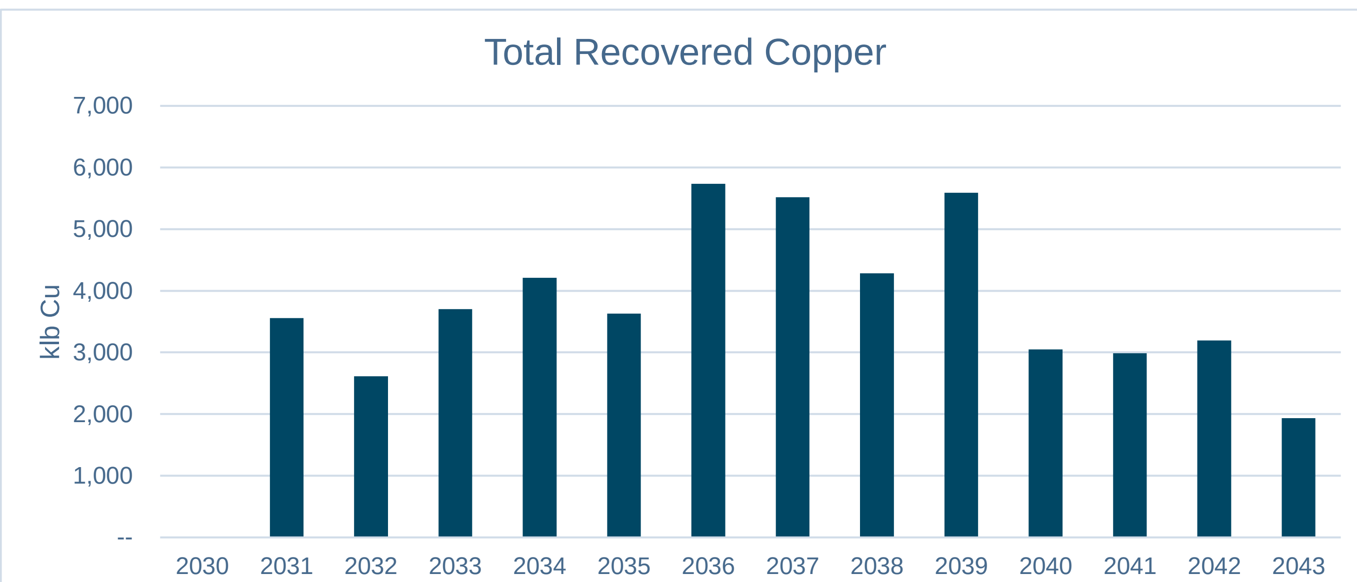
Metal production is summarized in Figure 22-1, and Figure 22-2 for gold and copper respectively.

Figure 22-1: Gold Production



Note: Figure prepared by Ausenco, 2022.

Figure 22-2: Copper Production



Note: Figure prepared by Ausenco, 2022.

22.4 Economic Analysis

The economic analysis was performed assuming an 5% discount rate. Cash flows have been discounted to the beginning of construction on January 1, 2028, assuming that the Project execution decision will be made and major project financing will be carried out at this time.

The pre-tax net present value (NPV) discounted at 5% (NPV5%) is US$1,254 M, the internal rate of return (IRR) is 25.0%, and payback is 3.4 years. On an after-tax basis, the NPV5% is US$826 M, the IRR is 20.5%, and the payback period is 3.6 years.

A summary of the Project economics is included in Table 22-1 and is shown graphically in Figure 22-3. The cashflow on an annualized basis is provided in Table 22-2.

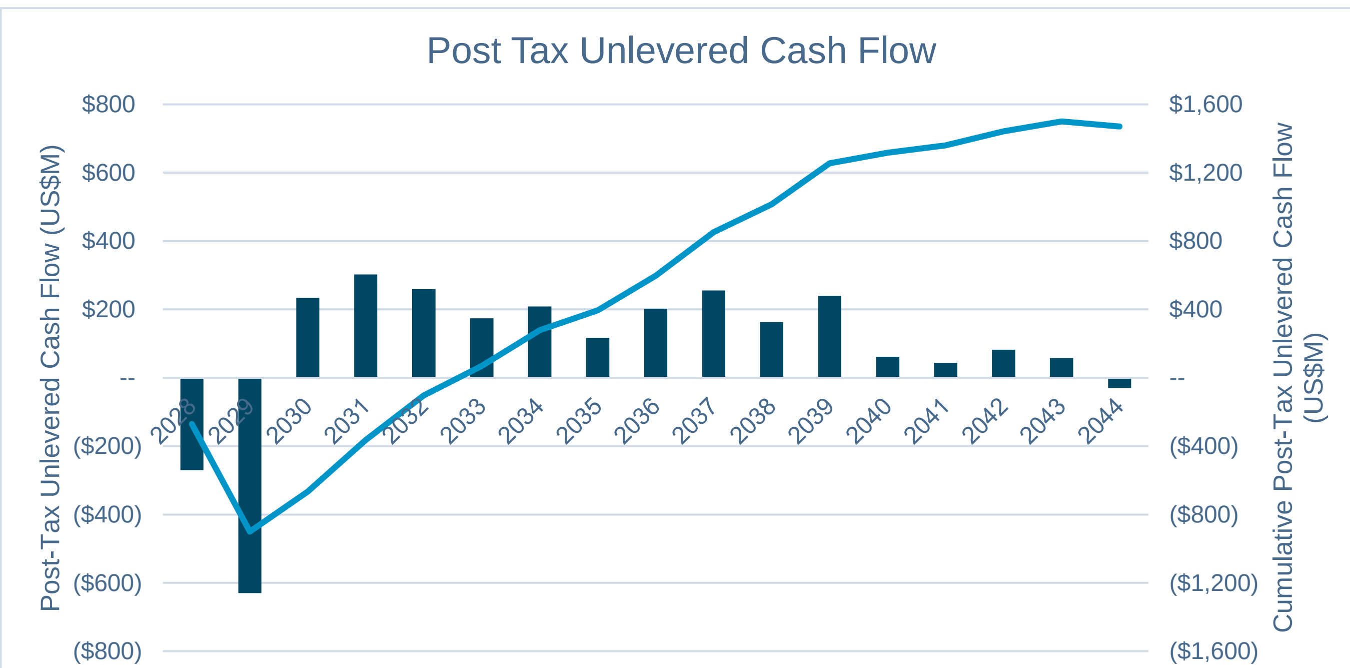
Table 22-1: Economic Analysis Summary Table

General	LOM Total / Avg
Gold Price (US$/oz)	$1,800
Copper Price (US$/lb)	$3.5
Mine Life (years)	13.6
Production	**LOM Total / Avg**
Total Plant Feed Tonnes (kt)	293,165
Plant Feed Head Grade Au (g/t)	0.63
Plant Feed Head Grade Cu (%)	0.05%
Leach Recovery Rate Au (%)	64.2%
Overall Recovery Cu(%)	16.2%
Total Gold Ounces Recovered (koz)	3,820
Total Copper Recovered (klb)	49,994
Total Average Annual Gold Production (koz)	281
Average Year 1 to 10 Annual Gold Production (koz)	332
Total Average Annual Copper Production (klb)	3,675
Operating Costs	**LOM Total / Avg**
Mining Cost (USD$/t Mined)	$1.8
Processing Cost (US$/t Processed)	$6.6
G&A Cost (US$/t Processed)	$0.9
Refining & Transport Cost (US$/oz)	$8.0
Total Operating Costs (US$/t Processed)	$12.4
Cash Costs* (US$/oz Au)	$921
AISC** (US$/oz Au)	$1,002
Capital Costs	**LOM Total / Avg**
Initial Capital (US$M)	$900
Sustaining Capital (US$M)	$276
Closure Costs (US$M)	$30

General	LOM Total / Avg
Financials - Pre-Tax	**LOM Total / Avg**
NPV (5%) (US$M)	$1,254
IRR (%)	25.0%
Payback (years)	3.4
Financials - Post-Tax	**LOM Total Avg**
NPV (5%) (US$M)	$826
IRR (%)	20.5%
Payback (years)	3.6

* Cash costs consist of mining costs, processing costs, mine-level G&A, copper revenue credit, refining charges and royalties over payable gold ounces
** AISC includes cash costs plus sustaining capital and closure cost over payable gold ounces

Figure 22-3: Post-Tax Unlevered Free Cash Flow



Note: Figure prepared by Ausenco, 2022.

Table 22-2: Cashflow Statement on an Annualized Basis

			-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Unit	LOM		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Production Summary																			
Mineral Resource Mined	kt	293,165	--	--	34,024	27,351	30,403	33,894	30,313	28,012	33,570	28,204	25,316	22,077	--	--	--	--	--
Non-Economic Rock Mined	kt	451,314	--	--	38,616	46,583	48,517	47,547	54,659	56,962	46,338	56,771	44,661	10,659	--	--	--	--	--
Resource Sent to Process	kt		--	--	21,581	21,581	21,581	21,581	21,581	21,581	21,581	21,581	21,581	21,581	21,581	21,133	21,581	13,066	--
Head Grade (Au Diluted)	g/t	0.63	--	--	0.80	0.79	0.69	0.69	0.76	0.57	0.79	0.83	0.66	0.77	0.31	0.31	0.38	0.40	--
Gold Contained	koz	5,946	--	--	558	545	480	476	526	398	545	579	455	534	213	208	261	166	--
Gold Recovery	%	64.2%	--	--	65.7%	65.5%	64.6%	64.5%	65.3%	63.2%	65.5%	66.0%	64.2%	65.4%	58.4%	58.4%	60.0%	60.4%	--
Gold Recovered	koz	3,820	--	--	367	357	310	307	344	251	357	382	292	349	124	122	157	100	--
Gold Payable	koz	3,816	--	--	366	357	310	307	343	251	357	382	292	349	124	122	157	100	--
Copper Payable	klb	48,244	--	--	--	3,432	2,522	3,572	4,063	3,502	5,534	5,323	4,133	5,393	2,942	2,881	3,082	1,866	--
Revenue																			
Gold Price	US$/oz	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800
Copper Price	US$/oz	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5
Gross Revenue	US$M	$7,038	--	--	$659	$654	$567	$564	$632	$464	$662	$706	$539	$647	$234	$229	$293	$187	--
Operating Costs																			
Mine Operating Costs	US$M	($1,449)	--	--	($128)	($136)	($141)	($145)	($164)	($146)	($145)	($166)	($150)	($77)	($14)	($14)	($14)	($9)	--
Processing Costs	US$M	($1,938)	--	--	($145)	($142)	($142)	($142)	($142)	($142)	($142)	($142)	($142)	($142)	($142)	($140)	($142)	($86)	--
G&A Costs	US$M	($259)	--	--	($22)	($22)	($22)	($22)	($22)	($22)	($22)	($22)	($22)	($12)	($12)	($12)	($12)	($9)	--
Refining and Royalties																			
Refining	US$M	($30)	--	--	($1.8)	($2.6)	($2.1)	($2.4)	($2.7)	($2.1)	($3.1)	($3.2)	($2.4)	($3.0)	($1.3)	($1.3)	($1.5)	($0.9)	--
Royalties	US$M	($9)	--	--	--	--	--	--	--	--	($2)	($2)	($1)	($2)	($1)	($1)	($1)	($1)	--
Capital Expenditures																			
Initial Capital	US$M	($900)	($270)	($630)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sustaining Capital	US$M	($276)	--	--	($110)	($40)	--	($44)	($8)	--	($39)	($3)	--	($32)	--	--	--	--	--
Closure Cost	US$M	($30)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	($30)
Change in Working Capital																			
Change in Working Capital	US$M	--	--	--	($8)	$1	$5	$1	($2)	$7	($11)	($0)	$8	($14)	$16	($0)	($3)	($0)	--
Pre-Tax Unlevered Free Cash Flow																			
Pre-Tax Unlevered Free Cash Flow	US$M	$2,146	($270)	($630)	$244	$312	$265	$209	$291	$159	$297	$367	$228	$364	$79	$61	$118	$82	($30)
Pre-Tax Cumulative Unlevered Free Cash Flow	US$M		($270)	($900)	($656)	($344)	($79)	$130	$420	$579	$876	$1,243	$1,472	$1,836	$1,915	$1,977	$2,095	$2,176	$2,146
Taxes																			
Unlevered Cash Taxes	US$M	($676)	--	--	($10)	($9)	($5)	($35)	($82)	($42)	($95)	($112)	($66)	($125)	($18)	($18)	($37)	($23)	--
Post-Tax Unlevered Free Cash Flow																			
Post-Tax Unlevered Free Cash Flow	US$M	$1,470	($270)	($630)	$234	$302	$260	$174	$209	$117	$203	$255	$163	$239	$61	$44	$82	$58	($30)
Post-Tax Cumulative Unlevered Free Cash Flow	US$M		($270)	($900)	($666)	($364)	($104)	$70	$279	$395	$598	$853	$1,016	$1,255	$1,317	$1,360	$1,442	$1,500	$1,470

22.5 Sensitivity Analysis

A sensitivity analysis was conducted on the base case pre-tax and after-tax NPV, IRR, and Payback of the Project, using the following variables: metal price, discount rate, leach recovery, initial capital costs, and operating costs. Analysis revealed that the Project is most sensitive to changes in metal price, leach recovery, then, to a lesser extent, to operating costs and initial capital costs.

Table 22-3 and Table 22-4 presents a summary of the Sensitivity Analysis. Figure 22-4 shows the pre-tax sensitivity analysis findings, and Figure 22-5 shows the post-tax results.

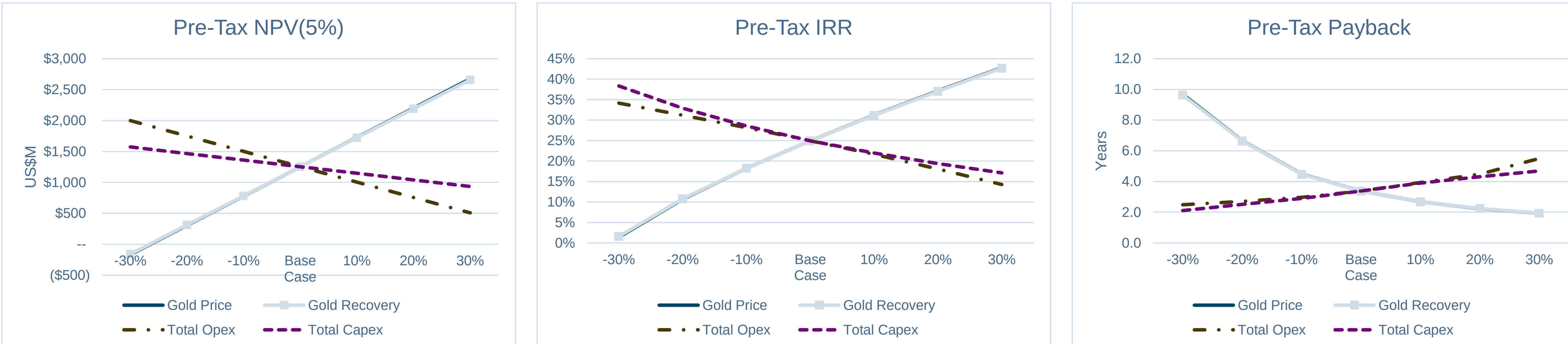
Table 22-3: Sensitivity Analysis Pre-Tax Summary

Gold Price	Base Case		Total Capex		Total Opex	
	NPV(5%)	IRR	-30%	30%	-30%	30%
$1,400	$202	8.8%	$521	($118)	$947	($543)
$1,600	$728	17.4%	$1,047	$408	$1,473	($18)
$1,800	$1,254	25.0%	$1,573	$934	$1,999	$508
$2,000	$1,780	31.9%	$2,099	$1,460	$2,525	$1,034
$2,200	$2,305	38.4%	$2,625	$1,986	$3,051	$1,560

Table 22-4: Sensitivity Analysis Post-Tax Summary

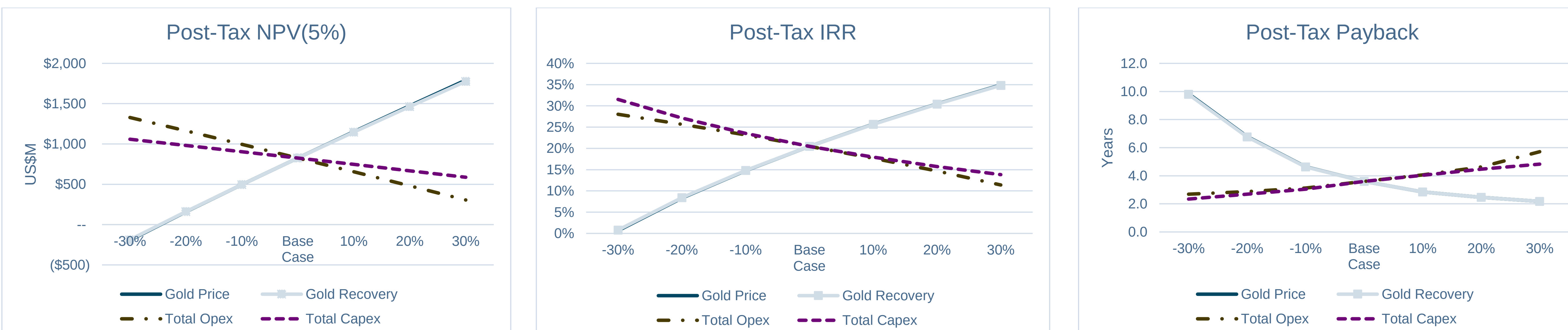
Gold Price	Base Case		Total Capex		Total Opex	
	NPV(5%)	IRR	-30%	30%	-30%	30%
$1,400	$82	6.7%	$330	($175)	$609	($551)
$1,600	$459	14.1%	$697	$213	$972	($81)
$1,800	$826	20.5%	$1,058	$587	$1,328	$305
$2,000	$1,188	26.3%	$1,415	$954	$1,678	$676
$2,200	$1,544	31.5%	$1,767	$1,316	$2,023	$1,041

Figure 22-4: Pre-Tax Sensitivity Analysis



Note: Figure prepared by Ausenco, 2022.

Figure 22-5: Post-Tax Sensitivity Analysis



Note: Figure prepared by Ausenco, 2022

23 ADJACENT PROPERTIES

The property hosting the Volcan Project and the Dorado deposits is surrounded by a number of active mines, development projects and exploration-stage properties. Several companies have published mineral reserves and/or mineral resources for these properties, and project development and exploration activities are on-going in the area. The Maricunga Gold Belt is a prolific porphyry gold district that hosts over 100 million ounces of gold resources. (Hochschild, website). A selection of such properties in the immediate area of the Project is illustrated in Figure 23-1, and brief summaries are provided below.

It is to be noted that the QP was unable to verify the following public information (websites, press releases and annual reports of the companies) and that the information is not necessarily indicative of the mineralization found on Tiernan's Volcan property that is the subject of this Technical Report.

Figure 23-1: Properties Adjacent to the Project (provided by Tiernan)

Figure supplied by Tiernan, 2022.

23.1 Maricunga Mine (Kinross)

The Maricunga open pit mine is located in the Maricunga mining district in central Chile, approximately 120 km east of Copiapo and is situated between 4,200 masl and 4,500 masl. The mine, constructed and commissioned in the early 1990s, achieved its first full year of production in 1996. Despite a suspension of mining operations between 2002 and 2004, it restarted in October, 2005 and continuously produced gold up to August, 2016, when it was closed.

As a result, of the suspension of mining and crushing activities, there was no ore mined and processed in 2018 or 2019. Gold equivalent ounces produced and sold decreased by 36% and 51%, respectively, compared to 2018, as rinsing of the ore placed on the leach pads prior to the suspension of mining activities continued to ramp down.

The mine was an open pit operation with mine production by front-end loaders and conventional off-road haul trucks delivering a nameplate capacity of 40,000 t/d to a heap leach process facility. Mined ore underwent three stages of conventional crushing and screening prior to placement on dedicated leach pads.

23.2 La Coipa Mine (Kinross)

The La Coipa open pit mine and its 15,000 t/d mill began operation in October, 1991. A new crushing system was installed in October, 1999, increasing throughput to 17,000 t/d. Conventional open pit mining methods and equipment were used to mine all ore and waste. Kinross acquired its 100% interest in the La Coipa mine in 2007. And operated it continuously until 2013 when operations were suspended. In March, 2022, Kinross announced that the mine poured its first gold bar after restarting operations following the suspension of activities. The re-start project commenced production from the Phase 7 deposit in Q1 2022, with the plant expected to ramp-up to reach full operating capacity in mid-2022.

La Coipa refurbished the existing process plant, camp and other infrastructure, as well as the mine fleet from Kinross' Maricunga operation, which has been placed on care and maintenance. At year-end 2021, Kinross increased La Coipa's expected LOM production by 45% to approximately 1 Moz AuEq. due to the addition of the Puren pit into the Project and optimization of the Phase 7 mine plan and extended La Coipa's estimated mine life to early 2026 from 2024.

Kinross continues to explore opportunities to extend mine life at La Coipa, including incorporating an additional pushback at Puren and other adjacent pits. Kinross also signed a power purchase agreement to supply La Coipa with 100% renewable power to meet its power needs.

23.3 Lobo-Marte Mine (Kinross)

Kinross acquired the Lobo-Marte Gold Project in northern Chile on January 8, 2009 from Teck Cominco Limited (Teck) and certain subsidiaries of Anglo American PLC. Close to 30,000 ha in size, Lobo-Marte is located in the Maricunga mining district, roughly midway between Kinross' Maricunga and La Coipa mines.

The Lobo-Marte Project contemplates an open pit, heap leach and SART (sulphidization, acidification, recycling and thickening) plant operation, with production commencing after the conclusion of mining at La Coipa.

Kinross announced the results of a feasibility study at Lobo-Marte in November 2021, which included a total LOM production estimate of approximately 4.7 Moz Au during a 16-year mine life. A positive development decision would depend on a range of factors, including permitting and other potential opportunities in the region.

23.4 La Pepa Project (Yamana/Mineros)

The La Pepa Project is comprised of several deposits on concessions which are immediately adjacent to the Volcan Project concessions. Yamana Gold Corporation (Yamana) completed its first resource estimate for the Cavancha area of the Project in 2008. This resource estimate was prepared based on reverse circulation and diamond drilling, with a total of 107 drill holes (92 RC and 15 diamond drill) having been completed. In October, 2018, Yamana announced it had granted Mineros S.A. (Mineros) an option to acquire up to a 51% interest in the La Pepa Project.

In December 2021, Mineros announced that it had, through its subsidiary, acquired shares representing 20% of the issued capital of Minera Cavancha SpA ("Minera Cavancha"), a joint venture entity that holds a 100% interest in the La Pepa Project (the "Share Acquisition"). Concurrently with such acquisition, Mineros and Yamana entered into a shareholder agreement dated December 20, 2021, pertaining to Minera Cavancha and operations at the La Pepa Project.

The Share Acquisition and entry into the La Pepa Shareholder Agreement followed the Company's exercise on June 25, 2021, of its option to acquire a 20% beneficial interest in the La Pepa Project under an option agreement dated December 14, 2018, and effective as of July 2, 2019. Under the La Pepa Option Agreement, the Company has the option to earn an additional 31% interest (for an aggregate 51% interest) in the La Pepa Project subject to incurring certain expenditures and other conditions, and thereafter to acquire Yamana's remaining 49% interest in Minera Cavancha at fair market value.

23.5 Norte Abierto Project (Newmont/Barrick)

Norte Abierto is a company born from the joint venture between Goldcorp Inc. (now Newmont Goldcorp or Newmont) and Barrick Gold (Barrick). Both are equal owners of the Project, which was created from the union of two previous initiatives: the Cerro Casale Project and the Caspiche Project, deposits separated by 12 km.

Norte Abierto has Proven and Probable gold Reserves of 23.2 Moz on a 100% basis and Measured and Indicated resources of an additional 26.6 Moz. In addition, the deposits contain estimated Proven and Probable copper Reserves of 5.8 billion pounds and additional estimated Measured and Indicated copper Resources of 6.7 billion pounds.

Norte Abierto is focusing its work on the development of the different activities that will determine how to make viable the exploitation of the Cerro Casale and Caspiche deposits in a single mining project. To do this, the Project is working on three priority objectives, as follows:

1. Updating of the geological models of Cerro Casale and Caspiche, through drilling campaigns to confirm and increase the geological confidence of these deposits.

2. Engineering studies to determine key aspects such as the supply of energy and water for the Project, as well as an analysis of the mining and metallurgical model. These results will be the basis of the pre-feasibility study for the future unified project.

3. Development of the sustainability strategy, including the management of Environmental Permits, the beginning of studies for the environmental and social baseline and early approaches with the community, social stakeholders and regulatory authorities.

23.6 Salares Norte (GoldFields)

Salares Norte is a gold and silver greenfield project located in the Atacama Region, between 3,900 and 4,700 masl; 180 km northeast of the city of Diego de Almagro and 330 km from the regional capital, Copiapo. In operation, during the first half of 2023, 2 Mt/y of ore will be processed for an average production of 2.8 Moz/y of metal doré (gold - silver), which translates into 350,000 equivalent ounces per year of gold.

This is a strategic project for Gold Fields, since Salares Norte serves as a base to consolidate the Company's presence in South America. Salares Norte is a project at the forefront of innovation, technology and care for the environment. Its operational philosophy is based on integrated processes and a remote monitoring unit to provide real-time support.

Likewise, a filtered tailings plant has been implemented, which improves the geochemical and geotechnical stability of the Project, by integrating the waste and tailings facilities. In this way, the maximum level of water recirculation is ensured, which allows a high efficiency in the use of water, which on average will only be 30 liters per second. Additionally, the mine will have one of the highest solar energy generation plants in the world, which will allow a significant percentage of its power requirements to be provided with clean energy.

24 OTHER RELEVANT INFORMATION

This section is not relevant to this report.

25 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this Report.

25.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Project's four mining concessions totalling 17,472 ha host all of the Mineral Resources estimated in this report. The property is large enough to accommodate the infrastructure necessary to host the proposed future mining operations.

Andina Chile owns water extraction rights from two wells located approximately 21km from the Mineral Resource area. Extraction rights with a permitted maximum pumping rate of 170 L/s exceed the water requirements for the proposed mining operations. Tiernan will be required to file an Environmental Impact Assessment (EIA) as the Volcan Project proceeds, and it is anticipated that the EIA and future studies will include some future commitment by the Company to take desalinated water for use in the processing facilities when and if it becomes available in the region.

The royalty agreement between Andina Chile and a consortium of local individuals that applies over the Mineral Resource area has minimal economic impact on the Project as there are no royalties payable on the first two million ounces of gold production and only US$5/oz on each ounce of gold produced after the first two million ounces and up to the four millionth ounce.

The QP is not aware of any significant factors or risks that may affect access, title or right or ability to perform work on the Volcan property by Tiernan.

25.3 Geology and Mineralization

The Maricunga gold belt is a prolific mineral belt in Chile which hosts a number of gold mines. Generally, the style of hydrothermal mineralization found in the Refugio district of the Maricunga belt is well recognized and Andina Chile has based its exploration strategies on this style of mineralization. As with all mineral deposits, there is variation within deposits themselves no matter how well known the deposit or mineralization styles are, and Andina Chile has been taking this into account during its exploration campaigns. Further geological and mineralogical work is warranted as this refines the knowledge of a particular deposit better and can possibly lead to further discoveries of economic mineralization at the Project or optimize the existing economic mineralization.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

The Mineral Resource area was well drilled by Andina Chile from 2004 to 2011 with seven phases of exploration drilling focusing on the sector that contains the Mineral Resources estimated in this report. Outside the Mineral Resource area, limited exploration work has been conducted apart from multiple drilling campaigns on the ODAE target, located approximately 6km north of the Mineral Resource area. Since 2011, neither Hochschild after it acquired Andina Chile, nor Tiernan have conducted exploration at Volcan.

Based upon a review of the exploration conducted by Andina Chile in 2011, the QP is of the opinion that the work that has been performed at the Project has been properly executed and follows best practices guidelines as outlined by the CIM.

25.5 Metallurgical Testwork

Metallurgical testwork on Volcan has been extensively carried out by a number of groups over many years. From 2006 to 2010, Andina carried out multiple phases of metallurgical testwork to optimize the potential of Volcan. This early phase of work culminated in the last published NI 43-101 Technical Report entitled, "Technical Report on the Results of the Pre-Feasibility Study on the Dorado Deposits, Volcan Gold Project, Region III, Chile," dated January 31, 2011 (the "PFS") and published on SEDAR by Andina Minerals Inc. Following the PFS, Andina carried out a further phase of testwork in 2010, 2011 and 2012 to support a potential feasibility study for the Project.

Although there has been a significant amount of metallurgical testwork carried out on Dorado Oeste samples and composite samples, there is limited testwork that accurately reflects the proposed metallurgical flowsheet. The recovery estimates for the proposed flowsheet are suitable for use in a Preliminary Economic Assessment, but more testwork is required for further engineering studies, such as a pre-feasibility study.

25.6 Mineral Resources Estimates

Micon's QP has considered the mineral resource estimates in light of known environmental, permitting, legal, title, taxation, socio-economic, marketing, political and other relevant issues and has no reason to believe at this time that the mineral resources will be materially affected by these items.

25.7 Mine Plan

Mineralized materials at the Project are amenable to open pit mining methods and an open pit optimization exercise using the Measured, Indicated and Inferred Mineral Resources was carried out. The engineered pit designs were reported using cut-off grades estimated by rock type, based on a gold price, including an allowance for refining costs, of US$ 1,587/oz. At Volcan, the mineralized material is near surface and continues at depth.

The estimated open pit mine life is 14 years, providing feed to the crushing circuit at an average rate of 60,000 t/d. Mineralized material is produced from the pit from 10 years of active mining with low-grade material set aside for processing for the last 4 years of mine life.

25.8 Recovery Plan

Gold contained in the mineralized material is amenable to recovery by conventional methods utilizing crushing, agglomeration, heap leaching and gold recovery by CIC and elution. The process plant has been designed in accordance with established good engineering practices for traditional heap leach plants.

25.9 Infrastructure

Infrastructure to support the Volcan Project during the LOM will consist of mine area, process plant area & complementary infrastructure.

The mine area infrastructure includes open pits, a low-grade mineralized material stockpile, Non-Economic Rock Storage Facilities (NERSFs), ROM pad, haul roads, diesel fuel storage & dispensing facilities, explosives magazine & emulsion storage, buildings for equipment maintenance and warehousing, administration office buildings and an electrical substation.

The process plant infrastructure includes a primary crusher, overland conveyor belt, coarse material stockpile, secondary crusher facility, tertiary crusher facility, agglomerator, heap Leach facility, Sulphidization, Acidification, Recycling and Thickening (SART) plant, Adsorption, Desorption, and Recovery (ADR) plant, refinery, reagents warehouse, cyanide handling facilities, Laboratory, Administration office building & gatehouse.

The heap Leach facility (HLF) provides suitable capacity to store and leach the 293 Mt of mineralized material identified through this study. The HLF will be designed to international and national standards used for the design of this facility, as described in Section 18. The ultimate HLF configuration meets the minimum factors of safety with respect to geotechnical stability. The HLF will be designed to withstand a reasonably foreseeable earthquake.

The complementary infrastructure includes an accommodation camp, fresh water supply system, potable water system, sewage treatment system, access roads, interior roads, surface water management & solid waste disposal landfill.

25.10 Environmental, Permitting and Social Considerations

The Volcan Project currently does not hold an Environmental Licence (RCA) or other environmental or sectorial permits. An Environmental Impact Study (EIA) was previously prepared and submitted to regulatory authorities in 2012 but was subsequently withdrawn from the system by the owner to allow for project and corporate modifications. A new EIA will need to be prepared and presented to regulatory authorities to apply for the required RCA. The new EIA will draw on some of the EIA work previously completed, but additional scope will need to comprehensively cover the project area and provide updated baseline studies for environmental components, as well as a comprehensive impact assessment, mitigation, reparation and compensation measures.

It is the QP’s understanding that these further permitting and environmental studies will be required, in conjunction with further economic studies, to demonstrate that the Project is viable.

At this time, key considerations include the following:

- Proximity to protected areas, including a National Park and a Ramsar site, among others, which could be affected by the Project activities. The sensitive ecosystems that are present in these areas will require effective mitigation, reparation and/or compensation measures and monitoring during all phases of the Project.
- Proximity to glaciers is relevant due to the hyper-arid conditions of the area and potential impacts to the existing water balance for the area.
- Visual effects on the landscape could also be of relevance, considering the proximity of the proposed site infrastructure to one of the lookouts with the National Park area. Special consideration should be given to this aspect during the design and closure phases of the Project.
- Water quality and downstream potential impacts to sensitive habitat can be mitigated by the design and construction of effective water management infrastructure, practices, and contingency plans. This requirement of the Project should be emphasized during the next phase of project design.
- The hyper-arid conditions and the dependence of downstream ecosystem health on continental groundwater will need to be carefully considered as the Project progresses. Other water sources, such as desalinated water from the coast will be considered in future to supplement water requirements.

- Human population is sparse but there is one non-Indigenous and seven Indigenous communities present in the Project area of influence. Indigenous populations move between lower urban areas and higher rural areas, where they use natural resources and transhumance practices are common. Considering this, an Indigenous Consultation Process may be required by the environmental authority, as part of the environmental approval of the EIA.

25.11 Markets and Contracts

The main product planned from the Volcan Project is gold and economically insignificant amounts of silver contained in doré bars. A small quantity of copper precipitate as generated from the SART process will also be produced. Gold and silver are readily traded commodities and, for the purposes of this Technical Report, it is appropriate to assume that the products can be sold freely and at standard market rates.

25.12 Capital and Operating Cost Estimates

The capital and operating cost estimates presented in this PEA provide substantiated costs that can be used to assess the preliminary economics of the Volcan Project. The estimates are based on two open pit mining operations, construction of a process plant, and infrastructure, as well as owner's costs and provisions. Estimate accuracy is reflective of the stage of project development and classified as an AACE International Class 5 Order of Magnitude/Conceptual Study estimate with a -30% to +50% accuracy

25.13 Economic Analysis

The Volcan Project PEA has provided a design with technical viability and positive economics on which to further advance the project.

The preliminary economic assessment is preliminary in nature, that it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the preliminary economic assessment will be realized.

25.14 Risks and Opportunities

25.14.1 Risks

25.14.1.1 Mineral Resources

There are some risks and uncertainties centered around the sheer size of the Project and the number of mineralized zones and the current geological understanding of these zones in an area with poor outcrop exposure and a reliance on significant amounts of drilling and interpretation of the structures controlling the mineralization. Other than the normal risks associated with exploration projects at this stage of exploration, the QPs have identified a few specific risks and areas of uncertainty based upon the level of work to date. These include the following:

- The complex mineralization domain interpretations that may change with additional drilling.
- Uncertainty in the mineralization models and continuity of mineralization associated with the drill spacing and inferred mineral resources.

- Uncertainty in the recovery model that will need to be updated with modern metallurgical characterization of all the mineralization types and styles within deposit areas.

25.14.1.2 Mining

The mine plan is partly based on inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA based on these mineral resources will be realized. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

Risks to the mine plan include changes to the following factors and assumptions:

- metal prices
- interpretations of mineralization geometry and continuity in mineralized zones
- geotechnical and hydrogeological assumptions
- ability of the mining operation to meet the annual production rate and anticipated grade
- operating cost assumptions
- dilution, mine operation and process plant recoveries
- operating time, climatic factors may adversely affect achieved operating time in a given year

25.14.1.3 Metallurgy and Recovery Methods

Although there has been a significant amount of metallurgical testwork carried out on Dorado Oeste samples and composite samples, there is limited testwork that accurately reflects the proposed metallurgical flowsheet. There is a risk that achieved metallurgical and process parameters differ from estimated values such as:

- gold extraction
- reagent dosage and consumption
- leaching time
- allowable maximum leach heap height

25.14.1.4 Market Studies and Contracts

Commodity prices can be volatile, and there is the potential for deviation from the forecast.

25.14.1.5 Environmental Studies, Permitting and Social or Community Impact

A previous environmental impact assessment was submitted then subsequently withdrawn prior to completing the review process. The environmental baseline information prepared to support that previous submission requires updating due to elapsed time and due to changes in regulatory requirements and will require additional baseline data collection prior to preparation of a new EIA. There is a risk that baseline collection may identify additional issues that require addressing in the design or require mitigation measures that may have unforeseen costs. There is a risk that an environmental Impact

Assessment, once prepared and submitted, is rejected or is approved with additional measures that are not currently foreseen.

Issues that are currently identified as specific elevated risks include:

- Proximity of the project infrastructure to the NevadoTres Cruces National Park.
    - Visual impact of the non-economic rock storage facilities and low grade stockpile have been identified as significant and recommendations have been included to investigate alternatives which would minimize these impacts.
    - Natural drainage from the project installations flows towards the Laguna Negro Francisco which is one of the principal elements of protection of the Nevado Tres Cruces National Park.
- Potential impact of water extraction for water supply to the project.
    - Possible depression of the phreatic water level in the vicinity of the extraction wells may potentially affect azonal flora within the Cienaga Redonda sector of the Pantanillo-Cienaga Redonda biological corridor, which is part of the Ramsar site.
    - There may be regulatory expectations in the future to minimize the use of water rights for continental water or groundwater and to review and assess options for other water sources.

25.14.2 Opportunities

25.14.2.1 Mineral Resources

- Hochschild has conducted a number of further studies related to the Project since completing its acquisition of Andina Chile in February, 2013. As a result of this work, a new preliminary model for the Volcan deposit has been both Hochschild and Tiernan believe further work is necessary before this geological and mineralogical model can be used as the basis for further exploration and economic studies. Recommended relogging of the core in order to establish better correlation between veinlet density and gold grades there is a possibility of improving the discrimination between economic and non-economic mineralized material which may lead to improved plant feed gold grades at lower tonnages without significant loss of contained and/or recoverable gold.
- Potential for Increases in Project Resources
    - The Ojo de Agua Este (ODAE) is a known prospect located 6.5 km northeast of the Dorado deposit. Geological mapping, trenching, a ground magnetic survey and drilling, together with corresponding surface, chip-channel, drill chip and core sampling, have been carried out in the exploration program. There is potential for additional economic resource to be defined from ODAE which could be considered as plant feed for the project in the future.
    - Other known mineralized areas within the property limits include the Andrea and Florencia Prospects. These prospects have had minimal exploration activity to date and may provide potential for further increase in project resource in the future.
    - There may be potential for identifying further mineralized prospects within the Property boundaries in the future.
    - There may be potential to negotiate additional plant feed sources from adjacent properties with identified mineralization.

25.14.2.2 Metallurgy

Recommended additional metallurgical testing is oriented to confirming metallurgical and process parameters for the selected flowsheet. Improved understanding of the relationship between HPGR roll pressure, fines production and gold recovery may lead to possible increases in gold recovery. Testwork on lower grade mineralized material at coarser crush sizes may lead to higher present value alternative scenarios of concurrent leaching of low grade concurrent with higher grade fine crushed material.

25.14.2.3 Environmental

Some commercial water supply ventures are proposed which could potentially transfer desalinated water to the Project area via pipeline. If available, this alternative to the underground water supply currently considered for the Project may improve the likelihood of obtaining a favorable outcome of the EIA review process or may be an imposed condition of environmental approval of the Project, possibly at some point during the operational.

25.15 Summary of Conclusions

Based on the assumptions and parameters presented in this report, the PEA shows positive economics (i.e., US$826 M post-tax NPV (5%) and 20.5% post-tax IRR). The PEA supports a decision to carry out additional studies as outlined in the recommendations.

26 RECOMMENDATIONS

26.1 Resource Estimate

The current resource estimate update used the original 2010 verified database described above. Only the economic parameters were changed when conducting the 2022 updated mineral resource estimates.

Hochschild and Tiernan have been working on a new more detailed geo-metallurgical model for the Volcan Project. However, further work and reviews have to be completed on this model before it can form the basis of any future work at the Project.

In particular, the work conducted of visual re-logging of the drill core did not provide adequate data on the location/constraints of gold bearing mineralization in sufficient detail to support development of a model. Advanced non-visual logging techniques such as spectral mineralogy should be considered including XRF, TiMax, portable spectrometer and/or polar charge analysis. Techniques should be developed on key drill holes in the core of the high-grade mineralization and tested for extrapolation into other areas of the deposit.

Upon development of an updated geological model, confirmation drilling may be required to test certain areas of the model. The extent to which drilling is required will not be known until the model is fully developed.

26.2 Mining

Engineering work related to open pit slope design for a Pre-feasibility Study should be focused on improving the confidence level of the design criteria, designing interim pit slopes, and developing an optimized final pit design. Additional review of work completed by Schlumberger Water Services in 2012 should be undertaken to determine the scope of any site specific geotechnical requirements.

Modeling of surface and groundwater flows that will report to the open pits is recommended for future studies. These flows should be predicted throughout the proposed life of the pit. A pit dewatering and depressurization plan (if required) should be developed and incorporated into the overall water management plan. The infrastructure and power requirements associated with this plan will need to be estimated.

A geohazard assessment of major infrastructure, including the open pits, plant site, camp and access and/or powerline routes, is recommended. This should include an assessment of avalanche potential within the project area and including the open pits. Large accumulations of drifting snow have been observed in the project area.

26.3 Metallurgical Testing and Flowsheet Development

Although there has been a significant amount of metallurgical test work carried out on Dorado Oeste samples and composite samples, there is limited test work that accurately reflects the proposed metallurgical flowsheet. The above recovery estimates for the proposed flowsheet are suitable for use in a Preliminary Economic Assessment, but more test work is required for further engineering studies, such as a Pre-feasibility Study.

Future test work should continue to evaluate and confirm:

- Recovery from a range of samples that cover the expected spatial distribution and grade range of the deposit. In particular, no high-grade samples have been tested after an HPGR grind at 3.2 N/mm^2.
- Testing and optimization of different HPGR crush pressures should continue. An understanding of the particle size distribution generated at different pressures and the impact this has on agglomeration reagent demand and cyanide consumption is needed to understand the costs and benefits of each scenario. An increase in fines content in the agglomerates placed onto the heap could also impact ultimate lift heights and other aspects of the design.
- A trade-off study of an alternative process flow sheet which includes air swept fines removal from the HPGR product for separate treatment via CIL, and coarse product heap leaching without agglomeration recommended to proceed with the current configuration of HPGR without fines removal followed by agglomeration. It is recommended that testing be done where the column leach and the fines tank leach are linked to ensure any economic benefits of the fines leach (with and without additional regrind) are well understood to confirm current trade-odd study result.
- Testing of leach recovery from low grade material at coarser crush sizes (e.g. primary crushed) is recommended to determine if value would be added to the Project by leaching the low material at coarse crush, concurrent with mining in place of the PEA basis which is to stockpile low grade material during the mine life then rehandle in the final Project years via the same processing route (I.e. fine crushing) as the higher grade material.
- The use of SART to reduce cyanide demand needs to be tested on samples being leached after different pre-treatments. Early work did not show any benefit to gold recovery, but copper recovery in the heap was increased when SART was included in the flowsheet. It was not clear form this work if any tangible reduction in cyanide demand was achieved with SART.
- Gold losses in SART need to be assessed.
- Bottle roll testing on all samples using a consistent procedure needs to be done and a recovery relationship established between these simple tests and the column tests. This proxy test will allow more data from smaller geometallurgical samples to be incorporated effectively into the block model. In these tests, milling to generate the correct fines load could be important.

26.4 Environmental and Social Considerations

The environmental monitoring plan proposed in the previous EIA (GHD, 2012) was developed based on baseline studies and information collected from 2009 to 2011 and needs to be assessed for adequacy in consideration of future EIA scoping efforts and current guidance for baseline studies provided by the Chilean environmental authority. Additional or continuation of existing environmental and social baseline studies will be required as part of the new EIA to be presented for approval, which should also support feasibility level designs and corresponding mitigation and management measures. Key recommendations include the following:

- A qualified professional experienced in mining EIAs (in Chile) should be retained to review currently available baseline data for adequacy and provide recommendations for additional data collection and studies to support the development of the new EIA. The key environmental components of the Project area to be assessed include those described in Section 20.1.1 of this report and any others that are identified from current guidance provided by the Chilean authorities and from other applicable international standards.

- As part of the above task, critical path baseline studies (those that require longer lead times) should be identified and expedited to minimize the potential for permitting delays. In particular, baseline studies that require multiple years of seasonal data such as hydrology, hydrogeology, surface and groundwater quality, and seasonal flora and fauna surveys should be fast tracked to minimize the potential for delays.
- A qualified water resources professional should be retained to conduct a review of existing surface water and hydrogeological monitoring and testing data within the Project area in the vicinity of the open pits and Project infrastructure. Based on this review, a conceptual model of surface, shallow and deep groundwater flow within the Project site and its interaction with downstream aquatic receivers should be developed.
- Assuming that the current plan to utilize the existing permitted water extraction wells to support mining operations remains in effect, a qualified hydrogeologist should review the existing conceptual hydrogeological model with emphasis on predicted interactions between extraction wells and local aquifers that discharge to downgradient areas including lagoons and wetlands. A study plan should be developed that includes additional hydrogeological monitoring and testing if needed to support the development of a numerical three-dimensional groundwater model to identify sustaining yields that will result in acceptable impacts to downstream receivers.
- A qualified professional geochemist should review existing geological and geochemistry data to develop a study plan that will assess risks of mine contact water to downstream surface and groundwater receivers and assess the requirement for ARD mitigation and water treatment. Consideration should be given to collect additional mine rock samples from historical drill core or from future resource or geotechnical drilling that is planned.
- A qualified person in the area of Indigenous knowledge and community relations should be retained to develop a Community Relations Plan and Strategy targeted at Indigenous and non-Indigenous communities potentially impacted by the Project. The plan should include methods and schedules for Indigenous/non-Indigenous communication, meetings, stakeholder information delivery, Project participation methods and record keeping. The plan should be implemented by the Company on a timely basis. The results of this initiative will help to inform the company early in the permitting process about key community and stakeholder concerns and facilitate the development of potential actions to address those concerns (e.g., environmental monitoring and mitigation, environmental compensation measures, employment, and contracting opportunities).

26.5 Further Studies

The Volcan Project PEA has provided a design with technical viability and positive economics on which to further advance the project. The next phases of the Project are to complete optimization studies and to proceed to a Pre-feasibility Study (PFS), as follows:

26.5.1 Phase 1 – optimization studies

Optimization studies should evaluate additional aspect of the Project which require or would benefit from further investigations to substantiate the design and options considered for the Project prior to the start of a PFS.

- Geological modelling, including:
  - determining methodology and techniques to identify and map areas of high-grade mineralization/veinlets in the existing drill cores;
  - developing geological models and incorporating geological controls into the mineral resource estimate;
  - developing a drilling program to test and validate the updated geological model, and

- developing a drilling program to test and validate metallurgical recovery assumptions with respect to the geological model (geometallurgical test work).

- Validation and confirmation drilling on existing resource area. Although the drilling completed by Andina in previous drill programs was extensive, confirmation of select drill holes by twinning is recommended to validate the past work.
- Additional metallurgical test work to substantiate the preferred process route and further validate the recovery assumptions and correlations based in the PEA. In particular, further evaluation of the potential to separate fines and tank leach the fine component to improve recovery should be considered following metallurgical testing.
- Siting studies to consider alternative sites for project infrastructure including the heap leach pad and the non-economic rock storage facilities.
- Development of an updated mineral resource estimate and design basis (process flowsheet and metallurgical recovery assumptions) based on the optimization studies for use as the basis for the PFS.
- Initiation of environmental baseline studies and social programs.

26.5.2 Phase 2 – Pre-feasibility Study (PFS)

It is not essential that the optimization studies be complete before initiating a PFS; however, key components of the optimization studies will be beneficial to the PFS and serve to focus the PFS engineering. A PFS would consist of:

- Field investigations and laboratory programs including geotechnical and hydrology studies to support final selection and design of the project infrastructure.
- Pit geotechnical field work and data analysis.
- Completion of a logistics study to further support road upgrades required for both construction and operation of the Project.
- Completion of a site investigation and power supply study to support the design and routing of the project power supply.
- Hydrological study and water balance to support the use of water from Wells 3 and 4 for project water supply as well as further investigation of the commercial availability of desalinated water in the project area.
- Continuation of environmental baseline studies and social programs.

The estimated cost for completing this work is summarized in Table 26-1.

Table 26-1: Volcan Work Program Cost Estimate

Program Component	Cost Estimate ($M)
Phase 1:	
Geological Modelling	1.0
Confirmation Drilling and Met Sample Collection	6.5
Metallurgical Test Work and Supervision	1.5
Environmental Baseline Studies and Social Programs	0.4
Subtotal Phase 1	**9.4**
Phase 2:	
Geotechnical and Hydrology	2.0
Environmental Baseline Studies and Social Programs	0.4
Engineering and PFS	1.7
Subtotal Phase 2	**4.1**
Total Cost	**13.5**

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